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Educational Research Conference 2006 & Cultural Inclusivity through Publishing Special Issue



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Kevin Marjoribanks: A life in education in context¹

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The passing of Emeritus Professor Kevin Majoribanks on the 29 April 2006 occurred at a time of continuing high level scholarly productivity. The present paper celebrates some of the accomplishments from his long career. It takes a developmental orientation, beginning with the early stages of his career in education and his choice of inequalities in educational outcomes as the core long-term focus for his scholarly endeavours. His emphasis was on family and school environments as the origin of inequalities in educational outcomes. His empirical work drew on both the conduct of large-scale longitudinal studies and on the analysis of secondary data. His scholarly achievements are reflected in the formulation of a series of increasingly comprehensive causal models linking environments to educational achievement and occupational attainment. His approach to research and theory construction offers a model for future scholars in educational research. Foremost, his achievements provide a foundation on which those future scholars can build.

Kevin Marjoribanks, educational outcomes, inequalities, causal models, environments

Emeritus Professor Kevin Marjoribanks (1938-2006) was a pre-eminent scholar in the international education community over several decades. His passing on 29th April 2006 occurred at a time of high level productivity and continuing contributions to the empirical and theoretical literature. The present article describes and comments on some of Marjoribanks' main empirical and theoretical contributions, including their origins and development over the nearly four decades of his academic endeavours that included more than 200 scholarly publications. It is intended as a celebration of his accomplishments and as an account of the strategies and processes associated with the development of a career at the highest level in educational scholarship and higher education. It begins with an outline of the central issue or passion that directed his scholarly pursuits over the course of his academic life.

INEQUALITIES IN EDUCATIONAL OUTCOMES

Marjoribanks' 1970 PhD thesis is the best place to begin in order to identify his central issue or passion. In fact, the focal point of that thesis provided the core direction for the rest of his scholarly endeavours. The topic of the thesis was "Ethnic and environmental influences on levels and profiles of mental abilities". Its first sentence was: "A variety of educational programs have been developed with the intention of ameliorating ethnic group inequalities in educational achievement." (1970, p.2). This is the first pointer to his career focus on inequalities in educational outcomes. The consistency of this overarching focus on inequalities in educational outcomes can be seen from any cursory glance at his subsequent list of publications. However, the consistency is well illustrated by the first sentence of what can be described as a late effort to integrate his empirical and theoretical contributions, namely his most recent book, *Family and school capital: Towards a context theory of students' school outcomes* (2002). The first sentence

¹ Based on Keynote address to The Annual Education Research Conference, Institute of International Education, Flinders University, November 2006.

of that book was “One of the persistent challenges confronting societies is how to reduce inequalities in the educational and occupational attainment of students from different socioeconomic, ethnic and race group backgrounds.” (p. 1).

The selection of these two first sentences from publications at each end of his career exemplifies the consistency of his driving theme, namely inequalities in educational outcomes. His PhD and some of his early publications used ability or intelligence as a measure of so-called educational outcomes (Marjoribanks, 1970, 1972a,b,c, 1974a,b). In this early research he operationalised intelligence or mental abilities by scores on the SRA Primary Mental Abilities test. The selection of mental abilities or intelligence was consistent with a theoretical model that included mental abilities as a mediator of educational achievement. It was this model that guided Marjoribanks’ early research (see for example, Figure 1, 1972c; summarised here as Figure 1). His research throughout the 1980s, 1990s and recently utilised other indicators of educational outcomes. These included: school academic results, levels of education achieved (including post-compulsory and post-school education), whether or not students completed school, and career outcomes.

The inequalities that motivated Marjoribanks’ pursuits were associated with differences in educational outcomes according to race, ethnic, and social status groups. His PhD research was conducted with five Canadian ethnic groups. Subsequently he analysed data associated with ethnic, race or social groups from the United Kingdom, Australia, South Africa and Hong Kong. In all of this research an international orientation is apparent. The international elements of his work arose partly from the countries in which he undertook research or data analysis, but also in terms of the race or ethnic groups for which he examined educational outcomes. His Australian research, for instance, included groups from Europe, Asia and the Middle East.

With inequalities in educational outcomes as the core of Marjoribanks’ life work, it is helpful to examine that core in the context of the educational, sociological, psychological, and political environment of the 1960s and early 1970s. This context may point to some influences on his choice to pursue inequalities in educational outcomes, as well as his chosen research methods and data analysis strategies. Marjoribanks’ undergraduate degrees and early teaching experience can also afford clues to the area that became his life’s work.

EARLY CONTEXT: FROM TEACHING TO PHD STUDY

Marjoribanks obtained a BSc in mathematics from the University of New South Wales in 1958 and completed his teaching qualification with a Diploma of Education, also from the same University, in 1958. The BSc clearly furnished the foundation for his later capacities and achievements in complex and innovative data analysis techniques. His exposure to teacher education and then his initial teaching experience in NSW came at a time of considerable debate about the future and purpose of secondary education generated by the Wyndham Report in 1957. Following his first teaching appointment at Maclean High School, a small NSW country school, in the early 1960s Marjoribanks took a teaching position at a leading independent school for boys in Adelaide (St Peter’s College). In the 1960s the contrast in the backgrounds and life chances of students from St Peter’s College versus the small country town in New South Wales where Marjoribanks began his teaching would have been apparent. The St Peter’s appointment probably exposed him to new dimensions of issues about the purpose and role of education in the lives of young people, socially and economically. It probably also placed him in a context where the school saw itself as taking a leadership role with respect to issues associated with educational outcomes and future trends in curriculum and teaching.

During these beginning years of teaching, Marjoribanks undertook a second undergraduate degree by distance study from the University of New England. It was in Economics. One can only speculate about the contribution of this study of economics to his coming focus on the role of education in students’ achievement and life outcomes. At that time, as now, there was

considerable debate about the importance and function of education in supporting economic growth. This attention to education and economic development could have provided a further impetus in the 1960s for Marjoribanks' attention to the links between education and individual, social, and economic outcomes.

We can conjecture, therefore, about a possible confluence between Marjoribanks' teaching experiences, educational issues and debates at the time, and his studies in education and economics that prompted ambitions towards higher study in the field of education, and research as a career. His strategy in making the first steps towards that career was critical for his subsequent achievements and contributions. Marjoribanks chose to leave Australia at a time when choice of North American universities was not a common path for Australian higher degree studies. The choice of Harvard for his MA. and then the Ontario Institute for Studies in Education at the University of Toronto revealed an early orientation towards major international scholars, the "big picture", and the mastery of theory and research at the forefront of educational issues.

EARLY CONTEXT: INFLUENTIAL PUBLICATIONS AND TRENDS

Marjoribanks' graduate study occurred in a decade that saw a number of seminal publications about inequalities in education. It was also a time of intense public and political debate. The formative influence of these publications and the *zeitgeist* of the time can only be speculated about. But, we can identify some of the research and analyses that Marjoribanks cited in his PhD, many of which he subsequently (1979a,b) acknowledged as being critical in shaping his ideas. They included Bernstein's (1961) analysis of social class and linguistic development, and Hess and Shipman's (1965) research on mothers' teaching styles and their child's learning styles, aimed at better understanding family sources of deprivation. There was also Coleman et al.'s (1966) book on equality of educational opportunity in the United States. In the United Kingdom there was the Plowden report on children and their primary schools in 1967, and Fraser's (1959) book on the home environment and the school.

One of the most important and influential analyses at the time was Bloom's (1964) book on *Stability and Change in Human Characteristics*. There was a direct path between Bloom and what Marjoribanks later (1979a) described as the "Chicago school" and his own research and developing theoretical ideas. Marjoribank's PhD supervisor (Weiss) had been a student of Bloom's. Along with Weiss' (1969) PhD, Marjoribanks also cited two other theses from Chicago as highly influential on his own work. These were by Dave (1963) and by Wolf (1964). All three theses were about the measure of process variables in the family environment. Marjoribanks (1979a) also acknowledged Murray (1938), through Bloom and his students, as the origin of his analysis of the environment in terms of alpha press and beta press.

The 1960s was a time of considerable debate about education and inequality. We should remember, for example, that Head Start in the United States began in 1964. Head Start was based on the extant knowledge about compensatory education and analyses of educational outcomes and cultural deprivation (e.g., Bloom, Davis, & Hess, 1965). The Plowden report in the United Kingdom was a response to public and political concerns about the role of education and inequalities. It was a time in the UK when there was an increasing emphasis on comprehensive schools and movement away from the tripartite system of separate schools and tracks for different students.

The increasing public, political and scholarly attention to inequalities in educational and career outcomes in the 1960s clearly prompted awareness among scholars and policy makers of the need for research; to provide analyses of inequalities as well as to underpin intervention strategies to reduce those inequalities. The intervention emphasis is apparent in Marjoribanks' thinking. As cited above, the first sentence of his PhD is about inequalities in educational outcomes, but is also about programs designed to ameliorate these inequalities. It appears that a significant impetus

behind his research on inequalities was the potential to use this knowledge as the basis for change. The intervention orientation and his background in sociology were also possible factors in his overriding emphasis on environmental analyses of educational inequalities rather than suggested genetic differences in intelligence (e.g., Jensen, 1969).

Marjoribanks (1970), along with Bloom (1964) and his students, recognised that an important impediment to the understanding of inequalities was that analyses were mainly restricted to general marker variables such as race, ethnic group or social group. The new emphasis (that included the work of Marjoribanks) identified the need to get beneath general categories such as these to understand better possible process or other factors that are the proximal causes of differences in educational outcomes. Thinking of this kind led to developments in three ways, to which Marjoribanks made seminal contributions from his PhD onwards. The first was the need to develop methods and measures of environmental process variables. The second was to incorporate the large number of factors associated with educational outcomes into causal models that yielded hypotheses about how the factors interacted together in influencing educational outcomes. The third was that data analysis strategies needed to be developed in order to examine the environments and test the causal models, together with techniques to present and explain the findings.

The next three sections of the present article take up these three areas of development and focus on Marjoribanks' contributions through (a) the definition and measurement of environmental process variables, (b) the development of causal models to explain the impacts of race, ethnic and social groups backgrounds on educational outcomes, and (c) the innovative data analysis and data presentation strategies that he advanced and employed. In doing this, advances in his work are traced over the course of his scholarly career.

DEFINITION AND MEASUREMENT OF ENVIRONMENTAL PROCESS VARIABLES

Marjoribanks undertook his PhD research and early writing and publication at a time of growing emphasis on the role of the family environment in child development and educational outcomes. Greater attention was being given to "environmental explanations". However, as he and others noted at the time, there were only preliminary understandings of how to conceive and measure the family environment as an influence on child development, school achievement, and occupational outcomes. Marjoribanks (1970) drew on Jensen (1968) to argue a need to define the environmental factors, measure them, and examine them using regression equations. The assumption was that the variance attributed to ethnic group or social status group differences would then be accounted for by the environmental variables. His immediate challenge at the time was to identify a set of environmental forces that influence child mental ability (since this was the variable assumed to mediate the effects of the family environment on educational achievement and in turn occupational attainment).

In defining the environmental forces and devising measures for them, Marjoribanks (1970) turned to the work of Murray (1938), Bloom (1964) and his students, Wolf (1964), Dave (1963) and Weiss (1969). With the aim of elucidating influences on student mental abilities and then educational achievement, Marjoribanks (1970) conceptualised the main feature of the home environment in terms of the "achievement orientation" of the home. This comprised the extent to which the home environment exhibited (a) a press for activeness, (b) a press for intellectuality, (c) a press for English, and (d) a press for achievement.

Marjoribanks drew on Murray's (1938) idea that the environment should be understood in terms of the kind of effect that it had on the individual, conceived in terms of the "press of the environment". Marjoribanks was also influenced by Murray's separation of the alpha press and beta press of the environment. Alpha press was the actual press of the environment, whereas beta press was the press as perceived by the individual. In his research and model building,

Marjoribanks' work centred on alpha press. He defined the press variables as "sets of social-psychological process characteristics" that were assessed in interviews by "obtaining measures of specific behaviours or attitudes within the family" (1979a, p. 31).

In his PhD research and published partly in Marjoribanks (1972a), he used semistructured home interviews to assess eight press variables. These were press for: achievement, intellectuality, activeness, independence, English, a second language, father dominance and mother dominance. The eight press variables represent a broad coverage of environmental factors that might influence educational achievement. He subsequently advanced his conceptualization of the family environment and in his 1972c article, which also drew on his PhD research, the core construct was the family's "achievement orientation". In his first major study following his PhD, described by Marjoribanks as the Adelaide Study, he conceived of the family as having five main environmental dimensions. These were again assessed by interviews. The five dimensions were: achievement orientation, press for independence, press for English, aspirations, and individualistic-collectivistic achievement values. This early evolution in his thinking can be seen to arise from a sharpening of hypotheses about the specific aspects of the environment (structure and process) that may influence educational outcomes.

As already noted, by 2002 Marjoribanks had shifted to conceiving the main role and measures of the family (and school) environments in terms of "capital", as outlined in the following section on his explanatory models.

THE DEVELOPMENT OF EXPLANATORY MODELS

A strong element of Marjoribanks' research throughout his career was that it was model or hypothesis driven. Many of his achievements can be attributed to the development of explanatory models of environmental influences on educational outcomes. His PhD research and early writing was directed by a model linking ethnicity, social class and occupational achievement (for example, see Figure 1 (1972a), summarized here as Model 1 in Figure 1). This theoretical model was unidirectional (except for a bidirectional association between ethnicity and social class) and mediational, with direct and indirect effects. Ethnicity and social class were conceived to influence the achievement orientation of the family and child intelligence. The families' achievement orientation directly affected child intelligence. His main outcome variable was educational achievement. This was seen as being influenced by both family achievement orientation and child intelligence. Although not measured in his research at the time, Marjoribanks' model incorporated occupational attainment as the ultimate outcome. This was influenced by educational achievement, family achievement orientation and child intelligence.

Marjoribanks' 1972 theoretical model showed that occupational attainment (as the terminal outcome) was central in his consideration of inequalities in educational outcomes. This model also emphasised mediational processes together with direct and indirect effects. Throughout the 1970s, Marjoribanks continued to evolve and develop his conceptualisation of processes influencing educational attainment. This can be seen in two of his models or frameworks published in 1979. One of these (1979a) was more general and the other (1979b) was developed to guide his research on ethnic families in Australia.

The general model incorporated several layers of the environment as the first step (summarised here as Model 2 in Figure 2). This included what he called ethclass, a combination of ethnicity and social class, the neighbourhood, family, school and classroom environment, and peer groups. Again the main processes were unidirectional, with direct as well as indirect (mediational) influences. The environmental characteristics were assumed to influence individual attributes of children, children's interpretation of social situations, and academic achievement. Academic achievement was also influenced by individual attributes of children. One of the links to achieved

status was from academic achievement. The model also incorporated other indirect processes assumed to influence achieved status through child attributes.

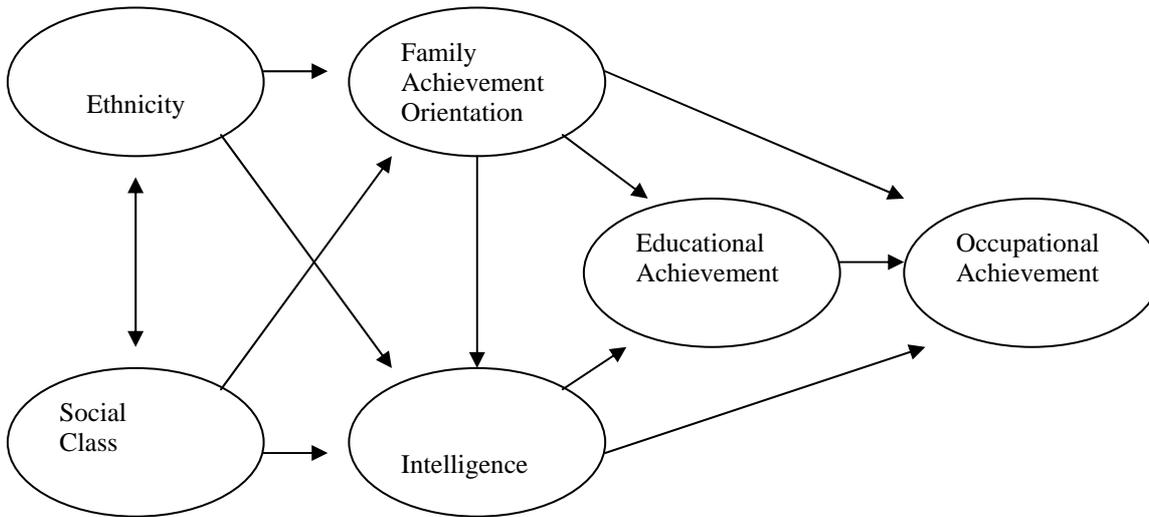


Figure 1. Model 1 (1972), based on Marjoribanks (1972c) Figure 1

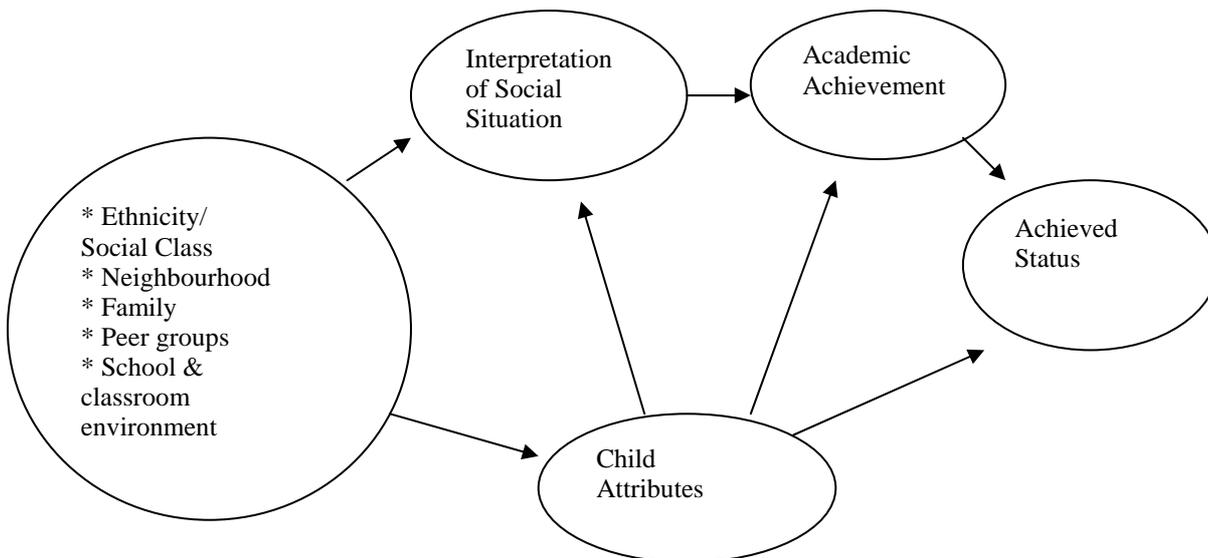


Figure 2. Model 2 (1979), based on Marjoribanks (1979a) Figure 1.1

The model developed for his research on ethnic families (1979b, summarised here as Model 3 in Figure 3) included academic achievement as the educational outcome. The “family achievement orientation” of the 1972 model had been expanded to now cover “family social-psychological dimensions” and the student “intelligence” of 1972 had been expanded to include “children’s intelligence and school attitudes”. Social status and ethnic group were conceived to have direct effects on academic achievement, but also indirect effects. The latter involved mediation through family social-psychological dimensions, and children’s intelligence and school attitudes.

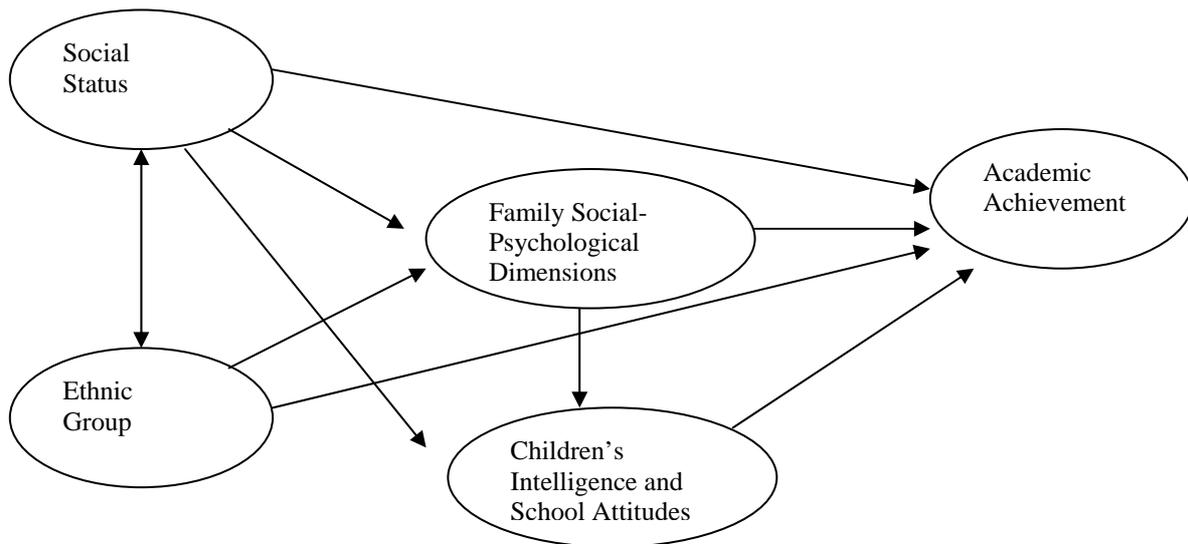


Figure 3. Model 3 (1979), based on Marjoribanks (1979b) Figure 1.2

It can be seen that throughout the 1970s Marjoribanks increased the complexity of his theoretical models to explain social status and ethnic group differences in educational outcomes. This increased complexity occurred mainly in terms of (a) the dimensions or elements of the family environment, and (b) characteristics of individual students that were influenced by these environments. It is apparent that his attention to the environment and its influences on students was gradually incorporating aspects of the school environment and student’s school-related attitudes and behaviour.

Marjoribanks’ research and the development of his conceptual understanding of environmental influences on inequalities in educational outcomes occurred partly through his engagement with a number of research projects and data sets during the 1980s and 1990s. In 2002 Marjoribanks published as a book what he probably intended as an integration of his theoretical and empirical work. The book’s title was *Family and school capital: Towards a context theory of students’ school outcomes*. Figure 1.2 of that book represents an overview of his conceptual thinking in what is now called a “mediation-moderation model” of family and school influences on educational outcomes (summarised here as Model 4 in Figure 4). Again the model was unidirectional with direct and indirect effects.

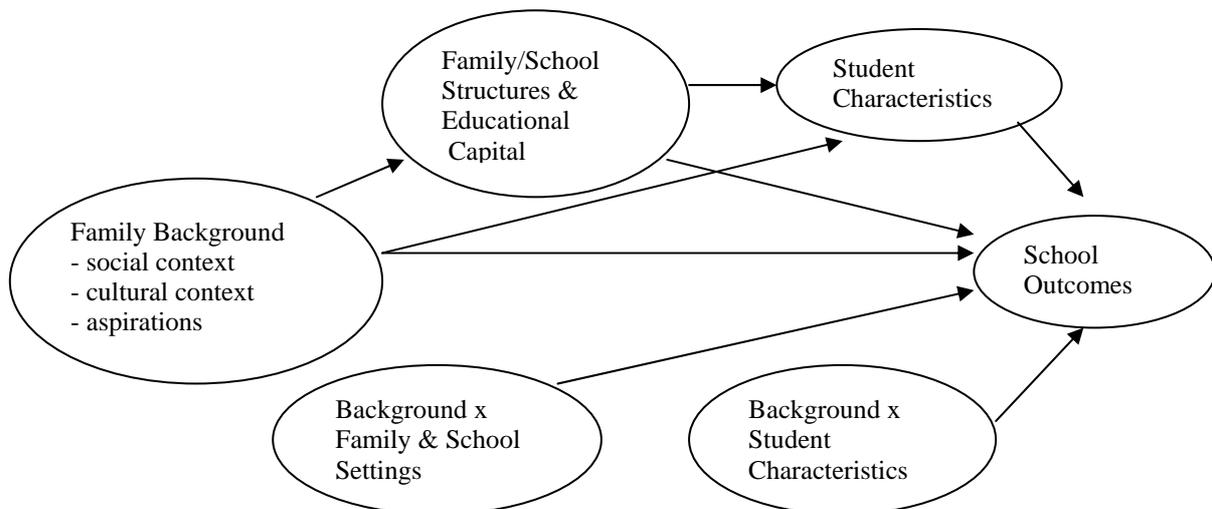


Figure 4. Model 4 (2002), based on Marjoribanks (2002) Figure 1.2

The core constructs in the 2002 model were family background, family structures and educational capital, school structures and educational capital, student characteristics, and school outcomes. The effects of family background were assumed to be mediated by family structures and educational capital, which in turn was mediated by school structures and educational capital. The final step in the model was student characteristics. These were assumed to be influenced directly by family background and indirectly through family capital and school capital. School outcomes were assumed to be directly influenced by family background, family capital and school capital. Most of the effects of the environment (family and school), however, were proposed to be mediated by student characteristics. This means that a strong element of the 2002 model was that family and school environments had their main impact on school outcomes through what was called student characteristics.

In addition to an emphasis on mediated effects in the conceptual model, Marjoribanks (2002) also highlighted the role of moderation in the overall understanding of the effects of family background, family capital and school capital on school outcomes. Marjoribanks' attention to moderation was consistent with his data analysis strategies and data presentation approaches from the 1970s onwards. His data analyses frequently involved the examination of interaction effects in multiple regression. In turn, he often presented the results in the form of fitted regression surfaces. An example of this approach is the reporting of the interaction between parents' aspirations and child intelligence in the prediction of mathematics achievement for three ethnic groups (Figure 5.7, 1979b). This result showed that the effects of intelligence and parent's aspirations on achievement were moderated by ethnic group. In the 2002 model, Marjoribanks was also interested in family background as a moderator. In this case, the interest was on how family background moderated the effects of school settings and student characteristics on school outcomes. For instance, the moderation could be in terms of variations in the effects the school setting or student characteristics according to features of family background (for instance, different effects from one ethnic group to another).

In the integrative 2002 model, Marjoribanks included in family background an expansion of his earlier ethclass. In 2002, family background was also called distal family background. It included the social (e.g., social status, parents own aspirations) and cultural (e.g., ethnic or cultural group membership) contexts. The more proximal elements of the family, with an emphasis on within family processes, were included in the family structures and educational capital construct. Family structure pertained to features such as whether it was an intact or single parent family, the size and role of the extended family, family mobility, and family size. Family capital centred on processes that would be expected to contribute to educational outcomes. It included parenting practices and styles, the provision of cultural and human resources associated with school success, and support for the child, especially support in relation to education and future plans.

The "school structures and educational capital" construct reflected an increasing emphasis on the school environment in Marjoribanks' research and model development during the course of his career. School structure covered elements such as whether the school was government or private, school size, whether it was single or mixed-sex, and whether the school used ability grouping. The school capital component dealt with the school's learning, interpersonal, and regulatory environments. School capital also incorporated student engagement as a component.

The student characteristics construct in Marjoribanks' (2002) model also reflects an evolution and development of ideas over his career. His PhD and first publications used ability or intelligence as the most proximal variable influencing academic achievement. In 2002, student characteristics incorporated: the student's aspirations for work and education, self-efficacy beliefs, effort and commitment to achievement and learning, as well as ability. Probably most emphasis in 2002 was placed on the student's aspirations. These were seen as arising in the context of the family background, family capital, and school capital. In essence, the stress was on the influence of

environmental contexts in the family and school on student aspirations as the core process mediating the effects of the family on educational achievement.

In Model 1 (Figure 1), educational achievement was the main outcome. In 2002 it had evolved into the broader construct called school outcomes. This was deliberately intended to enable attention to be given to one or more of a number of school outcome indicators. Around that time and during the previous decade or so, Marjoribanks had published research with a variety of these outcome indicators. The variety partly reflected the longitudinal emphasis in the research. When at school, for example, the outcome measure might be school achievement, whereas data collected at age 21 years could focus on the level of education that has been achieved. His outcome measures, therefore, included school academic results, standardised achievement test results, whether or not the student completed school, the highest level of education that had been achieved, and career outcome. His 2002 model was intended to reflect this diversity.

DATA ANALYSIS AND DATA PRESENTATION STRATEGIES

With his first degree in mathematics, it is not surprising that one of the strengths of Marjoribanks' research and contributions to scholarship occurred in the areas of data analysis and data presentation strategies. Beginning with the PhD, his main analysis strategies were based on correlational and regression techniques. These were developed and evolved in concert with his theoretical models and research hypotheses. In the 1970s (e.g., 1979a, 1972b) he focused on regression analyses with interaction terms and linear plus non-linear effects. He perfected the technique of presenting his results in regression surface models in order to display the interaction effects plus linear and non-linear relationships. In order to assist visual presentation and understanding, his strategy was to plot the data in terms of standardised scores with means of 50 and standard deviations of 10. He then combined two or more regression surfaces in the one figure to illustrate the effects of different contexts. For example, to show the differences between ethnic groups in the effects of the interaction between press for English in the home and student intelligence on educational achievement, Marjoribanks plotted regression surfaces for two or three separate ethnic groups (see Figure 5.8, 1979b).

Because his models were largely mediational in character, Marjoribanks needed to develop strategies to test and illustrate mediational effects. His approach was to undertake a series of multiple regressions, first entering variables covering family background followed in turn by models that included variables measuring family capital, then school capital, and finally student characteristics. He paid attention to the increment in variance explained at each step and the significance of the individual variables in the final model. He also gave importance to the change in unstandardised regression weights from one step to the next. This change enabled him to comment on whether and to what extent variables entered in the first or early steps were mediated by variables entered in subsequent steps.

His mastery of interaction effects in multiple regression was illustrated by publications that described and elucidated this technique (e.g., Marjoribanks, 1998a). For instance, Marjoribanks (1998a) made the case for the complexity of educational phenomena and therefore the role of analyses using different kinds of interaction, with associated presentation strategies for the obtained results. A particular achievement of that publication was to present and discuss the different types of interaction effects. He set out clearly differences between ordinal, disordinal and hybrid interactions, noting that probably too much emphasis in research had been placed on disordinal interactions at the expense of ordinal interactions.

Interaction effects in educational research are consistent with different effects according to situation or context. For instance, high aspirations might have different effects on educational achievement for different ethnic groups, or in schools with different learning environments. As part of the discussion of the role of situation and interaction effects Marjoribanks (1998a) went on

to highlight the hierarchical (students nested within classes) aspect of much educational research. This raises the possibility that characteristics of students in classes or other features of individual classes could affect the relationship between educational inputs and achievement outcomes. He then outlined the developments in statistical theory in the form of multilevel analyses such as Hierarchical Linear Models (HLM) as a basis for the investigation of within- and between-classroom or school phenomena. For example, different teaching methods might vary in the effect on student achievement in different classes or in different schools.

Although in this 1998 publication Marjoribanks discussed the importance of multilevel analyses in understanding the effects of environmental contexts and other interaction effects, it was not until a publication in 2006 that he took account of the nested nature of the data in his own research. He was in the process of mastering multilevel analyses, however, and his next series of publications would, no doubt, have moved to multilevel analyses. Moreover, he was encouraging his doctoral students to undertake multilevel analyses that involved cross-level interaction effects.

PRIMARY RESEARCH AND ANALYSES OF SECONDARY DATA

An appreciation of Marjoribanks' milestones and achievements can be partly captured through the research he conducted and the analyses that he undertook on secondary data. The first step on this path was his PhD research. This was a study of a sample of families from five ethnic groups in Ontario, Canada, with at least one 11-year-old boy attending school. In turn, the sample for each ethnic group was divided into sub-samples of middle class and low class families, based on a socioeconomic status index. Data about the family environment were gathered through semistructured home interviews. The SRA Primary Mental Abilities Test (1962 Revision) was used to obtain verbal, number, spatial, and reasoning ability test scores for each boy. The selection of boys only was based on an assumption of possibly different processes influencing educational outcomes in boys and girls. Some of his subsequent research examined boy-girl differences (Marjoribanks, 1979a). A series of publications emerged from this PhD research (e.g., Marjoribanks, 1972a,b,c, 1976b; Marjoribanks & Walberg, 1975a,b; Marjoribanks, Walberg, & Borgen, 1975). These publications addressed a number of questions about particular elements of family context associated with environmental influences on educational outcomes. These included social class, birth order, family size and sibling constellation.

Immediately following the awarding of his PhD, Marjoribanks took a position of Lecturer and Tutor in the Sociology of Education at the University of Oxford Department of Educational Studies. Here he initiated his second substantive research project in the form of the Banbury School Research Project (Marjoribanks, 1976c, 1978). The research involved assessments of intelligence and creativity at the beginning of the first year in secondary school. During their first school year, and at the end of their second year, the students' school-related attitudes were measured. The students completed academic achievement tests at the end of their first and second school year. Marjoribanks examined the relationships between the school-related attitudes and academic achievement while controlling for intelligence and creativity (Marjoribanks, 1976c). The project also enabled him to use the cognitive and attitudinal measures to compare students from stratified and mixed-ability school structures (Marjoribanks, 1978).

Marjoribanks' third substantive research study was what he called "The Adelaide Study". This was a longitudinal study. It began with a cohort of 800 students 11 years of age and their families from Government and Catholic schools in Adelaide. It involved several follow-ups with the sample until the students were 21 years of age. The ethnic background of the sample included families that were Australian, English, Greek and Southern Italian. Semistructured home interviews with the parents were used to assess family environment variables, such as parent's aspirations, cultural capital, social capital, and parent support. The first data collection included standardised tests of student achievement and the Raven Progressive Matrices test at age 11 years.

Subsequent data collection (e.g., at 16 and 21 years of age) involved student assessment of the learning environment, and student aspirations as well as other measures of educational outcomes (such as school completion and the level of education reached at age 21 years).

In the late 1990s and more recently, Marjoribanks undertook a series of studies in South Africa with Mboya, in Hong Kong with Kwok, and in Taiwan with Hung. The South African research, for example, involved senior secondary students and included the investigation of the influence of family structures and family processes on self-concepts (Marjoribanks & Mboya, 1998) and the effects on self-concept of distal family capital, family social capital and goal orientations (Marjoribanks & Mboya, 2001). The research in Hong Kong investigated the effects of social status, birth order and sibsize on 14-year-old students' perceptions of the family learning environment (Marjoribanks & Kwok, 1998a) as well as links between family capital and academic achievement (Marjoribanks & Kwok, 1998b). Finally, in a sample of 11 year-old Taiwanese children, Hung and Marjoribanks (2005) investigated the contributions of family background, family learning environment and school learning environment to academic achievement, educational aspirations and self-concept. These studies were part of Marjoribanks' attempts to examine the extent to which his models of educational outcomes were supported by research in international contexts.

A key ingredient of Marjoribanks' contributions was that he used his conceptual and analytical capacities to undertake secondary analyses of a number of important data sets. For example, his 1976a article provided analyses of data collected for the three age-cohorts in the Plowden follow-up study undertaken for the report on children and their Primary Schools in the United Kingdom. Marjoribanks' paper examined whether family environment measures mediated links between sibsize and children's cognitive and affective characteristics. A number of other analyses using the Plowden data set are outlined in Marjoribanks (1979a), for instance, an analysis was undertaken of interactions between family environment measures and child intelligence in the prediction of achievement (see also Marjoribanks, 1979b). His analyses of secondary data also included a large sample from the Netherlands (e.g., Marjoribanks & Walberg, 1976c). The latter article investigated sibsize, birth order and social-status effects on intelligence test scores.

In recent years, Marjoribanks published a series of papers (e.g., Marjoribanks, 2004, 2005) based on data collected by the Australian Council for Educational Research (ACER) for the Longitudinal Survey of Australian Youth (LSAY). The LSAY project involves a series of follow-up data collections on youth moving from upper secondary school to post-secondary education and work in Australia. The samples included youth from Anglo Australian, European (Greek, Italian, Netherlands), Asian, and Middle East backgrounds. The LSAY studies provided a fertile field for Marjoribanks to undertake investigations about influences on a number of educational outcomes in a succession of publications. An example from these publications (Marjoribanks, 2005) is discussed below.

As already highlighted, a significant strength of Marjoribanks' approach to research was that it was hypothesis and model driven. In turn the results were used to clarify and develop further the guiding conceptual framework. This was a reason for the evolution of theoretical models throughout his career. His research publications often took up separate parts of his guiding theoretical model rather than providing an overall assessment. It is not possible to comment here on the extent to which his own analyses confirmed his model and to trace the effects of these results on his theoretical thinking. Instead, two examples are highlighted.

The first example is his analysis of young adults' educational attainment from the Adelaide study, as reported in Table 8.1 in his 2002 book. The Table presents a series of regression analyses beginning with measures of the family cultural context in the first model. Then family social context measures were added in the second model. School and parent support were included in the third model and the final model added students' educational and occupational aspirations.

When all variables were included, only three maintained a significant effect: the two variables about student aspirations and a third variable that measured student reports of the importance of school success and their efforts to achieve success. The results showed substantial mediation of family and school effects by student aspirations and effort. This example yielded strong support for his 2002 theoretical model that the effects of family and school structures and capital on outcomes were mediated by student characteristics.

The second example asked parallel questions but was derived from the LSAY project. Marjoribanks (2005) investigated contributions of family background and adolescents' educational aspirations to educational attainment as young adults. The results in Table 1 of that publication showed that when all variables were entered, student aspirations made a significant independent contribution to educational attainment. In addition, however, ethnicity retained strong effects, as well as gender, family social status, and interactions between social status and ethnicity. This set of results confirmed partial mediation of family background by student aspirations. However, consistent with his 2002 theoretical model, there were also direct effects from family background to educational outcomes. The results were also consistent with his decades of effort to emphasise the effects of **differential** environmental contexts through the study of interactions among environmental variables. In this case, for example, ethnic group differences in attainment for youth with high aspiration levels occurred for young adults from higher social status families and not for those from lower social status families. Marjoribanks concluded that "family social status and ethnicity combine to provide varying educational experiences for young people" (2005, p.111). His analyses of the LSAY data also supported a conclusion that the same environment might not have the same effect on individuals. One reason for this is that individuals might interpret their environment differently and thereby engender different outcomes.

OVERVIEW OF RECOGNITION AND OTHER CAREER CONTRIBUTIONS

Throughout his career, Kevin Marjoribanks' appointments and recognition from professional societies supplies further evidence of his achievements and standing among peers. Marjoribanks was elected as a fellow of a number of international and Australian professional societies in fields extending from education to statistics and the social sciences. This is testament to the breadth of his knowledge and the scope of his scholarship. His fellowships were as follows: Royal Statistical Society (1997), Academy of Social Sciences in Australia (1982), Australian College of Education (1983), and the International Academy of Education (1997).

His academic and editorial appointments are also evidence of his achievements and standing. He was appointed as Professor of Education at one of Australia's leading universities (The University of Adelaide) in 1974. This was only four years after completing his PhD and is consistent with the impact and volume of his scholarly contributions in the short period from his graduation. Equally significant was his tenure as Vice-Chancellor of the University of Adelaide from 1987 to 1994. Following this period as Vice-Chancellor, he returned to his position as Head, Graduate School of Education at the University of Adelaide for the remainder of his career.

His editorial appointments are also important as part of his contribution to scholarship and as recognition of his standing. He was a Foundation Editor of the Oxford Review of Education in 1974 (again, only four years after completing his PhD). He took over the editorship of the Australian Journal of Education in 1981 at a difficult time for the journal and contributed significantly to its re-establishment as the pre-eminent educational research journal in Australia. Finally, his appointments as visiting scholar to universities such as the University of Oxford, Stanford University and Harvard University during his career further demonstrate his standing in the international education community.

SUMMARY REFLECTIONS

A consideration of Marjoribanks' academic career reveals a core focus that was sustained over more than four decades. During that time he made a number of seminal contributions and established himself at the leading edge of knowledge in the field of inequality in educational outcomes. Inherent in this were the contributions he made in areas such as the analysis of family environments, environmental processes, data analysis strategies, the conceptualisation of causal processes in the effects of environments on educational outcomes, and linked to the latter, the mechanisms of contextual influences.

His research and theoretical advances through model building were always data-based. He provides a model for educational research in his attention to the use of hypothesis based research, usually stemming from overall theoretical models. The way in which his research career was devoted to the development and testing of ever more comprehensive models of links between environments and educational outcomes represents a paradigm for the long-term conduct of educational research.

A feature of Marjoribanks writing, and also his public presentations, was the clarity of his language and communication. His PhD supplied the first evidence of a great ability to capture and express ideas with simplicity and precision. Part of the value of Marjoribanks' scholarship arose from his ability to master a number of areas of intellectual endeavour as well as large and complex bodies of knowledge spanning different disciplines. His work, for example, depended on the command of at least the following: educational research, multi-method research strategies, data analysis, educational psychology, educational theory, and sociology.

Marjoribanks' work profoundly shaped and will continue to shape research on learning environments, inequality and factors contributing to educational outcomes. He provides an exemplar for anyone wishing to set out on a significant career in educational research. He was a modest man, of humour, and wisdom with an ability to deal with great complexity. He combined this with a deep-felt concern for and commitment to education as an agent in the human condition and in children's life chances.

Something of the man and the themes and issues underpinning his life-long devotion to the analysis of inequalities in educational outcomes might be revealed by the last two paragraphs of his 2002 integrative book. Here he draws on Carson McCullers novel *The Heart is a Lonely Hunter*, a story about young Mick Kelly in a small Southern US town, experiencing discrimination, hardship, and lack of opportunity. It is about inner isolation, poverty, and environmental entrapment. Mick Kelly lives in two worlds or rooms. One is the inner room of plans, foreign countries and the music she loves; her imagined songs and the symphony of her life. The other is the outer room of school, family and everyday life. The tragedy of Mick's life was that because of deteriorating economic circumstances, her inner room was all but closed when still young. In the last paragraph of his book, Marjoribanks makes a plea for parents, teachers and members of the community to keep alive the "inner room" of children's lives. He saw his context theory of students' school outcomes as helping to make that possible.

Marjoribanks' research and theoretical developments placed students own hopes, plans and ambitions at the forefront of influences on educational outcomes. In turn, he saw these hopes, plans and ambitions as arising substantially from the environmental processes and influences of families and schools. In drawing attention to the "inner room" at the end of his book, Marjoribanks was possibly highlighting an element of his own world that was so much and for so long immersed in the inner room associated with the challenges of research, scholarship and the development of theoretical models. The value of his contributions is reflected in the fact that his own plans and aspirations for educational research were able to reach fruition. Implicit in attention to the inner room at the end of his book is a plea for others interested in advancing

scholarship about inequalities in educational outcomes also to actualise the ambitions of their inner room. As with Marjoribanks, this will require dedication, persistence, and the mastery of a broad spectrum of scholarship in a number of disciplines.

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Issues in language learning

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This article considers the current debate in Australia into the learning of literacy and foreign languages. It examines not only the literacy levels attained by Australian students in their national language (English) in comparison to these in other countries, as well as between Australian states, but also theories involved in school learning and the learning of language, with particular reference to the learning of a foreign language. The article raises and discusses 12 issues that arise in language learning. It is noted that in many countries it is necessary for students to learn at least three languages, namely, the mother language, their national language and an appropriate foreign language, that make heavy demands on the time available in the curriculum of the schools if adequate levels of competence in language usage are to be attained.

Language learning, foreign languages, literacy, curriculum time,
second language, mother tongue, national language.

INTRODUCTION

The pages of the national newspaper in Australia are currently filled with 'The Literacy Debate'. They follow a sustained challenge to the curriculum of the schools in the different Australian states. However, this debate and the accompanied challenges are largely devoid of the findings of research and the established theories on which research into language learning is built. Instead the debate is based on ideological perspectives, personal opinions and political affiliations. The idea that literacy and numeracy lay the foundations for the learning that occurs in schools and at later stages of adult life is probably only 30 years old, although it can scarcely be said to be a novel idea. Literacy and numeracy have served to replace the concepts of general intelligence in Australian schools, and the specific intelligences that were formerly thought to underpin school learning, with their strong genetic overtones. As a consequence tests of literacy, and to a lesser extent numeracy, have in the main replaced the tests of intelligence that were formerly widely used in Australian schools. One of the consequences of this change is that information is now available on the performance of Australian youth at the age of 15 years, immediately prior to the end of the period of compulsory schooling on tests of reading, mathematics and science literacy in comparison with students in other nations of the developed world.

The Organisation for Economic Cooperation and Development (OECD) has since the beginning of the twenty-first century conducted the Programme for International Student Assessment (PISA) studies of 15-year-old students in reading, mathematics and science literacy in the years 2000, 2003 and more recently in 2006. In PISA 2000, reading literacy was the major domain and mathematics and science literacy were minor domains. In successive cycles mathematics and science literacy have replaced reading literacy as the major domain. Figure 1 presents the profile of the Australian states and territories in comparison with other countries in reading literacy in the

PISA 2000 testing program. Australian students achieve at a high level when compared with other countries, and are in the same group as other English speaking countries. There were, however, noticeable differences between the Australian states, with South Australia doing well, although the reasons for the differences between the states have not been adequately examined or explained.

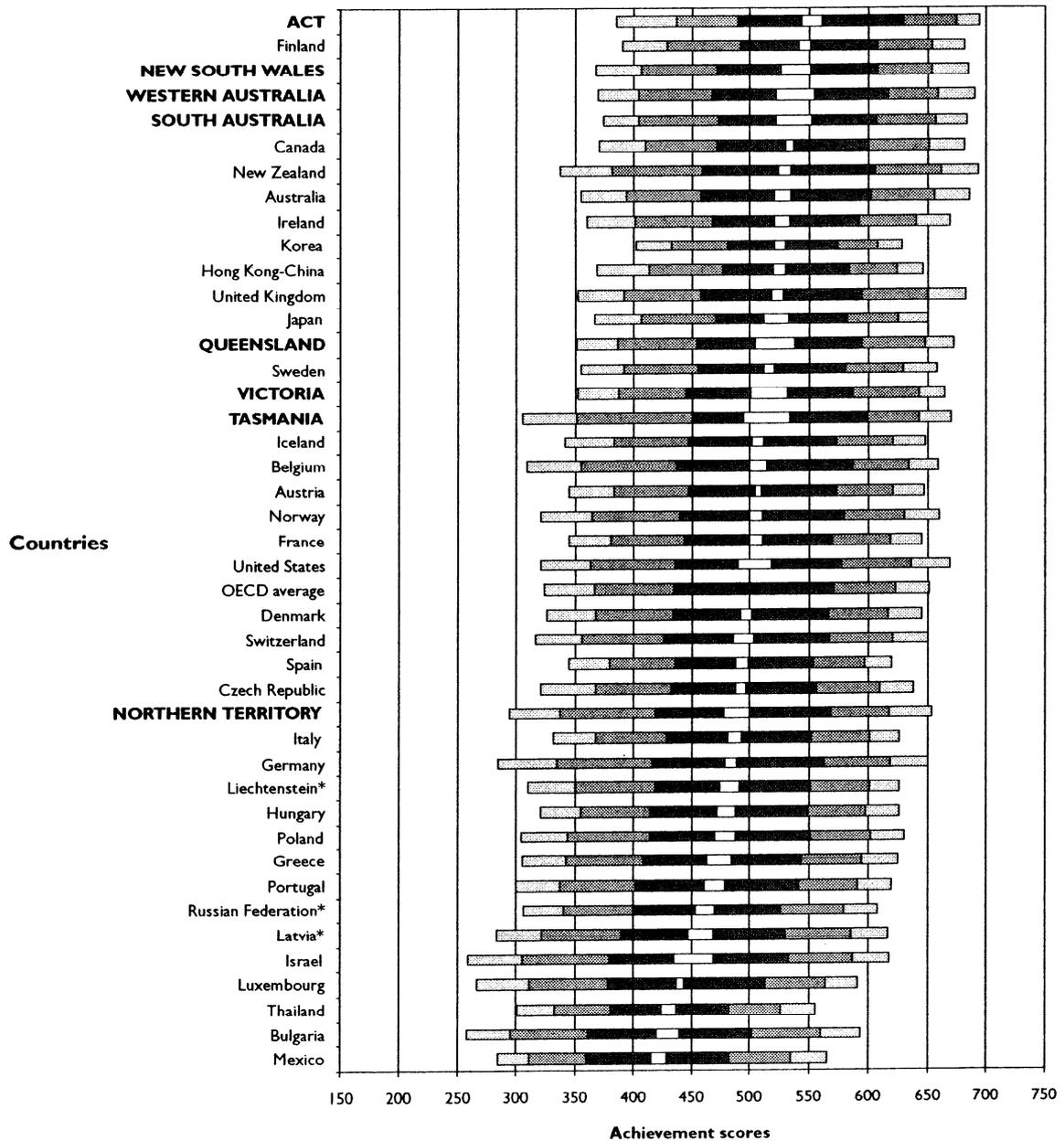


Figure 1. National Performance in reading literacy in PISA 2000 (Marks and Creswell, 2004, p.143)

Moreover, it appears that all systems of education within Australia are producing students who, in general, perform well in the important field of literacy in their national language when compared to other developed countries. Consequently, a sustained attack on the school systems of the Australian states does not seem to be warranted, although some state systems clearly need to give consideration to their lower levels of achievement in language learning. In order to raise the standards of learning in the field of language within a school system, curriculum planning and development must be guided by the findings of research in the field and the theories that have

been advanced that are concerned with school learning and, in particular, the learning of language. Much has been written about language learning from the viewpoint of the skilled practitioner (see Nunan, 1985)

THEORIES OF SCHOOL LEARNING AND THE LEARNING OF LANGUAGE

Much has been written about the learning of language, that a brief paper can scarcely do justice to the large body of scholarly writing that is readily available. Nevertheless, it is surprising that relatively little attention is being given to the work of, probably the most distinguished educational and psychological researchers of the twentieth century, namely J. B. Carroll and the Thorndikes (father, E. L., and son R. L.) from the United States, Piaget from Switzerland, and Vygotsky and Luria, from Russia. From Carroll (1963) has come the Model of School Learning and more recently (Carroll, 1992) a hierarchical model of cognitive reasoning, verbal and quantitative abilities. These abilities occupy a central place in the hierarchy. From the Thorndikes have come the *Principles of Teaching* (E. L. Thorndike, 1906) and the argument that reading, beyond the initial stages essentially involves reasoning, together with the observation that the school systems pay little attention to the teaching of reading beyond the primary school stage (R. L. Thorndike, 1973). It should be noted in passing, that in Australia, it seems that reduced attention is being given to the teaching of reading for good readers at the fifth grade level and beyond (Hung, 2003). If reading is essentially reasoning beyond the initial stages of learning to read, then the work of Piaget (see Flavell, 1963) can provide the theoretical foundations for the development of the cognitive skills associated with reasoning. In addition, the work of Vygotsky (1978, 1986), that emphasizes the social context and situations in which learning occurs, as well as the importance of employing the zone of proximal development in presenting new content for learning, makes an important contribution.

During the past three decades two apparently different theories of learning have been advanced, namely, the symbol processing theory and the situated action theory. The proponents of each theory have claimed that the opposing theory could be accommodated within their own theory. This seems to indicate that a single overarching theory is required that can encompass the two alternative theories. This appears to be the function of neuroscience with its ideas of which neural nets and connectionism seeks to model how the brain works (see Lakomski, 1999, for a detailed discussion of these ideas).

In its simplest form, on the one hand, symbol processing, whether of words or numbers or other symbols, contends that rational thinking consists of manipulating linguistic and other symbols in the head. Thus, intelligent behaviour is based on reasoning and working with a well-constructed symbol system using the brain. On the other hand, situated action theory makes four central claims:

- (1) action is grounded in the concrete situation in which it occurs;
- (2) knowledge does not transfer between tasks;
- (3) training by abstraction is of little use;
- (4) instruction must be done in complex social environments. (see Anderson *et al*, 1996, p.5)

These two perspectives are derived from different research traditions and require integration if the functions of language are to be understood. Piagetian ideas of cognitive development can be linked with neural nets and connectionism, as suggested by Collis and Biggs (1982), within the constraints of cognitive load theory (Sweller, 1999), if the operation of the brain is considered to undergo development during the years of schooling. Such development of the brain occurs in part as a consequence of instruction in the processing of abstract symbols that are grounded both in concrete situations and under the influence of complex social environments. A major challenge to

the brain arises when a second language system is learned, so that two language systems are in operation at the sometime, each being based on the same concrete situations, although developed in different social environments.

In summary, before considering issues in the learning of language it is necessary to draw attention to several critical aspects of the complex social environments in which language learning occurs.

- (1) A distinction is commonly made between **foreign** language (LF) learning and **second** language (L2) learning. In foreign language (LF) learning the target language is studied in a school setting in a classroom. In second language (L2) learning the new language is initially learned without the aid of formal instruction, through exposure in a natural setting. In addition, a distinction is commonly made between the mother tongue language (L1), that is the language of the home and the national language (LN) that is the language of the country in which a person lives. In many parts of the world it is necessary for young people to become proficient in both their mother tongue (L1), their national language (LN), a foreign language (LF) and possibly a second language (L2).
- (2) Initially the mother tongue (L1) is learned and subsequently a second language (L2) is learned. It seems highly desirable that an adequate level of competence in the learning of the mother tongue (L1) is achieved before any formal learning of the national language (LN) or a second language takes place through classroom instruction.
- (3) The learning of languages, involving both the national language (LN) and a foreign language (LF) is comprised of learning the four skills of listening, speaking, reading and writing. The mastery of all four sets of skills appears to be required for successful learning both of the national language (LN) and a foreign language (LF), if these languages are to be used in both national and global settings.
- (4) In each domain of listening, speaking, reading and writing, there is a developmental sequence involved in the mastery of each new language, namely, the national language (LN) and the foreign language (LF). The higher stages of learning involve the ability to reason using the language symbols and processes of both the national language (LN) and the foreign language (LF)
- (5) At the highest levels of learning, involving reflection and hypothetic and deductive thinking, there are different logical systems and symbol systems associated with both the national language (LN) and the foreign language (LF). While it is readily accepted that mathematical symbol systems have common logical rules for the processing of different mathematical symbols, it also seems highly likely that different language systems have different rules for the processing of the different languages.
- (6) In the assessment of performance in the different language systems a scale of performance is required, that is probabilistic in nature and possesses the properties of an interval scale. Such a scale also exhibits a conjoint relationship between the language based tasks and the persons being assessed, so that persons are assessed relative to the difficulties of the assigned tasks in an operation of measurement. A separate scale of measurement is clearly required for each language domain of listening, speaking, reading and writing. However, within each domain for each language, there needs to be a single uni-dimensional scale of performance. These scales of performance are a necessary prerequisite for monitoring and planning the learning of the languages of mother tongue (L1), second language (L2), national language (LN) and foreign language (LF).

TWELVE ISSUES IN LANGUAGE LEARNING

In the sections that follow 12 issues are identified that relate to language learning and in particular, the learning of a foreign language (LF), whether a national (LN) or mother tongue (L1) language is being considered or whether a second language (L2) through exposure in a natural setting is involved, or whether a foreign language (LF) is being learned formally in a classroom and school setting.

1. Is there a common theory of language learning, with respect to (a) listening, (b) speaking, (c) reading and (d) writing?

Krashen (1981) has advanced, what can be considered as a strong general theory of language learning. This theory makes a basic distinction between two processes that are considered to be totally separate, namely 'formal classroom instruction' and 'acquisition' that occurs in a natural setting. Acquisition is more likely to occur with reference to listening and speaking. Formal classroom instruction is more likely to take place with respect to reading and writing. However, acquisition is involved in learning to read. The acquisition processes seems to correspond to situated action, while formal classroom instruction seems to correspond to symbol process learning. This distinction appears to be useful, but symbol processing clearly seems to dominate formal classroom instruction, while situated action clearly seems to be closely related to acquisition. However, these two learning processes have much in common. Using the ideas of neural networks it may be possible to combine these two theories of learning into neural processes with meaningful variations.

2. Can Carroll's model of school learning be applied to both formal classroom instruction and informal language acquisition in a natural setting?

Carroll (1963) developed this model in order to investigate prediction of success in complex learning tasks. Three variables were specified in terms of time: (a) **aptitude**, that involved the amount of time a student would require to learn a task to a specified criterion given motivation, opportunity to learn and optimal quality of instruction; (b) **perseverance**, that involved the amount of time that a student was willing to engage in active learning, or more generally the level of motivation of the student; and (c) **opportunity to learn**, that involved the amount of time provided for learning in a specific program. In addition, there were two further variables that were not specified in terms of time: (d) **ability to understand instruction**, that was provided; and (e) **quality of instruction**, that involved the structuring of the learning task, the effectiveness of presentation and the skills of the instructor. All except the last variable listed in this model would seem to be involved both in the informal acquisition of language through second language (L2) learning as well as in the formal national language (LN) and foreign language (LF) learning situation and the informal learning of the mother tongue (L1). Consequently, it would be possible to undertake research to investigate the efficiency and effectiveness of second language learning under different learning conditions, and to test this model of learning in non-school learning situations using four of Carroll's factors. In the investigation of L1, LN, and LF learning all five of Carroll's factors warrant consideration.

3. What is the time required to achieve competence in foreign language learning?

Carroll (1975, p.182, 184) showed that there was a strong linear relationship between the mean reading score of students within a school system and the average number of years that the students had studied French as a foreign language (LF). This linear relationship was replicated for all four domains of language learning, namely, listening, speaking, reading and writing. Carroll (1975, p. 275-6) argued from this evidence that for the average student in an academic program under the typical conditions of instruction it was estimated that between six and seven years of instruction would be required to achieve commonly accepted levels of competence in all four fields of listening, speaking, reading and writing French as a foreign language. This estimated

time could be reduced by one year for highly motivated students and by one further year for high-ability students. Rarely would students be provided with the opportunity in Australian secondary schools to attain the commonly accepted levels of competence in foreign language (LF) learning.

4. What is the most effective age to begin learning a foreign language (LF)?

Burstall *et al.*, (1986) in England showed that students beginning French at age eight years and continuing to age 13 years did less well than students beginning at age 10 years and continuing to age 15 years. Likewise, Carroll (1975) in the study conducted by the International Association for the Evaluation of Educational Achievement (IEA) of French as a foreign language in eight countries found that no benefits came from beginning instruction in French at an early age. In Sweden and the United States students starting the learning of French in later grades performed better. There was clearly little support for introducing the learning of French as a foreign language (LF) during the early and middle primary school years. It would appear from the limited evidence available that a level of competence in learning a native language (LN) (and mother tongue) was required before beginning to learn a foreign language (LF).

While the number of years of exposure to learning a foreign language (LF) is clearly important, where vocabulary and grammar are under consideration adolescent students perform better than either adults or children, when the length of exposure is held constant. However, it is possible that in second language (L2) learning both the number of years of exposure and an early age of starting influence the level of success (Quinn and McNamara, 1988, p. 13). The issue that arises in curriculum planning is how to develop a curriculum for the learning of a foreign language (LF) to ensure that students have the opportunity to attain a required level of competence that is expected to involve at least six years, under optimal conditions of learning.

5. How can an efficient and effective curriculum in a foreign language be planned?

The facility to read and to speak languages other than English is going to be of increasing importance to Australian citizens in the future. The enrolments in foreign language courses at Years 11 and 12 are so low in Australian schools, partly as a consequence of the schools attempting to teach a range of language subjects, that the teaching of such subjects is neither efficient nor effective. Moreover, the provision of only five years of secondary schooling in some Australian schools is inadequate for the teaching of foreign languages only at the secondary school level for students to achieve the generally expected levels of competence. Nevertheless, to impose the teaching of foreign languages in the primary schools as preparation for secondary school study is neither desirable nor possible except in all-age schools. What appears to be required is the establishment of basic foreign language courses over four years, namely Grades 7, 8, 9 and 10 in secondary schools in order to provide for effective teaching in secondary schools. However, there is a further major problem in the teaching of foreign languages in Australian schools that involves steep declines in the participation rates across the years of secondary schooling until very small numbers choose to study these foreign language subjects beyond Year 10, with relatively small numbers of students at the Year 10 level. It seems to be essential to provide language maintenance courses that focus on speaking and reading in a foreign language (LF) for three periods a week throughout Years 11 and 12, or five periods a week for a semester to sustain and develop a greater facility in the reading, listening, and speaking of foreign languages. Consequently, assessment at the Year 12 level needs to be based on reading and translation exercises as well as an oral examination to assess the level of facility that the students have developed in the spoken language. In order to achieve an adequate level of competence in all four skills of listening, speaking, reading and writing, it appears to be desirable for students to study the learning of a foreign language (LF) as a major subject throughout Years 11 and 12 for at least five periods a week. It is possible that the high standing of Australian students in the PISA 2000 study is related to the fact that few students study a language other than English, and the time given to learning foreign languages in other countries reverts to the teaching of English in

Australia. The need to support the development of reading and speaking skills in foreign languages (LF) probably outweighs the gains achieved in literacy in English.

6. What are the key features of foreign language learning?

Of considerable importance for foreign language learning (LF) is the use of the foreign language for a substantial part of the teaching time in the classroom, with a corresponding reduction, but not elimination of the use of the national language. In addition, the use of electronic aids such as computers and DVD players is beneficial for both listening and speaking, but to a lesser extent for the development of reading and writing skills. Furthermore, the time spent on homework has, as may be expected, an influence on the development of reading skills, but much less and only an indirect effect on listening skills. Classroom activities are much more important for listening. Time spent on homework appears to be a clear indicator of effort. Moreover, the students' aspirations to understand a spoken foreign language contributes more to listening achievement than to reading achievement, while aspiration to learn to read the foreign language contributes more to reading performance than to listening performance, (Carroll, 1975, p.272-4; Walker, 1976, p. 198). There is emerging evidence to suggest that computers can be employed both for improving writing skills through the use of spelling and grammar checking routines as well as through less formal communication with other students using interpersonal written or informal chatting in a synchronous computer learning environment (Goldberg et al., 2003).

7. What are the components of reading achievement and are these components the same across countries?

There is a growing body of evidence at different levels of education from testing programs at the Grade 3 level through to adult literacy programs and the PISA literacy testing programs in approximately 60 countries, that there is a strong major factor associated with reading comprehension that is present in all reading tests. However, the theoretical foundations involved in the construction of reading tests, commonly differ according to the theoretical perspectives of those persons commissioned to develop the tests. Consequently, it is commonly possible to detect the presence of specific reading skills or type of reading material components that are nested under a single higher order general reading ability factor (Lietz, 1995). Thus in the IEA Reading Literacy Study (Elley, 1994) three factors involving narrative, expository and documentary materials were detected as nested beneath a single higher order factor of reading ability. Similarly, in the IEA Reading Comprehension Study (Thorndike, 1973) the specific skills of (a) following the ordering of ideas in a paragraph, (b) finding answers that are explicitly stated in the text, (c) recognizing implied meaning, and (d) recognizing a writer's purpose, were reported to be nested under a general reading ability factor (Lietz, 1995). Moreover, these test structures were found to operate in translated tests across seven different languages, although the tests were originally constructed in English (Lietz, 1995). The confirmation of the nested factor structure of reading tests supports the calculation of a total score for reading performance as well as separate subscale reading scores that are assumed to be correlated with each other. Furthermore, it supports the monitoring of reading performance across different age and grade levels, across countries with different languages involved, and over time where different curricula and different methods of teaching reading may be employed within a country under different theoretical perspectives.

8. Can scales of performance associated with the learning of foreign languages (LF) be developed in order to assess student learning across grades of schooling?

The work undertaken with reading comprehension tests discussed in the previous section across different languages supports the development of scales to measure reading achievement within countries where languages other than English are spoken. Moreover, work undertaken within Australia, an English-speaking country, indicates that a single scale for the measurement of

literacy performance can be formed out of a language subtest and a reading subtest (Hung, 1997), although the calculation of separate subscale scores is also meaningful. Much of the work that has been carried out within language testing has been done with languages that employ the Roman alphabet. Consequently, work with lexical morphemes called 'characters' or 'ideographs' in the Chinese and Japanese languages may differ in significant ways from work with the Roman alphabet in Western highly developed countries.

Two studies were recently undertaken in large schools to remove possible between-school curricular differences across year levels or grades. Separate studies were done with the learning of Chinese as a foreign language in one large school operating on three campuses from Grade 4 through to Grade 12 (Yuan, 2002) and in Japanese as a foreign language in a large school from Grade 8 to Grade 11 and at the university level in Years 1 and 2 (Taguchi, 2005). In both studies growth across grades in learning the foreign language was measured in a meaningful way, to detect mean change in performance across school terms. The measures associated with learning the foreign language were validated with subsequent analyses. However, while both studies were restricted to reading and the use of written language, these studies indicated the potential of using scales for the assessment of learning a foreign language (LF) that did not use the Roman alphabet in classes where English was spoken as the national language (LN).

9. Can scales be developed to assess the learning of foreign languages in schools in the four domains of listening, speaking, reading and writing?

Two major studies have been carried out by the IEA to assess performance in learning a foreign language (LF). Carroll (1975) investigated the factors associated with the learning of French as a foreign language in eight countries, four of which were English-speaking countries and four were not English-speaking countries. Tests were developed to assess performance in listening, speaking, reading and writing. Two types of writing tests were employed, one that could be reliably scored being of an objective or quasi-objective nature, the other involved direct composition. The study was guided by Carroll's (1963) model of school learning and the study assessed the performance of both 14-year-old students and students at the terminal secondary school level.

A study of English as a foreign language (Lewis and Massad, 1975) was also carried out in ten countries at the 14-year-old and terminal secondary school levels that mirrored the study by Carroll described above. Both studies employed similar tests of listening, speaking, reading and writing. The study of English as a foreign language, however, made less use of analytical and statistical procedures and focused on: (a) an examination of the place of English in the education systems involved; (b) an examination of the relationships between variables describing the country, the school, the teacher and the student with performance on the achievement tests; and (c) an analysis of errors made by students in responding to the tests in order to obtain a greater understanding of how students learned English as a foreign language (LF).

Both these studies showed the feasibility of the development of tests in the four domains of listening, speaking, reading and writing in the learning of foreign languages. While these tests were developed before Rasch scaling became readily accessible, subsequently work has been done by McNamara (1996) together with the two studies reported in the previous section by Yuan (2002) and Taguchi (2005) to indicate that measurement and the equating of scales could be used to assess performance in the learning of foreign languages over time and across grades of schooling in reading and language usage. Consequently it seems likely that Rasch measurement procedures can be more widely employed to measure performance in listening, speaking and creative writing and directed composition as well as reading, where the use of Rasch scaling is well established (McNamara, 2000).

10. Can the procedures of cognitive acceleration be employed to advance student performance across age and grade levels in the learning of foreign languages?

Failure to take into consideration the stages of cognitive development advanced by Piaget serves to confuse and confound the teaching and learning of both national and foreign languages (Shayer and Adey, 2002). This occurs particularly in the provision of materials and tasks associated with the learning of reading and listening. However, while it is appropriate to undertake the cognitive acceleration of reasoning skills at appropriate stages in school learning since both reading and listening involve the employment of reasoning, it is also necessary to recognize the importance of the idea of a zone of proximal development advanced by Vygotsky (1978, 1986). Nevertheless, it is necessary to recognize that the responses of students are probabilistic in nature, but advancing up a scale of learning at different levels and at different rates for each different individual.

TIME AND OPPORTUNITY TO LEARN

11. Can policies be developed for the learning of languages in developing countries?

In many developing countries of the world it is necessary for young people to learn at least three languages, namely their mother tongue (L1), that is spoken in the home, the national language (LN) that is spoken throughout the country in which the students live, and a foreign language (LF), that is rapidly becoming English in non-English speaking countries in order to obtain the benefits of globalization and engagement in trade. The findings of research indicate that it is unwise to commence the teaching of the national language (LN) in situations where it is not the mother tongue (L1), until the child has mastered the skills of listening, speaking and reading in the mother tongue (L1), arguably at the fourth grade of schooling (Marhum, 2005). Likewise, the findings of research seem to indicate that it is unwise and possibly unnecessary to commence the teaching of a foreign language (LF) until students have mastered not only the skills of listening, speaking and reading, but also those of writing at the end of Grade 6 or the end of primary schooling. However, this leaves a bare six years for the development of competence in all four domains of listening, speaking, reading and writing in a foreign language. The learning of languages in schools makes heavy demands on the time available in the school curriculum at all levels, but especially if students are to attain competence in their mother tongue (L1), their national language (LN) and foreign language (LF), commonly English.

12. Can more effective policies be developed for the more effective learning of foreign languages in developed English-speaking countries?

Under the existing matriculation examination schedules in most developed English-speaking countries, very few students continue with the learning of a foreign language after an initial two or three years of learning at the lower secondary school level. It seems that the skills of symbol processing need to be well developed in a national language (LN) before efforts are made to commence the learning of a foreign language (LF) in a formal classroom situation. Where the teaching of a foreign language is commenced at primary school level it seems best restricted to listening and speaking that language, while working in narrative or story situations, with some introduction of students to the culture associated with the language involved. Simple written word recognition and the writing of familiar words seem meaningful, at the primary school level, without the introduction of language usage and grammar.

At the middle and upper secondary school levels, listening and reading and increasingly viewing together with listening, seems to be appropriately based upon stories that portray the operation of key values. Subsequently the universal values and virtues can be introduced, that are expressed not only in the context of the national language (LN), but also in the context of a foreign language (LF). The gradual introduction of the abstract ideas associated with values and virtues can help to advance cognitive development, at the middle and upper secondary school levels, in the same

manner as narrative and historically based accounts of events seem to be appropriate during the transition from the concrete to higher levels of cognitive operation during the secondary school years. The premature teaching of so called 'critical literacy', that seems to involve highly abstract levels of thinking appears to be better taught and learned at the university or adult education levels of education and not prematurely introduced during the years of secondary schooling.

CONCLUSIONS

Students from China, Indonesia, and Japan as well as from other countries of East and South East Asia are coming to Australian universities in increasing numbers to enrol in undergraduate and postgraduate courses in order to return to their homelands to teach English as a foreign Language (LF). At the same time the teaching of foreign languages in Australian universities is struggling to continue in operation. This is partly a consequence of the existence of so many foreign languages that have claims to be taught in Australian universities without a single language that has a dominant place. The two languages that have the strongest claims are arguably French and Chinese. French has a traditional but perhaps declining place in foreign language learning throughout the world, while Chinese has an emerging role in modern Asia.

With several universities now operating in all major cities of the Australian mainland, the rationalization of the teaching of languages other than English appears to be necessary together with an obligation to sustain a teaching force that can operate effectively in the secondary school systems throughout Australia. Furthermore, the development of scales of performance in listening, speaking, reading and writing alongside an understanding of the associated culture, is now capable of setting goals, curriculum objectives, and standards of performance to be attained at different levels of schooling. Unless concerted efforts are made to advance in a systematic way the learning of foreign language in Australian schools and universities, the people of Australia must rely on immigration and the acceptance of English as the global language to maintain its position in a world that is going to be increasingly dominated by people whose national languages are no longer English.

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A tension for Spanish teachers' professional development: "skills to carry out your job" or continuing "...personal cultural knowledge and attributes"?

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This article is a critical reflection on a study of the views of Spanish teachers in South Australian schools about their professional development (PD) needs and experiences. Officials responsible for designing Spanish specific PD were interviewed. Sixteen teachers were randomly selected from private, public, country and metropolitan middle schools and were interviewed using a semi-structured questionnaire with an open-ended response format. Non-native and native Spanish speaking participants formed the cohort. The findings of the study revealed that within-system weaknesses and individual-identified locus of control, were barriers to Spanish teachers' PD and growth. Tensions existed between teachers and officials' expectations of PD which influenced participants' views of PD and achievable outcomes. The findings suggest participatory strategic negotiations are required if both parties are to improve the perceptions of the value of PD provisions and outcomes.

Spanish teachers, professional development, Provider, Learner Partnerships,
teachers' views, perspectives

This project investigated the perceptions and needs of teachers of Spanish and included a group of 16 teachers, a third of the teacher population, from metropolitan and country South Australia. The project also involved interviewing officials engaged in programming and planning PD for Spanish teachers in schools during and prior to 1999. During individual interviews, participants were asked to reflect on what first came to mind when they thought of PD and discuss their past experiences with PD and evaluations of providers and provisions of Spanish specific PD. A rating scale was provided to teachers for them to rate PD forms. The purpose of this investigation was to understand what PD existed for Spanish teachers, to seek Spanish teachers' evaluations of PD undertaken and to examine teachers' perceptions of their needs and goals for learning. The teacher participants were practising Spanish teachers at the time of the study. The officials' group of participants were directly involved in the planning and execution of PD for Spanish teachers. In the country and metropolitan cohort of teachers and the group of officials, there were native and non-native Spanish speaking participants.

It has been argued that first-hand accounts of teachers' perceptions and experiences should influence the content and methods in any teacher development program, if it were to engage actively teachers in their learning (Commonwealth Department of Employment, Education and Training 1991; Dawkins 1990; Hughes 1991; Lawson, Hattam, McInerney & Smyth 1997; McMillan 2003; Abadiano & Turner 2004). The perspective that underlined this study, viewed positive reform as being essentially generated through contextual understanding, researching firsthand accounts and individual perspective valuing because change, as Le Roux states, might

happen to us but innovation was not only dependent on individuals but also on collective will (Driscoll and Halloway 1994). This perspective was essential to this study's understanding of teachers' perspectives and voices. In the following discussion I will explain what the perspectives of teachers and officials were and the resulting implications for PD and teachers' learning.

WHY ARE TEACHERS A MAIN RESOURCE FOR PD?

Spanish teachers' voices and perspectives, often absent from language teaching research published, were considered to be a fundamental missing piece in the tapestry of Spanish language teacher development programs. These were found to be lacking, based on a number of teachers' and officials' reflections of PD provisions prior to 2000. Teacher perspectives have been reported to be a requirement for promoting participants' willingness "to engage with all issues involved in teaching-and-learning how to interact and communicate interculturally" (Scarino & Papademetre 2002, p.2). However, published formal needs analysis of these teachers was apparently non-existent at the time.

In 2000, the results of a survey of needs were published in the *Newsletter of the Spanish Language Support Service R-12 South Australia* (DECS 2000). The survey reported that: 40 percent of Spanish teachers stated that their oral proficiency was basic, 25 percent stated that it was efficient, 20 percent stated that they were fluent, and 14 percent stated that they were very fluent¹. It would be imperative to understand more about Spanish teachers' levels of proficiency in order to prepare PD adequately for the group. Despite the reported low levels of proficiency, the PD offered, appeared to not address directly Spanish teachers' needs, ignoring the recommendations of a two decade old report (SAIL et. al 1989) for language-level specific PD. This situation was complex and provisions did not depend entirely on the good will and enthusiasm of providers. These committed individuals had advocated the teaching of Spanish in South Australia for many years. External federal and state support was clearly needed in order to support teachers and providers of PD. The recent review of PD sessions has shown little promise in this area.

PD sessions in 2005 (DECS 2005) showed that little transformation had been achieved, specifically to extend teachers' individual proficiencies and cater for their interests. PD sessions for Spanish teachers included nine sessions in total with PD for understanding SACSA, DELE testing, generalist PD for more advanced levels and one session on action research. In contrast, Japanese teachers PD (DECS 2005) included over 20 sessions for PD related to SACSA, general PD, language practice, enhancing linguistic proficiency, use of ICT in the classroom, Intercultural Language Learning, Curriculum Leaders' Training and specialist courses for beginning language practice. This PD program showed an advance in depth, quantity and variety in comparison to offerings for Spanish teachers prior to 1999. This would also appear to apply to the program in 2005.

The findings of this study and a recent review of PD initiatives show that there is a need for ongoing research in this area since little has changed to personalise PD for Spanish teachers. It seems as though departmental initiatives continue to dominate the programs of Spanish teachers' PD (four out of nine sessions offered in 2005 in total). *A Review of Teacher Education in NSW* (DET 2000) stated that "freedom of choice for teachers in schools is almost non-existent. Teachers' professional development is directed at the system's requirements" and this issue is prominent in the interviews conducted in this study.

¹ The survey's sample size was not published.

THE STUDY'S INTERVIEWS

The interviews used in this study were semi-structured and enabled an in-depth open-ended response. The design of the interviews allowed teachers and officials to express their views openly. This generated opportunities for gathering rich data and challenging the researcher to develop appropriate and dynamic coding procedures. Taylor and Bogdan proposed that requesting access to and acknowledging the teacher's own words increased the reliability of the data (Burns 2000 p.424).

RESULTS AND IMPLICATIONS FOR PD AND SPANISH TEACHERS' LEARNING

From this study's data it was evident that a majority of the Spanish teachers and officials interviewed suggested that the PD provided was largely ineffective because it did not address individual linguistic and cultural needs. Research had shown that PD was not only central to maintaining high teaching and educational standards but also to influencing the process of extending students' learning (Guskey in McMillan 2003). Since ownership over learning was imperative to sustainable learning and its outcomes (Abadiano & Turner 2004), a gap existed between PD provisions for Spanish teachers and their perceived utility. The interviews of Spanish teachers illustrated that the individual teachers experienced low morale regarding the PD they had undertaken. This was considered to be a negative influence on teachers' participation in PD.

In this study Spanish teachers' reflections of their participation in PD coincided in nature with the findings in other research into teachers' views of PD (DET 2000; Evans 2000; Goodfellow 2002). In these studies top-down style PD was reportedly considered not relevant or appealing to potential learners (Abadiano & Turner 2004) since PD often involved teachers in passive learning of "the latest ideas regarding teaching and learning from experts" (Klingner 2004 p.248). This weakened the promotion of teacher autonomy in learning (Wajnryb & Richards In McMillan 2003). Spanish teachers stated in this study that PD was "a means to acquire skills", "meet employment requirements" or "skills to carry out your job". These definitions emphasise how in some cases teachers themselves adopt passive attitudes to PD.

In the available research literature, teacher direction in teachers' learning was generally rare, as was the case with Spanish teachers and their involvement in PD. Today, further initiatives have increased teacher involvement. The Spanish Teachers Association of South Australia had more recently sought teacher expertise in planning annual conferences. Teacher expertise was considered essential. One teacher stated that "you never finish learning, students are changing and you need to update learning and experience", illustrating that the task was ongoing, required ownership and sharing of ideas, an ideal situation at conferences for Spanish teachers and their PD. Two teachers said that PD was about "learning and growing", one of them concluded that it was vital and helped overcome isolation. The issues discussed have implications, ranging from positive to damaging effects of influence on teacher motivation for undertaking PD. A general lack of hope in Spanish language teachers' perceptions of PD prior to the year 2000 was of concern to teachers and trainers. This was a local and global issue in nature and effect.

International and Local Barriers to Teachers' Professional Development

On an international level, educational reform in the teaching of foreign languages, in America (Guntermann 1992; Modern Languages Association 1978), the United Kingdom (Howard & McGrath 1995), Japan (Arani & Matoba 2006) and Australia, has demonstrated increased expectations of language teachers, particularly in terms of the definitions of what counts as quality teaching and in-service education in foreign language teaching. In South Australia, this has led to the specification of standards of professionalism for teachers of languages and cultures (AFMLTA & DEST 2003). These expectations are extremely high and on some level, offer contradictory messages and demands for classroom practice, adding to the workloads of language

teachers (Arani & Matoba 2006). Spanish language teachers, who were teachers of a minority language in an educational system shifting away from the languages of Europe (Scarino & Papademetre 2002), despite the increasing recognition of the Spanish language and its varieties in curricula around the world, faced major challenges in South Australian schools. There was limited relief for them at times when they embarked on the journey of their own learning. These challenges continue to impact on teachers' learning and PD needs today.

Around the world, Spanish departments also met with higher demands to respond to an increased number of background speakers as well as meeting the technological and globalized social order's needs. The changing conditions affected aims and outcomes of PD. In Australia, with the influx of native Spanish speakers in Australian courses (In press 2002 EFE News Service) there is also a need to adapt. In America, this growth has shown that some departments are "ill equipped" to respond to new and renewed needs (Stavans 2005). How well we can deal with this issue is unknown and appears to have not attracted the attention of research workers and scholars.

Without teacher motivation for the provision of PD, educational progress may stagnate. A belief in teacher motivation underlies most policies and official debates that have shown renewed interest in teachers' PD. These interests sometimes ignore the importance of the process of prescribing PD. Scarino and Papademetre (2002) rightly argued that often debates about standards of professionalism were complex given that they aimed to consider the needs of those affected by reforms and changes, as well as the context of their needs, while also considering educational department agendas, where issues of politics and association could not be ignored. In this study, negotiations were examined and reported to be limited. Initiatives were mostly organised and executed by official bodies. Although policies encouraged teachers to take control of their learning, through a wave of devolving responsibilities, barriers identified within the system appeared to obstruct commitments to sustained PD. Spanish teachers' views illustrated this.

Considering needs in context requires: "learning" and "growing"

Throughout the period of this investigation, no published accounts or government reports were located in the area of Spanish teachers' PD needs or expectations. To some extent, this illustrated that so-called 'top down' initiatives might be in place. Without formal individual and group feedback about needs, and the inclusion of the parties affected in the process of PD design and implementation, it would seem that the parties involved lacked an understanding of the relevance and motivation for system and individually driven learning. Needs would appear to have been completely overlooked.

It has been argued that "unsatisfied learning needs tend to have an adverse effect upon work performance" (Green 1996 p.78; Evans 2000). Evans added that: "Individual's needs determine their values and ideologies-which, in turn, through an iterative process, determine their needs-and these combine to shape individual's conceptions of, their 'ideal' job" (Evans 2000 p.176). For this reason, providing teachers with opportunities for learning and transforming the PD for these teachers across the whole period of their careers (Kist 2006) would be essential to future PD. Banking on the already existing hunger for both process and content, among the Spanish teachers, would be a great advantage.

Spanish Teachers' Definitions and Reflections

For Spanish teachers, professional development is a broad concept that is multidimensional in nature. PD is defined as the "skills to carry out your job", the "means to acquire skills" and the meeting of "employment requirements". PD was also considered to be related to [the teachers'] "own personal learning" and that of others, through "transfer of understandings" and resources. The majority of Spanish teachers' views were positive when defining PD and its potential to enhance teaching practice and status. For example, a Spanish teacher stated that PD helped

teachers become “involved” in their profession and another stated that “it aided the process of becoming better teachers and improving practice”. Table 1 presents information on the frequency with which Spanish teachers mentioned each PD form or issue related to PD.

Table 1: Frequency of Spanish teachers’ responses

Teacher Responses to: What do you think of when you think of PD for Spanish teachers?	Frequency
Types of PD: workshop, hub group, conference, reading	81
Pedagogy; LOTE practice and methodology	51
Content- Generalist courses: Mandatory Reporting; First Aid	46
Personal; growth, extension, interest, learning, satisfaction	19
Affective Responses; positive, neutral and negative reactions in talking about PD	18
Learning methods; observing practice; analysing materials	16
PD providers; STASA, Curriculum Officer for DETE, SSABSA	16
Travel - Long term exchange; in-country experience	11
Network; working with other teachers or native speakers	9
Time; in school; out of school; having enough time; time to reflect and digest new understandings	5
Curriculum Resources; ALL: Statements & Profiles; SACSA	4
Place: in the city, in the country	2
Immediate: something which can be put into practice instantly	2

Most Spanish teachers discussed PD as a process and an ongoing exercise. One teacher mentioned that it was necessary if a teacher was to be up to date in theories and methods of current value and application. It was perceived to be for personal and professional growth, implying that it might be self-directed. One teacher stated that engaging with PD was about recognizing the importance of the language and “keeping the language going”. This would imply that teaching was almost like a form of cultural work and activism for the language. PD should therefore also support teachers’ roles as cultural workers.

On the other hand, more passive views were held on the matter. One teacher stated that PD was only for non-native teachers and recent graduates. Another believed that PD was a “waste of time”. A majority of teachers’ identified PD forms in a discussion of their preferences, which were largely other directed. Table 2 gives the most preferred forms of PD discussed by Spanish teachers. The teachers completed a rating scale for preferred forms of PD. Responses are listed in Table 2 in no particular order.

This table shows the types of PD mentioned by Spanish teachers. Generally, Spanish teachers were positive towards the PD forms listed in Table 2. The average rating was 8.0 on a rating scale of 1 to 10. However, an analysis of the responses of individual teachers showed quite distinct preferences. In addition the analysis of the ratings of metropolitan and country teacher subgroups yielded no statistically significant differences in preference for certain forms. A Mann-Whitney non- parametric test was used and differences in mean ratings of the two groups of teachers were examined, showing no differences in mean ratings. A qualitative analysis provided an in-depth perspective of the group of Spanish teachers’ perspectives and needs of individual teachers showed how the group and subgroups identified certain forms, with more frequency and how some of these were related to needs, contexts and individual choice with variations across cultural and demographic contexts. For instance, in teachers’ discussions PD was identified as a form of training and a means to assist teachers with programs, gathering and sharing ideas and work products.

Table 2: Types of PD valued by Spanish teachers

Delivery & Content of PD	Formal PD	Informal PD
Face to face	Workshop	Conversation
Listening	Reading	Social events ie. Fiesta
Video conferencing	Planning units	Talking with natives
Structured and strict demonstrations	Across the curriculum	Sharing ideas and work with teachers
Viewing curriculum documents	Hub group	Listening to music
Level specific	Action research	Watching a film
Overseas guests and speaking to natives	Understanding the system	Travel
Exchanging resources	Travel	Dancing
Culture	Conference	
Cooking		
Incorporating Spanish		

This view was common in previous research. Studies have claimed that teachers viewed knowledge generation and knowledge learning as part of a process of transmission rather than creation, with a focus on practical application (Collinson & Fedoruk Cook 2004). This was quite different to constructivist beliefs which guided much educational policy and the current SACSA framework. On the other hand, Spanish teachers often discussed the importance of PD that involved talking and working with others and being “able to take things back to the classroom”.

The discussion of teachers' views illustrates the value awarded to collaborative networking and rapid investment desired by teachers in order for PD to be effective. This encourages a degree of passivity which may be encouraged by the pace and style in which changes take place in education, stressful workloads and how time and support are managed. This discussion of the qualitative analysis emphasizes how this group of teachers' lack of homogeneity is better understood by interpreting the similarities, differences, nuances and counterproductive views, in the context of their identified needs and current social, professional and demographic contexts. Moreover, this affects future plans that are required in all considerations of these teachers' learning.

The complexity of the range of definitions illustrated that the teachers perceived the locus of control over learning in a majority of instances, as residing with providers of PD. However, native Spanish speaking teachers often said that they took care of their own PD. One non-native Spanish teacher stated that if she wanted to find out something about Spanish culture that she would have to do it herself. Through the interpretation of teachers' and officials' words it was revealed that there were obvious differences between these parties. Views about PD were in some areas in direct opposition. The examples of teachers' words are employed here to demonstrate how complex the group's needs are.

Officials Perspectives

Officials interviewed in this study held quite unique views of what it meant to be engaged in professional development. When asked to define PD officials talked about “teaching” and “skills needed for the classroom”, holding here similar instrumentalist approaches toward learning and application, as were exhibited in some of the teachers' views. Two officials stated that PD was needed to have “a high level of linguistic proficiency”.

In contrast to the group of teachers, officials generated a list that included a greater scope and variety of formal and informal PD forms. Some of the PD forms included training, reading, working with colleagues, action research, undertaking scholarship work, networking with colleagues, attending conferences, programming work and participating in unit and assessment writing. Most officials valued studying abroad, participating in curriculum and resource development and indicated an interest in “having teachers' input” into these areas. One official stated that establishing “open networks” with colleagues was very important. Another official

stated that PD supported a teacher's capacity to develop "personal cultural knowledge and attributes". The need for critical, personal reflection on one's knowledge, language and culture was highlighted as part of this process. One official summed up the self-directedness valued by officials, for Spanish teachers' PD. He stated that PD was a means to "insight [or for my] own curiosity", "keeping up-to-date with own academic interests and continuous learning". Another stated that PD needed to encourage and support people "to do their personal best". She later added that PD was more than "what they [teachers] do in the classroom but for what they do for personal enrichment". This official believed that teachers should aim to be "reflective practitioners" and to understand the idea that "it is threatening", to be a lifelong learner, but that "it is very liberating".

Officials Evaluations and Reflections Regarding PD for Spanish Language Teachers

Officials' were asked to evaluate PD provisions and one concluded that for PD to be successful, it needed to provide "a balance" between the needs of providers of PD and those of an audience of a "reasonable size". It was his belief that this was not the case in the past. He proposed that "PD hasn't been thought for teachers on a career levels basis". Three officials, a majority of those interviewed, stated that Spanish teachers' attendance at PD was poor; an issue which made addressing needs difficult. One official stated that there were many important and valid reasons for this. She proposed that teachers were overworked and that a "kind of siege mentality" existed which was a factor holding teachers back. This official also stated that some people clearly resisted change while others embraced it.

A study of what PD worked with teachers claimed that unless teachers perceived changes to be relevant to "their situation, then change isn't likely to occur" (Abadiano & Turner 2004). Other research has claimed that "imposed changes which affect the things they value the most can mean that teachers can no longer find a match between their aims and purposes and those prevailing in schools" (Sikes, in Evans 2000 p.185). It is important to note here that these are influential issues and generate implications for teachers' learning and motivation to undertake PD, but also for work satisfaction. These issues affect Spanish teachers' participation in concrete ways.

Obstacles to Spanish teachers' PD

Spanish teachers' PD is bound to be problematic, given that these teachers possess unique individual interests, a wide range of educational levels and are at different career stages. Spanish teachers hold a variety of approaches to learning and teaching and motivation for their area of work. This variety presented a challenge for providers who had been found to prefer PD that valued a "one size fits all mentality" (Klingner 2004). The impacts on education systems and institutionally driven changes to the environments in which teachers' work and learn played a major role in teachers' perceptions of PD and the obstacles produced, especially with respect to whether they perceived PD to be a necessity, an obligation, a burden or a waste of time. PD was therefore dynamic in many ways and teachers appeared to engage in PD as consumers, creators and collaborators but also with a variety of degrees of interest, enthusiasm, apathy and resistance. This was evident across the group of Spanish teachers interviewed and should be taken into consideration when seeking to understand how obstacles could be created on both sides of the fence.

Spanish Teachers' relationships, with the school community and support from administrators, varied with teacher and context. Most teachers stated that although they appeared to receive support, the range of support and strategies to avail Spanish specific PD support and funding, were greatly limited. Lack of school and administrative support was a popular issue in research

into teachers' PD (Klingner 2004) and this created damaging effects for teachers' work and emotional wellbeing.

When Spanish teachers' interviews were examined for affective responses, tensions were revealed. Five teachers, native and non-native Spanish speakers, were negative towards the PD they had undertaken. Three teachers were neutral to PD and eight teachers expressed clearly positive attitudes to the PD they had undertaken. In a study on effects of change on job morale and satisfaction a teacher stated that at times teachers got into a routine of work and that this affected their levels of satisfaction to the extent that "they tend to look outward for the root of the problems, rather than looking inward" (Evans 2000, p.182). This would appear to apply to some approaches taken by a few of the Spanish teachers and officials interviewed in this study. It should be noted that counterproductive views were also held.

Few teachers (three) thought that PD was unnecessary or could be a waste of time. One official stated that "advisers should lead intellectual debates". The former views would contradict the popular and contemporary view that teachers should facilitate lifelong learning by being lifelong learners themselves. The latter diverged from current PD trends supported by the group of officials' interviewed which promoted teacher autonomy, by suggesting a top-down approach. These views illustrate how dichotomies and overgeneralisations fail to capture key views that may stand in the way of change or empowerment.

Spanish teachers perceived a number of internal and external school factors, some that affected the group and others' that affected the sub-groups to a larger extent. For instance, country teachers stated that issues of distance, access, time, school support and lack of opportunity to speak to other speakers and teachers of Spanish affected them. All country teachers highlighted the issue of language teacher isolation. One teacher said, "the monocultural aspect of rural life is very so different to the urban lifestyles" and that "here in country SA a lot of people are still very"... "behind in their multicultural intellect", when reflecting on support mechanisms in and outside the school. The changes that were driven by the SACSA framework at that time, in its early stages, for instance, were also perceived to be creating new pressures adding to the existing lack of support for languages in schools. A teacher commented on this issue saying that:

The Department is making so many changes by doing the SACSA framework, Partnerships 21 all those sorts of things, putting different priorities on school budgeting, on school curriculum and so on and really in rural South Australia I don't think that a lot of people still conceive a need for LOTE to be one of the main 8 areas for kids education.

Most country teachers mentioned often that isolation was a big factor and that distance, lack of administrative and community support, affected in different ways their participation in PD sessions. Some perceived PD to be planned ignoring school schedules and driving time to the session, since 37.5 hours were expected for PD by the Department for all teachers without concession, and that PD provisions were either too basic or irrelevant to their needs. A teacher shared his frustration with PD planning. He said it was organised mostly: "from 4 o'clock to 7 o'clock in the city", and that he would therefore need to ask for the afternoon off "to travel two to three hours there and back". The issue of time was not only an issue for country teachers' work but also for their wellbeing. Lack of time has been a perennial issue for teachers (Collinson & Fedoruk Cook 2004). Time was a recurring theme in all of the teachers' interviews.

The metropolitan teachers perceived obstacles to include the costs of attending PD and the lack of budget and government funding provided to support Spanish teachers. A lack of funding for providers was also discussed. A teacher stated that one provider's funding was being cut, a reduction that affected her ability to service needs. Although teachers discussed the language support services and language advisers as being very helpful in their involvement, teachers

mentioned that they were rarely available on site or in an ongoing way given that the advisers themselves, despite their commitment and enthusiasm, lacked government support and adequate funding. One teacher said that the range of linguistic proficiencies of providers was positive and comforting. In contrast, one non-native Spanish speaking teacher from the country stated that officials' proficiencies were low and that he: [did not] "need to be taught by someone who [knew] less than [him]". Four teachers mentioned that PD providers' proficiencies were low. Three teachers added that PD providers often lacked appropriate qualifications and teaching experience meaningfully to "meet their linguistic needs". Other obstacles mentioned by metropolitan teachers included the age of employment, level of proficiency in the Spanish and English language of some teachers, not having access to a language consultant in 1999 and excessive paperwork required to apply for PD. Teachers stated that sufficient time was not released for PD, especially to study abroad. The imposition that teachers used "in-class time" to attend PD sessions, giving up student time, marking, family and teacher time was often mentioned to be a major obstacle for PD. These views were complex and continued to illustrate the myriad range of reflections and expectations and the perceived impediments that impacted on participation in Spanish teachers' PD and future participation in PD.

CONCLUSIONS

There are a number of implications from the analysis of the group of teachers' perceptions of PD. The apparent lack of faith in provisions does not distinguish this group of teachers from those prominently reported on in educational research and research into teachers' learning and training (Ayres, Meyer, Erevelles, & Park-Lee, 1994). There appears to be a lack of consistency, effective networking and partnerships engaged in obtaining critical feedback, throughout the process of planning and implementing PD for Spanish teachers. This appears to be counterproductive to teachers' learning and participation in the PD provided.

A review of provision and an analysis of needs with regard to Spanish teachers' linguistic skills and cultural knowledge, for Spanish language and cultural learning and in some cases, for learning the English language and innovative Spanish language teaching methods, appears to be well overdue. Officials and teachers appear to be well prepared to develop these partnerships. An official's suggestion to audit teachers and providers is considered to be an important step towards dismantling barriers that exist in providing PD to Spanish teachers at some level. A current review of these contexts must not be delayed, though it is envisaged that this is a sensitive issue for PD providers and participants to deal with. It is likely that collaborative partnerships and efforts may minimise the negative impact of approaches which neglect either party's needs.

Given the range of needs and views discussed in this article, one teacher's comment stands as a highly valid point: "you can never say you'll provide PD for all Spanish teachers because needs are too diverse". It is proposed in this article that this is especially true if top-down approaches are used. The challenge for PD providers; teachers as self directed learners and officials as learners and providers, is to understand and acknowledge that PD should be:

concerned with creating improvements in educational practice and the social relationships that underlie those practices, and ought to be about crafting and living out mutual forms of accountability among teachers, administrators, parents and students (Smyth 1995).

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Key factors that influence recruiting young Chinese students

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The discussion in this paper is based on the assumption that international education is equated to recruiting and educating international students, even though its true concept goes far beyond this narrow understanding. The purpose of this research is to look at the key factors that influence recruiting young Chinese students, and make sure all who work in this field understand how their business will achieve success.

This is done through an analysis of the Chinese education system, the history of young Chinese students studying abroad, China's economic outlook, the Australian and Chinese governments' attitudes and international education policies, and the expectations of the students and their families. The article concludes with some constructive recommendations and suggestions.

Chinese students, study abroad, recruiting business, education.

INTRODUCTION

According to Australia Education International (AEI), the total full-fee paying international student enrolments in Australia during 2006 reached a total of 383,818, of which China accounted for 23.5 per cent (90,287). Meantime, the total commencements of international students reached 211,296. Table 1 presents data on enrolments from different countries and the growth in enrolments in 2006.

Table 1. Enrolments from different countries and the growth in enrolments in 2006

Nationality	Enrolments	Percentage of Total	Growth in on 2006
China	90,287	23.5%	10.5
India	39,166	10.2%	41.9
Republic of Korea	31,257	8.1%	18.8
Hong Kong	20,523	5.3%	-3.8
Malaysia	19,166	5.0%	-1.0
Thailand	17,889	4.7%	8.3
Japan	17,804	4.6%	-6.6
Indonesia	15,038	3.9%	-6.7
United States	12,045	3.1%	-4.3
Brazil	10,190	2.7%	43.9
Other	110,453	28.8%	12.3
Total - All nationalities	383,818	100.0%	10.9%

(Source: AEI Releases Annual 2006 International Students Enrolment Data, Wednesday, 21 February 2007)

The Higher Education sector is where most international students are enrolled; the market share is as high as 45 per cent. The market share of the school sector used to be 14 per cent in 1994 and is now reported to be around 6.5 per cent of the total market. However, in South Australia, according to a 2006 Parliament report (Parliament of South Australia, 2006, The Impact of

International Education Activities in South Australia, Twenty Fourth Report of the Social Development Committee), the total enrolment of international students is 17,936, of which the school sector has 1,964 contributing nearly 11 per cent. Within the school sector, China is the largest resource country which accounts for 45 per cent compared with 42 per cent of the national situation.

It is an AU\$ 7.5 billion industry according to the Federal Minister Hon. Julie Bishop MP at the International Education Forum 2006 but is re-estimated as an AU\$ 9.8 billion industry (AIEC Perth, 2006), which provides at least 15 per cent of university revenue and creates at least 51,000 jobs for the nation. Obviously all states across the country have benefited significantly from this industry. Australia's economy without international students would definitely be very different.

As an International Business Manager responsible for the China market for the South Australian Education Department I understand many schools are interested in recruiting young students from China and they have put considerable resources into the recruitment process. However, while some are successful, many have not achieved as satisfactory a result as they had expected. People would be curious to know **why**? This paper explores the reasons and helps us understand why young Chinese students choose South Australia for their overseas education.

METHODOLOGY

As a skilled marketing person, I have had very rich experiences in dealing with Chinese education agents and students on the frontline. This research has involved a questionnaire, interviews and critical incidents as well as participating in a few international education conferences to investigate the key factors that affect the international education business and to illustrate how we may be more successful in this industry.

Education Profile of China

China is a heavily populated country. Even though the Chinese Government has made great efforts to control the growth of its population, the population of China, however, in January 2005 exceeded 1.3 billion.

In China, education is divided into three categories: basic education, higher education, and adult education. Basic education in China includes pre-school education, primary education and regular secondary education. The Compulsory Education Law stipulates that each child has nine years of formal education. Secondary education in China can be divided into academic secondary education and specialized/vocational/technical secondary education. Academic secondary education is delivered in academic lower and upper middle schools.

Lower middle school graduates wishing to continue their education take a locally administered entrance examination, on the basis of which they have the option either of continuing in an academic upper middle school or of entering a vocational secondary school.

The latest figures show that in recent years the secondary school education system had developed steadily: in 2004, the total enrolment was 92.64 million¹.

The History and Reasons for Young Chinese Students Going Abroad for Study

Education is regarded as being above everything else in China. The beliefs that "education, the treasure within" and "education, the beauties within" are deeply rooted into and have become part of China's tradition and Chinese culture. For centuries China stood as a leading civilization, outpacing the rest of the world not only in the arts and sciences but also in the size of its economy. Until 1820 China accounted for about one third of the world GDP. China attracted

¹ <http://big5.china.com.cn/chinese/ch-sz2005/kj/kj.htm>, viewed on 11 June 2006

many people from overseas including westerners who came to learn its advanced technology, its culture and its history. Unfortunately in the nineteenth and early twentieth century's, because of the inability and corruption of the Qing government, the country was invaded by foreign troops. This was followed by civil unrest and major famines, China was left behind by the western countries, and it was from then on that people began to realise and think about the importance of studying abroad to learn from western countries.

The Contemporary history of overseas study

Rong Hong was believed to be the first young Chinese student to study abroad. After seven years study at Yale University in the Unites States, he returned to China in 1854 (Yao 2004). It was under his advocacy, and with the strong support from senior government officials that the Qing Government launched a government-sponsored pilot scheme of sending young Chinese student to study advanced technology and culture in western countries. So the first group of 120 young students, aged between 12 to 16 years, were sent to the United States between 1872 and 1875. Even though the plan was abolished due to the conservatives in the Qing Government, some of the young students who returned made significant contributions to the process of China's modernization and achieved success in their professional careers. These included the railway engineer Zhan Tianyou, and Tang Shaoyi the founder of Fudan University and the first Premier of the Republic of China who inspired the later generation of overseas students.

Given the contribution that the Western values made, and the role that the returned overseas Chinese students played in the Republic Period, and in contemporary Chinese history, studying abroad became more fashionable later despite the change of governments until the Cultural Revolution in the 1960s. Wang (2005, pp5-14) classified the trend as: the first generation from 1872-1900; the second generation from 1900-1927; the third generation from 1927-1949; the fourth generation from 1949 -1965 and the fifth generation is from 1978 to today.

1978

It is obvious that there was a major 'gap' from 1965 to 1978. This was because of the Cultural Revolution in China during this period.

The year, 1978, in China's modern history is regarded as a 'watershed' date, as from then on the Chinese Government began to carry out its reform through the so-called 'Open-Door' policy. Chinese intellectuals welcome this reform as their 'spring'.

The man who steered the reform was Deng Xiaoping, the most influential leader after Mao Zedong, who himself also had the experience of studying abroad (in France). Deng Xiaoping ordered the State Council to work out a policy to expand academic communication with foreign countries and to support students and scholars studying abroad. Since then (1978), according to *People's Daily Overseas Edition* (27 February 2007), there have been more than one million students and scholars who have been sent (sponsored by the Government) or gone (self funded) overseas to study.

The word '*Hai Gui*' was created especially to refer to those returned overseas students. '*Hai*' means 'sea' and '*Gui*' means 'turtle' which in Chinese has the same pronunciation as 'returned'. So '*Hai Gui*' really refers to the 'returned overseas students'.

Going abroad to study has become a fashionable aspect of culture in China today.

Dream of Hai Gui

According to statistics from the Ministry of Education P.R.China, in 2001, 51 per cent of leaders of universities administered by MoE, 80 per cent of the academics, and 90 per cent of the deans in the universities have had the experience of studying abroad. By 2005, *Hai Gui* has accounted for

more than 94 per cent of all middle-and-above management leaders of the China Academy (Wang et al. 2006, p.4). In future the figure will be even higher. *Hai Gui* are not only playing their roles in the academic world, but also in government, in politics, in economics, in military and foreign affairs, in technology and in all walks of China's society.

Hai Gui have changed not only their lives and their careers but also the course of China's modernization, and China's twenty-first century and beyond. They are highly regarded by the government and the society, awarded with eye-catching salaries and prominent positions. The value of foreign qualifications and the so-called 'fame and gain' the returned overseas students have obtained aroused the strong interests of young students to follow their example.

The out of step education system

During the past few decades, China's economy has boomed, so that China has overtaken the United Kingdom since 2006, becoming the fourth largest economy in the world². Alongside this economic development, China's education has also achieved great success. However, the education system has not kept pace with the economic development. Mooney (2006) writes in Beijing:

Chinese higher education lacks creativity..., "Our universities give you knowledge, but not the ability to do critical thinking," says Hu, of the Shanghai academy.

Students complain of instructors who stand in front of the class reading from a textbook, barely bothering to look up from the pages. "The old professors prepared their notes five or ten years ago, but a lot of things have changed since then," she (Ms Tang, a recent graduate of a university) says. "They're divorced from society."

Chinese scholars say respect for authority also holds students back. "In a Confucian society the teacher tells the truth and you don't question it," says Hu. The tradition discourages open discussion in the classroom and the possibility of students' challenging their professors.

In the school sector, even though the Chinese government has increased the number of university places, competition is still very strong, that leaves curriculum reform in a 'dead' situation. According to one newspaper there were more than 9.9million high school graduates participating in the national entrance examination in 2006, but there were only 5.3 million places available, which means that about 47 per cent of the students were not able to continue with their higher education study. The competition is so fierce that high school students only sleep 5.5 hours a day according to an education official from a Municipal Education Department. So to avoid such fierce competition some students and their families may choose to study overseas.

The impact of the trend of globalisation

Students going to study abroad or student mobility is not only a feature of the Chinese system. Currently, it is estimated that over 2.7 million students study outside their home country, according to a conference held in Beijing in 2005 (*People's Daily Overseas Edition*, 18 November 2005). Projections by various institutions including IDP Australia, suggest dramatically expanding the demand for international education, doubling over the next ten years and then perhaps doubling again, with as many as seven million students studying outside their home country. The latest figure on the percentage of foreign tertiary students studying abroad reveals that:

² Wikipedia, the free encyclopaedia's website, [http://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(nominal\)](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)) viewed on 1 February 2007

- (a) out of every ten tertiary students studying abroad, four are Asians, three are Europeans and one is African;
- (b) half of all foreign students study in Europe and almost one-third are in the United States;
- (c) three countries host half of the world's foreign students (United States, United Kingdom, and Germany) adding in the next two highest hosting countries (France and Australia), these five countries serve two-thirds of the world foreign students;
- (d) while 30 per cent of all foreign students are in the United States, they represent only 4 per cent of this country's tertiary students, while in the United Kingdom and in Germany, foreign students make up one in ten of the total tertiary enrolments and, in Australia almost one in seven;
- (e) eight out of ten foreign European students study in another European country;
- (f) three out of five foreign students in Europe are studying either in the United Kingdom, Germany or France.

(Source: *Tertiary Students Abroad: Learning without Borders*: UNESCO Institute for Statistics, 2005)

China, as a member of the global community, is inevitably part of this trend.

Commercial feature

If the social contribution and personal career development are regarded as the inner drive in this trend, the commercial features have to be seen as the outer drive.

In the United States, the number of international students enrolled in higher institutions has reached 565,000 and the economic benefit to the country is estimated at US\$13 billion. (International Institute of Education Network Website, 2006) In Australia, the total enrolment has reached 380,000 students and the economic benefit to the country is believed to have reached AU\$ 10 billion. According to the Australian Government, in 1995, 5.9 per cent of total university income was tuition fee income from international students (IDP Education Australia 1997). This has now exceeded 15 per cent.

Some commentators criticize Australian institutions for being too commercial:

In Australian institutions, international education has been shaped largely by university leader-managers—particularly entrepreneurial presidents and marketing units—rather than by faculty. To seize niche markets, some universities have developed new programs almost overnight without much regard for shared governance or faculty ownership of the curriculum. (Marginson, 2002)

In South Australia, there were 17,936 overseas students in 2005, more than triple the number in 1998 (5,584). International students make a significant contribution to the State's economy, over AU\$553 million in 2005 (Philips, 2006), which accounts for approximately 0.9 per cent of the state GSP³.

A report from China indicates that in 1991, the number of Chinese students studying overseas was 39,000, but in 2006 this figure had reached 130,000 (People's Daily Overseas. Edition 7 March 2007). Given that most young students choose an agent to help them to apply for a letter of offer from overseas education providers, and students' visas, say the average spending is about Chinese Yuan (CNY) 10,000 for the service, this service only is a CNY 1.3 billion industry. The commercial push is obviously an unarguable factor. As school students are very young, agents play a key role in recruiting and referring students to the Australian school sector.

³ SA GSP 62,798m, <http://www.treasury.act.gov.au/snapshot/GSP/pdf>, viewed on 21 November 2006

In order to attract more international students, education providers also make every effort to provide a significant amount of marketing funds, and some providers even pay as high as 25 per cent of the first year's tuition fee as commission or incentive for their agents.

The Governments' Policies

Australia

As a report prepared by Sydney University points out,

Australia's participation in international education was facilitated through the Colombo Plan in 1950. The aim of the Plan was to assist Asian Pacific nations to raise their standard of living. Over the following two decades many students from Asia came to study in Australia. In 1969, Australian universities established the International Development Program of Australian Universities and Colleges (IDP). The original IDP charter was to implement the Australian aid program in higher education. However, since the 1960s the role of IDP has expanded under its new role of IDP Australia, acting now as a broker between Australian education institutions, foreign governments, and companies and funding agencies. [It is not surprising, as] the economic and social impact of globalisation has tended to supplant many of the earlier efforts of international co-operation. (An International University, Sydney University, 2003, Report of the Committee to Review Internationalisation)

I do not believe the original aims of international education still remain. I strongly agree with Skilbeck (2006) that "a dominant motif over the past two decades in Australia among several other countries has been international education as a tradeable commodity."

The Australian Government, for more than the past decade has seen international education as a new export industry, supporting the aggressive overseas recruitment activity by educational institutions. The May 2003 Budget included a comprehensive package of Commonwealth initiatives worth more than AU\$113 million over four years to support and expand Australia's international education industry (The Hon. Dr Brendan Nelson MP 2003). Moreover, in the same year a Memorandum of Understanding on promoting Australia Education Internationally was signed between Department of Education Science and Technology, Department of Foreign Affairs and Trade, Austrade, Department of Immigration Multicultural Affairs, Department of Industry Tourism and Resources, Australian Tourism Commission, and AusAID to strengthen the Australian engagement in international education and training and building up Australia's share in international trade, it is interesting to note that the original aims of international education are rarely mentioned in this document.

China

According to officials from the Ministry of Education, P.R.China, more than one million Chinese students and scholars since 1978 have gone overseas study, among whom 230,000 have returned to China⁴.

China's rapid social and economic developments owe a great amount to the nations' international education policy and its practice. The Chinese Central Government's policy in this regard involves supporting students and scholars studying abroad, encouraging them to return to China upon their completion of studies and guaranteeing the freedom of coming and going.

People's Daily Overseas Edition (20 August 2001) points out that "the new policy is meant to end the thinking that only those students who return to China are patriotic". "They will win the

⁴ http://www.chisa.edu.cn/chisa/article/20060606/20060606016180_1.xml , viewed on 8 June 2006

respect, encouragement and rewards by the government for their contributions to China, whether they live at home or abroad”, the policy states. According to the policy, students can serve the motherland through part-time jobs, cooperation in research, investment and founding new companies, human resources training, and acting as intermediaries without having to live on the mainland⁵.

By 2003 in China, 21 National Science Parks for returned students to start-up enterprises” were established and jointly sanctioned by Ministry of Education, Ministry of Science and Technology, Ministry of Personnel and State Bureau of Foreign Experts Affairs and, around 8,000 enterprisess were set up with an annual revenue of CNY 30 billion (AU\$4.6 billion). The Chinese government believes that a so-called ‘harvest season’ is coming, and the policy will be continued.

The economic growth of China

Since China implemented its Open-Door policy in 1978, China's economy has maintained an average annual growth rate of 9 per cent. In 2006, China revised its GDP to more than US\$2 trillion according to the director of the National Bureau of Statistics (NBS), which means the country has overtaken the United Kingdom to rank fourth in world economy (it was the thirty second in 1978).

Education is regarded as the first choice investment before the house and car for many Chinese families. This belief comes from traditional Chinese culture, and the continuing rapid growth of China’s economy makes more and more people’ s so-called ‘dreams’ come true.

South Australia’s competitors and factors affecting the business

According to AEI in 2005, 93 per cent of the schools market came from 12 countries and regions, with 73 per cent coming from merely four countries and regions: China, the Republic of Korea, Hong Kong SAR and Japan. Despite an overall growth in student numbers at the school level since 1994, proportionately the school sector has dropped from 13.6 per cent in 1994 to 7.4 per cent of overall international student enrolment in 2005.

In my view, this is mainly because of the concerns of parents about young students’ safety and welfare issues.

In terms of competitors, they are not from the traditional competitors like the higher education sector is facing, as both the United Kingdom and United States’ policies are focused on the tertiary level (Skilbeck and Connell 2006, p.46). The competitors are mostly from interstate and the private sector. New South Wales (NSW) and Victoria (VIC) recorded the largest international students’ enrolment. In 2004, NSW shared 35 per cent of the whole market, VIC shared 29 per cent, Queensland shared 16 per cent and West Australia shared 9 per cent.

Other than the interstate threats, the private sector and their products are also taking their share from the government sector. In 2006 non-government schools enrolled 61 per cent of international school students. Enrolment in foundation programs together with other non-award program has also grown by 11 per cent and commencements by 13 per cent.

Apart from the above factors, some traditional student resource countries such as Japan, Singapore and Malaysia are making every endeavour to build up their images as regional centres for international education.

⁵ viewed on 17 October 2005 http://english.people.com.cn/english/200108/20/eng20010820_77688.html

Expectations of Students, their Parents and Chinese Agents

For young Chinese students, the most important factor that their families first consider is a safe environment, and this is where South Australia is believed to have an advantage. Other factors they are concerned with are considered in the following section.

School expectations: When a Chinese family is thinking about sending their child to study in Australia, normally there are two things they always ask. They are: “What is your school’s hardware like?” and “What is your school’s software like”?

People in Australia feel puzzled when they are asked these questions. What Chinese students’ parents really mean or they really want to know are about the standard of the school’s facilities and teaching quality. For Chinese people, the ‘hardware’ really refers to the school’s appearance, the facilities and location⁶. The term ‘Software’ refers to a school’s academic program and support services and caring including the Tertiary Education Ranks of its students.

It is part of the traditional Chinese culture that all parents wish their children to be successful (to be so-called ‘dragons’) in their future career. A survey that I administered in 2004 among 45 young Chinese students in South Australian government schools showed that 48 per cent of young Chinese student wished to obtain a Bachelor’s degree, 29 per cent wished to obtain a Master’s degree. A strong academic program is clearly one of the key criteria that students and parents consider.

Home-stay expectation: Due to China’s family policy, one couple normally can only have one child. A safe environment is also a key criterion for their decision.

The term of ‘safe environment’ does not just refer to the city environment; the concern is more related to the home-stay environment. In 2004, almost 75 per cent of public school international students used homestay. Generally speaking students feel satisfied about their homestay environment. But cases such as Ms Qu encountered do exist.

QU, as an international student, graduated from a South Australian government school in December in 2004, and is now studying in a university in South Australia. About two years ago, I conducted a business trip to the city where QU is from. QU’s parents came to the hotel where I was staying to see me. I invited them to have coffee in the hotel lounge. Qu’s parents told me an unpleasant story relating to their daughter’s experience.

One Saturday night QU’s homestay parents were out for dinner, she had dinner herself at home and then did some self-study at her room. Around 9.00pm she felt she wanted to drink something. She then took a cup of milk to her room. As she was concentrating on her study, she split the milk onto the carpet. QU felt very embarrassed and then found the vacuum machine, using it to vacuum the carpet.

The next day (Sunday) morning, her homestay father knocked at her door questioning her what did she do to the vacuum machine because it didn’t work. After listening to Qu’s story about the milk, the father declined Qu’s suggestion to repair the vacuum machine for the family if she damaged it. The homestay parents took QU to a vacuum shop in the afternoon asking her buy a new cleaner, same model, for the family. As they couldn’t find exactly the same model they agreed for Qu to buy a similar one.

“How much do you guess?” Qu’s father asked me? “People always say that milk is not expensive in Australia, but one cup of milk cost me AU\$ 800.00!, which is about CNY 5,000 , enough for us to buy perhaps a dairy cow in China!!”

⁶ All Asian students have shown a strong preference for schools in metropolitan centres.

Apart from some individual cases, the common homestay issues are food, household chores, language, safety issues, internet and telephone use. Placing unreasonable burdens on students, such as, excessive house duties and babysitting, is justified to students as 'the Australian way' (Parliament of South Australia 2006, p.75).

There are no clear guidelines on the homestay's responsibility and service standards, so there is an urgent need for training and counselling regarding responsibilities and expectations of both students and families. Government infrastructure investment is strongly recommended for the young student. Remember "overseas students themselves are the most powerful marketing tool in international education" (Parliament of South Australia 2006, p.47).

Cultural Sensitivity and its Effect on Business

People always say, "Business is business regardless of what cultural background one is from". Not exactly, I would say. Business is business but cultural sensitivity does make a difference.

It is very popular to talk about internationalization or globalization in these times. However, internationalization or globalization does not mean centralization, nor does it mean one culture dominating another, or being above another. If one really understands the meaning of internationalization or globalization one should allow the existence of the differences, should understand that handling the business should be based on the mutual respect and mutual understanding of different values of concept and different cultures.

Mrs H is a school principal of a South Australian Government Schools. She is very proud of the growth of her school's international student program, and is keen to get it growing even faster.

Mr G is a principal of a private school from China. I know he will bring business for us so I accompanied him to visit Mrs H's school when he visited Adelaide in 2003.

Mr G felt insulted after the visit to Mrs H's school. Because Mrs H did not provide the transport to him nor did she reimburse Mr G for the taxi expenses as she promised according to Mr G.

Mr G vented his unhappiness to me, "I don't like H's manner at all. Who does she think she is? I am also a school principal in China!" Mr G told me he would not cooperate with Mrs H and asked me to find another school for him.

For the last three years since Mr G's first visit to Adelaide, he has sent about 80 full fee paying students to South Australian Government Schools but none to Mrs H's school.

I know Mrs H did not mean to ignore him, but the fact is that she lost a very good business opportunity through a lack of understanding of Chinese culture and giving Mr G the wrong impression that he was not welcome.

Issues and Recommendations:

As it is stated in this paper, I believe that the aim of international education has been supplanted by the economic benefits. It is very dangerous for the continued growth or maintenance of programs that international education is more profit driven rather than education focussed.

As a result of the current international education policy, Australia relies too much on the revenue from international students, that is 15 per cent of the total university revenue. In South Australia according to the Parliament of South Australian, the Twenty Fourth Report, the three universities all have high proportions of international students, the University of South Australia 30.7 per cent, followed by the University Adelaide 23.0 per cent and Flinders University 19 per cent.

Following the pace of the higher education sector, with the support from state governments, the secondary sector is also keen to expand its market share. It is reported there were 1,964 overseas students in 2005, who poured more than AU\$45 million per annum into the state economy.

In the State Strategic Plan⁷ the South Australian Government has set targets for the number of full fee paying students, but has neglected the true concept of international education and the provision of service to young international students.

Tiffen, Associate Professor of Government at the University of Sydney, criticized the Howard government for reducing university funding compared to its international counterparts, which may have potentially serious effects.

Professor Mary Kalantzis (2001) also pointed out, that “Australia spends a mere 4.3 per cent of GDP on public investment in education (OECD 2001:B2.1a). This compares with an OECD average of 5 per cent, whilst the leading nations spend well over 6 per cent of GDP on their education sector. Simply, there is not enough money in the system”.

Again, as a result of the current government policy on international education, concerns about the quality of education at both tertiary (Federal) and school (State Government) level have to be raised. Based on a range of performance indicators, Flinders University is placed at number 26, the University of Adelaide at 36, and the University of South Australia at 37 among the 38 publicly funded universities in Australia⁸, even though I don't agree with assessment method and there may be different views on the evidence collected.

According to the *South Australia Chinese Weekly* (15 June 2006), South Australia is one of the worst states facing low retention rate and a perceived poor quality of school education. The ambitious plan to build up Adelaide as an ‘education city’ and ‘university city’ might be affected by this negative report.

Overseas, Australia has been criticized in recent years by the Asian media, for example, the Chinese media and some academics, for its export of education in the terms of ‘greedy’, ‘nakedness’ and ‘bleeding’. This is because of the government's policy on international education has lapsed from its true meaning. International education is regarded as a purely tradeable commodity. As a result, problems of quality of students and the quality of the international students' program are all emerging, as well as young students' welfare issues. These include:

- not being treated as local students, and their rights are not protected;
- racism, discrimination and bad treatment;
- unfair policy (overseas student visa conditions) implanted by DIMA;
- community acceptance and understanding;
- support services;
- cultural shock;
- language barrier & communication difficulties;
- feeling of being treated as a ‘cash cow’;
- friendship (according to my survey two years ago, when in need 75 per cent of the young Chinese students will speak to their friends, 4 per cent to teachers, 21 per cent to parents);
- loneliness, and
- pastoral care.

These issues are very common and are not just happening to young Chinese and other nationals, but are happening to young overseas students across all Australia, as research conducted by Monash University in a study of 202 students' cases has suggested.

⁷ http://www.saplan.org.au/plan_detail.php, viewed on 20 June 2006

⁸ <http://www.australian-universities.com/rankings>, viewed on 20 June 2006

Therefore it is strongly recommended that one urgent issue for the Governments at both the Federal and State levels is to broaden their internationalisation focus “from merely the recruitment of fee-based international students to a more broadly-based internationalisation policy” (Report prepared by Sydney University). The Governments must also increase funding on education and see it as an investment for the future of the nation. The government must make sure to build up, through every avenue, a world-class education which is worthy of its name. Otherwise, Australia today, as one of the biggest education export countries in the world however, could become an education service import country tomorrow. This is not an alarmism position.

The Governments must also show to the world that they not only welcome but provide superior services to overseas students. As part of this they need to make sure that the following changes occur.

- Australian teachers and students participate in study tours to understand the diversity of the world.
- Enough attention is given by Governments to engaging the wider public and to creating an atmosphere that international education is valued by the community.
- Set up scholarships to attract highly intelligent students to South Australia, and welcome those who would like to stay to join the local people to contribute to the development of the state and the nation.
- Set up an independent agency for dealing with grievances between international students and education providers so that young students are looked after well and their rights are protected.
- School leaders, staff and students are aware of the cultural sensitivity and its effects on their International Student Program.

CONCLUSIONS

The concept of ‘International Education’ should not be narrowed to just recruiting full fee paying students. I agree with Skilbeck that there should be a much broader understanding and Australia’s international education activities should be presented in many places and different ways.

Even if we accept ‘International Education’ as it is interpreted now, as a tradeable commodity, we still have to understand our customers and best serve their needs. Only by doing so, can we achieve success.

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More than prize lists: Head teachers, student prize winners, school ceremonies and educational promotion in colonial South Australia

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Australian educators now operate in environments that frequently stress marketing activities. This article highlights the ways that colonial school prize ceremonies were deliberately developed to promote teaching activities. These ceremonies were part of carefully considered strategies that helped to boost the status of entrepreneurial teachers who had taken the risk of establishing their own private educational ventures. Private school promotional techniques were extremely influential because they were also used to extend the growth of government-supported and corporate schools as well as cultural activities in Australia's colonial civil society.

Promotion, ceremonies, newspapers, prizes, curriculum

INTRODUCTION: PROMOTING THE PRIZE LISTS

Over the past two decades, the promotion of contemporary educational institutions and services, the role of educational entrepreneurs, and the operation of educational markets have all received considerable attention in both the daily press and professional journals for educators (Kenway, 1993; Young, 2005, pp.1-3). This article argues that entrepreneurial teachers and educational administrators in colonial Australia carefully constructed both school ceremonies and published accounts of these ceremonies. The actual ceremonies and the published accounts were among the most prominent of the tools used by these colonial educators and administrators to promote their aims and objectives as well as school or class activities. An attempt to launch a career as a specialist teacher or establish a school in colonial South Australia during this period involved risk. The uncertain nature of the colony's economy could easily threaten such an enterprise, an especially dangerous state of affairs for those who embarked on the hazardous path of establishing themselves as head teachers and proprietors of their own independent private venture schools. Commercial entrepreneurs and supporters of the colony transmitted accounts of school ceremonies held in South Australia to England in order to promote ongoing investment and migration, but for some early South Australian entrepreneurs, the ability to promote teaching services in the colony could quite literally mean the difference between public respect and a comfortable life or dire poverty and distress (Young, 2005, pp.85-127).

Australian historians have traditionally used newspaper reports of school prize ceremonies as sources for institutional and local histories, finding information about school administrations, as well as curricula and co-curricula activities. Researchers have also used lists of students and teachers in order to provide biographical and genealogical information. Since the end of the 1960s, Australian educational historians have also begun to devote more attention to the lives of head teachers and proprietors of colonial private venture schools (Young, 2005, pp.12-14, 51, 53). They have uncovered a sinuous but strong strand of risk-taking, enterprise, and entrepreneurial activity (Riordan, 1992; Theobald, 1985). The idea that teachers have been vital, active entrepreneurs is both challenging and exciting, and a number of colonial newspaper sources have

provided rich veins of information about educational advertising and ceremonial activities in schools.

From the late 1840s, men and women who had commenced teaching in private venture or corporate schools in South Australia began to work in government-supported schools and the emerging public education system, and this transfer influenced the adoption of techniques used to promote the growth of public schools. A number of prominent teachers were also key figures in the development of South Australian cultural life. The use of examination and prize ceremonies to promote schools and teaching activities served to foster local interest in high culture through the presentation of music, literary recitations and art, as well as support for popular culture through the staging of sport activities (Hyams, 1992, p.1; Nicholas, 1953; Saunders, 1965; Young, 1985; Young, 2005).

TEACHERS AND ENTREPRENEURS

The earliest private teachers in colonial South Australia had to build a market for local educational activities (Nicholas, 1953; Reid, 2000). These colonial teachers also transplanted promotional techniques that had been developed by entrepreneurial educators in Britain since the eighteenth century. Research into the growth of cultural consumerism in eighteenth century Europe has supported the examination of techniques developed by private teachers to promote their teaching services (Agnew, 1993; Brewer, 1997; Brewer and Porter, 1993; McKendrick, 1982). Private teachers in the English provinces during this period persistently promoted their classes and schools, eager to teach knowledge and skills that would elevate their students' prosperity and social status (Money, 1993). These entrepreneurial teachers stood alongside equally enterprising musicians and actor-managers, painters and craftsmen involved in the development of public exhibitions and the trade in the fine and decorative arts, as well as authors, printers and booksellers involved in the extension of the publishing trade (Brewer, 1997; McKendrick, Brewer and Plumb, 1982; Plumb, 1982).

Entrepreneurial teachers were thus cultural entrepreneurs anxious to build an audience of consumers for their knowledge and skills. Some fulfilled the role of cultural entrepreneur in more than one area. A number of eighteenth century English artists developed markets for their own paintings and prints, as well as their work as teachers and producers of instructional material. Some artists continued to follow this path well into the nineteenth century, both in England and the Australian colonies (Brewer, 1997; Carline, 1968; Young, 1985)

Prominent eighteenth century cultural entrepreneurs such as Josiah Wedgwood developed strategies that included a range of interconnected techniques to promote their work. Ceremonial occasions were associated with press advertising, the production of trade publications such as prospectuses, and the cultivation of networks of patronage and support from prominent identities. Even though they frequently worked in smaller arenas, private teachers in eighteenth and nineteenth century England also wove a similar series of promotional techniques together in order to attract the ongoing support of students and their families (Agnew, 1993; Brewer, 1997; Bermingham and Brewer, 1995; Brewer and Porter, 1993; McKendrick, 1982; Money, 1993; Robinson, 1963-64).

Many private teachers in colonial South Australia were shrewd and canny operators, quick to observe social preferences and trends as well as needs in the colony. These colonial teachers also tried to shape attitudes and activities involved with education and associated cultural activities in the colony. A number of licensed teachers were equally astute and eager to promote their work. Those teachers who sought to become licensed head teachers in government-supported schools under the Central Board of Education and its successor the Council of Education were still members of a competitive marketplace for educational services. A government licence was granted only after the teacher had been involved in the process of developing a school. Even if

support for the school had been obtained from a local religious group or a district council, the teacher had to attract and retain ongoing support from parents, and maintain a viable number of student enrolments. Nor could these teachers rely solely on the government stipend that came with the licence for financial security. Teachers had to continue to seek student fees, even though the Board sought to limit the level of the fee received from each student. Biographical accounts and records from the Board have revealed that licensed teachers did not always restrict their enrolments to children from working class populations. They were also prepared to undertake a range of other money-making ventures, such as writing, in order to increase their financial status. Colonial South Australian newspapers frequently featured advertisements for private and corporate schools side by side with advertisements for licensed or public schools and classes, and private and licensed teachers or their agents also used advertising columns in newspapers to seek buyers for their schools. Both male and female teachers demonstrated that they were keenly aware of a need to elevate and protect their own reputations as well as the prestige of their schools (Hyams, 1992, p.1; Saunders, 1965; Whitehead, 1996; Young, 2005).

DISPLAY, EXHIBITION AND EDUCATIONAL PROMOTION

The inclusion of exhibitions of student work in early South Australian school ceremonies and the descriptions of these exhibits in local press reports were part of a broader colonial interest in exhibitions and display. Social historians and cultural historians have attached considerable importance to the intensity of interest in the development of public displays and exhibitions during the Victorian age. Colonial South Australians were not immune to the allure of exhibitions and displays. Local retail traders mounted decorative displays and exhibitions, particularly for special occasions such as Christmas. Local displays and exhibitions of art, craft and technology were reported in the press, especially from the 1850s. The importance of the educational display was established during the Victorian age by the Great Exhibition of 1851, and colonial interest in major international and colonial exhibitions was reflected in press articles and parliamentary reports. The school ceremony was a major outlet for the display of work by children, but interest in this type of presentation was not isolated, as local so-called 'juvenile' exhibitions of artwork and horticultural items were reported in the local press from the 1860s (Young, 2005, pp.63-64, 244-245, 260-262).

One of the most important consequences of Foucault's interest in relationships between social boundaries, knowledge and power has been the application of this concern to the consideration of the Victorian love of display (Bennett, 1992; Bennett, 1995, pp. 60-61, 72-73). For Bennett (1995), whose work has encompassed the areas of cultural history and cultural studies, this association between display, structures of knowledge and power, as well as the desire to implement social regulation resulted in the rise of what he called an "exhibitionary complex". Bennett's research in this area concentrated on examining this "exhibitionary complex" in connection with the growth of the international exhibition, major public ceremonies, museums or galleries, and even seaside resorts in Victorian Britain. The importance of cultural display and school promotion in connection with Australian schools during the late twentieth century has also been recognised (Kenway, 1987, pp. 313, 389-390; Kenway and Bullen, 2001), and historians of education could usefully consider Bennett's focus on the use of the exhibitionary complex if they wished to examine the development of private, corporate and government-supported schools during the nineteenth century. Two of Bennett's (1995) own subjects for investigation, Victorian exhibitions and museums, were developed in great part for their potential to provide mass education as well as entertainment. The history of art and design education during the nineteenth century also showed that educational administrators and teachers in colonial Australia became swept up in the development of public exhibitions of student work (Young, 1985).

EXAMINATION AND PRIZE CEREMONIES IN COLONIAL SCHOOLS

Examination and prize ceremonies became the subject of the leading editorials in colonial South Australian newspapers. Newspaper managements clearly regarded school ceremonies as important opportunities to scrutinise educational developments in the colony, and the press provided considerable space for the publication of accounts of local ceremonies. The formats used for these events and the associated presentation methods employed to publish information about schools were also important in their own right. Both ceremonies and subsequent newspaper accounts of these ceremonies became the means to promote educational services.

As with educational advertising in newspapers, the practice of producing prize lists and holding prize ceremonies and open examinations had been transferred from Britain. The *Advertiser* suggested that Mr. Francis Haire introduced the practice of holding a regular public school examination ceremony into the colony, and Haire used his newspaper advertising to draw attention to his student examinations during the 1850s. Colonial teachers such as James Bonwick were educated and trained in British educational institutions where competitive internal examinations and prize ceremonies had been developed, and student examinations and prize ceremonies were part of the Sunday School Movement. The use of educational prizes had also been transplanted to other English-speaking areas, such as the United States, and information about prize ceremonies held in England as well as colonial schools in eastern Australia was occasionally published by the South Australian press. (Edmonds, 1991; Entwistle, 1994; Entwistle, 1995; Hoskin, 1979; James, 1979; Kane, 1972, pp.31-34; Young, 2005, pp.137-144, 212-213, 251).

Mr. Sommer's first examination ceremony at his school in Flinders Street was advertised and reported in the Adelaide press. However, Sommer did not prepare a specific report of his own for the ceremony, and he suggested that recommendations from audience members would be more valuable. Information about ceremonies was no doubt transmitted through word-of-mouth or private letter, but the publication of accounts of school ceremonies in newspapers could be fitted into newspaper advertising strategies (Young, 2005, pp.129-144).

Newspaper reports of these ceremonies in colonial South Australia showed that private and corporate schools for boys were the most constant adherents to the use of ceremonies. From the late 1840s, government-supported schools run by licensed teachers for both girls and boys joined their ranks. More detailed accounts of ceremonies at schools run by women or schools for girls were only featured on an infrequent basis from the late 1840s to the 1870s. This was rather curious situation given that ladies' schools in the United States held complex annual internal examinations before audiences during the last decades of the eighteenth century. In early colonial South Australia, other social occasions were often used to mark the end of a school period in girls' schools. The press carried reports from schools run by female head teachers that outlined the staging of charity concerts or performances, as well as social functions such as picnics. This was linked to attitudes about women as the caregivers or guardians of morality, good taste and grace in social matters during this period. Regular reports that concentrated on the actual prize ceremonies from girls' schools did not become a feature until the late 1870s and early 1880s. This delayed development may have been connected with the essentially private, familial nature of many of these schools during the period and linked to a widespread unease with women being heavily involved in academic pursuits and public displays of competition during the Victorian age. Female activities associated with social events and philanthropy were far more acceptable during the mid-nineteenth century. The increased incidence of the printing of reports of school ceremonies in girls' schools during the late 1870s and early 1880s coincided with press coverage of the development of the Advanced School for Girls, and the increase in opportunities for girls to become candidates in external public examinations (Edmonds, 1991; Jones, 1980; Mackinnon, 1984; Norton, 1980, pp.285-287; Young, 2005, pp.141-142).

School prize ceremonies became a regular feature in Adelaide newspapers after the opening of schools affiliated with the Church of England. The format for school examination and prize ceremonies in South Australia changed over time during the colonial period. The awarding of prizes was initially linked to internal school examinations, conducted within schools before audiences of parents and members of the local community. Sometimes accounts of examinations during the 1860s revealed the use of a mixture of written and viva voce examinations for the same group of students. From the second half of the 1850s, ceremonies were presented in conjunction with reports of examinations and associated newspaper accounts that featured prize lists.

Some accounts of school examinations and ceremonies were printed more than once in a range of newspapers. When newspaper proprietors were associated with both weekday and weekly newspapers they would publish the same material about schools in each of these different publications. By the late 1860s, material published in the *Register* and the *Advertiser* was often found elsewhere in other newspapers, such as the weekly *Observer* and *South Australian Chronicle*. The Adelaide press also printed accounts of school ceremonies produced by people called 'observers' or 'correspondents' from outside the Adelaide square mile who were supportive of particular schools in their locality, or reprinted accounts originally published in country newspapers such as the *Mount Gambier Standard* or *Walleroo Times*.

While it is clear that newspaper managements in colonial South Australia were prepared to send representatives to attend and report on events in schools, it is equally clear that entrepreneurial educators carefully constructed school ceremonies and tried to shape the published accounts of these ceremonies. Colonial newspaper proprietors had provided an outlet for educational entrepreneurs to publicise their work, and many eagerly seized these promotional opportunities with both hands. The lengthy lists of student prize winners were not included merely to extend the space taken up under a boldly printed school name. Newspapermen and teachers such as Frances Sheridan revealed that they were particularly concerned about the inclusion of student names on lists. A letter from Mrs. Sheridan suggesting that student names had been omitted in a newspaper report resulted in an editorial rebuke, implying that any error had come from her administration. However, newspapermen were also happy to print additional names associated with prize lists whenever required, and some pressmen actually participated in these school activities (Young, 2005, pp.139, 140, 142-144).

School prize ceremonies were frequently preceded by the publication of head teachers' advertisements or notices that featured information about the staging of these events. By December 1879, L.S. Burton's advertisement for end-of-year events at the government-supported Gawler School outlined a program that included a display of student work, the presentation of singing performances from the school's infant section, student athletics, and an evening entertainment that included prize presentations and further pupil performances. The *Gawler Standard* underlined the celebratory, theatrical nature of this school day by publishing this advertisement in a column under the advertising title of "Amusements" (Young, 2005, p.139).

Even internal school examination ceremonies that were held as private events continued to attract press attention. *The Gawler Bunyip* adopted a somewhat censorious tone when details of a private examination ceremony at the government-supported Willaston school were not provided directly to the press. An obituary for John Lorenzo Young suggested that he felt some unease with the demands of his prominent school speech day ceremonies in White's Rooms, and Young used a private function in association with the prize ceremony proceedings for his school at Parkside in 1872. However, a brief newspaper account of this scaled-down event was still published by the Adelaide press, and Young continued to prepare lists of prize-winning pupils for newspaper publication during the latter years of his teaching career.

Accounts of school examinations were initially placed in news columns that provided a collection of short paragraphs of information about recent events or prominent local figures. Some accounts

of school ceremonies were incorporated into reports of events in particular district or local council areas. Accounts of prize lists and ceremonies were occasionally printed in newspaper advertising columns, and during the 1870s, they were often printed as separate items with prize lists, but firmly identified by newspaper managements as advertisements paid for by school administrations. Here at last was outright recognition of the way in which these reports of school ceremonies served a commercial function.

Days set aside for examination and prize ceremonies were special and important places on school calendars. During the period between the 1850s and the start of the 1880s, advertising notices for school ceremonies as well as accounts of prize ceremonies in larger schools for boys were often published in Adelaide newspapers twice a year, once for the ceremony held before the mid-winter holidays in June, and again in December for the final ceremony that marked both the end of the school year and the commencement of the Christmas holidays. Country newspapers, such as those published for readers in the towns of Gawler and Mount Gambier, usually printed accounts of school ceremonies just before Christmas each year. Members of teaching circles in local licensed schools knew that newspaper accounts of their ceremonies were not as lengthy or detailed as accounts of ceremonies in major corporate or private venture schools for boys, and one letter to *The Adelaide Times* suggested that unfavorable comparisons and conclusions could be drawn from the disparities in column space and printing ink. Support for private venture and corporate schools promised greater financial returns for newspaper managements, but these circumstances did not stop the continued inclusion of reports from government-supported schools in South Australian newspapers as the decades rolled on (Young, 2005, pp.139-141).

The longest and most complex accounts often emanated from ceremonies held in corporate boys' school, such as the Collegiate School of Saint Peter. These reports could take up several columns of closely-spaced typescript. The complexity of an account of a ceremony may well have reflected the resources of the school conducting the ceremony. However, these accounts also suggested that the school administration believed that a particular effort was required in the quest to build enrolments, especially for male students. By the late 1860s and 1870s, St. Peter's faced competition from Prince Alfred College, as well as a series of active private entrepreneurs, such as John Whinham and his sons (Young, 2005, pp.138, 141-143).

As with press advertising, the Central Board of Education was shrewd enough to see potential benefits from the adoption of the established private school practice of the school prize ceremony. Licensed teachers such as William Cawthorne actually used the Central Board's support for annual examinations as a springboard for advertising and publicity. During the early 1870s, the Board was happy to use an official publication to encourage the use of ceremonies as a means to cultivate widespread interest in government-supported schools in the colony, and two board members, James Bath and John Hartley, were actually well-versed in the practicalities and consequences of actually running school examination and prize ceremonies. J.A. Hartley had presided over school ceremonies when he had been headmaster of Prince Alfred College (Lock, 1981; Saunders, 1965; Young, 2005, pp.141, 288, 292).

Some educational entrepreneurs openly railed against the use of examination and prize ceremonies. Mr. Bonwick was critical of the pressures placed on students through the use of prize incentives and competitive examinations, believing that they could result in a lowering of student health and confidence. Between 1857 and 1858, *The Educational Journal of South Australia* and a prominent private teacher, John Whinham, likened the process of presenting prizes to a form of puffery, which promoted the reputation of a school in a manner that appealed to the affections and egos of doting families. Whinham's comments drew some qualified support from his fellow members of the Preceptors' Association, but if the rate of publication of accounts of school ceremonies can be used as any guide, the use of ceremonies continued unabated. Indeed, subsequent newspaper accounts of school ceremonies at Whinham's school for boys suggest that

he was quite prepared to adopt similar processes to draw attention to his own school (Young, 2005, p.251).

Newspaper accounts of school ceremonies usually included descriptions of the locations used to stage these events. Many schools conducted these ceremonies within the school. The most prominent of these was the Collegiate School of St. Peter, but even small government-licensed schools within and outside Adelaide opened their doors to parents, friends and local community members. Some teachers chose to hold these ceremonies in halls that were separate from the school location. The use of larger halls away from school premises may well have provided these educational entrepreneurs with more logistical problems, but they also furnished a special platform for a bolder presentation. White's Rooms were fitted with a form of platform stage. Founded by an entrepreneurial tailor and vigneron, George White, these Assembly Rooms had become one of the major venues for concerts, theatrical performances, public speaking engagements and visual displays in Adelaide during the colonial period. Whether the ceremony was held in the school or another location, teachers paid attention to the interior decoration of the room or hall. Evergreen plant material was positioned around the area, and displays of student work were set out for viewing (Young, 2005, pp.212-214).

Newspaper lists of prize winners revealed instructional levels and the curriculum activities on offer. The inclusion of information about conduct awards and their winners also indicated concerns about school discipline and moral education. Time was set aside in the school schedule specially to prepare students for their participation in these school examination and prize ceremonies. It is clear that the examination and prize ceremony required considerable planning and this could even result in the disruption of the teaching schedule. Far from removing a sense of showmanship in school prize ceremonies, the development of external examinations actually provided head teachers with additional means to make their school ceremonies glisten. The publication of external examination results in the Adelaide press amplified the process of drawing attention to school successes, as a student's name was listed alongside the school attended or the means of instruction used to prepare for candidature, so parents and students were able to compare the progress of candidates from different schools at a glance.

Researchers interested in colonial Australia's cultural history should not overlook accounts of school ceremonies. School ceremonies furnished vigorous educational entrepreneurs with a platform to promote the development of a wide range of cultural activities. Subsequent press accounts of ceremonies also revealed the ways in which cultural traditions had been transferred from Europe. Press accounts of school ceremonies provided descriptions of special exhibitions, decorative displays or student performances such as singing. Displays usually consisted of items from those sections of the school curriculum that were most conducive to producing work with a strong visual interest. This included student artwork, such as drawings and paintings, design works in the form of architectural and engineering drawings, mapping, examples of penmanship and calligraphy, and exercise books. Schools with female students also featured displays of plain and fancy needlework, or fashionable craft work such as leatherwork or artificial flowers.

The theatrical nature of the speech ceremony was emphasised by the reliance on the presentation of student recitations and music. Whinham's school in North Adelaide continued to feature displays of public speaking during the 1860s and 1870s. John Whinham's son, Robert, a prominent member of the school's staff, may well have fostered the speaking skills demonstrated by students at this school. Robert Whinham had become active as a public speaker and amateur actor. School prize ceremonies provided specialist music teachers with a platform to promote their work. These teachers prepared and presented a range of musical items, especially in the area of choral singing. A number of these specialist music teachers were peripatetic instructors, prepared to move between a number of schools, as well as form their own independent classes or teaching schedules with individual private students. For some independent music teachers,

performances at school ceremonies were part of a network of opportunities to foster and perform music in colonial society. T.W. Lyons' appearance at a school ceremony stood alongside his other musical performances in Adelaide, such as conducting an independent performance of choral singing.

From the mid 1860s, school ceremonies, especially in boys' schools or licensed schools, began to include displays of sport or physical exercises. In boys' schools, the inclusion of team games such as cricket and football were part of the cultivation of a so-called 'manly' spirit. The development of athleticism was viewed as a vital aspect of encouraging masculinity and loyalty to the school. The Adelaide press linked the inclusion of drill in South Australian private, corporate and licensed schools to military displays established by the local volunteer forces. Drill was offered by the private and corporate boys' schools, but displays of calisthenics and drill in licensed schools were also presented as proof of the development of good order and discipline, as well as evidence of the teachers' concern for the health of the pupils (Young, 2005, pp.248-252, 259-261, 265-274).

School ceremonies were used by teachers and their supporters to cultivate public interest in the social networks linked to their educational activities. In addition to publishing lists of student prize winners, newspaper reports of ceremonies could include references to special or notable guests and members of the audience, plus details of comments or speeches made by the specially invited chairman of the proceedings as well as the head teacher and invited examiners. In colonial communities such as those found in Adelaide, Gawler and Mount Gambier, where settlers were often well acquainted with each other by either direct or more indirect means, newspaper accounts showed readers the type of families and social networks prepared to support a particular school. By obtaining favourable attention in the press for a child, teachers were able to acknowledge the trust placed in their schools by parents, and possibly ensure the continuation of enrolments. The dependence on the public distribution of prize lists through press publication was extended when larger schools for boys also began to rely on the awarding of new prizes from their own old scholars.

Newspaper accounts of ceremonies often included references to special activities held in conjunction with these events, such as picnics, suppers, and commemorative acts. Accounts of examinations and prize ceremonies emphasised the care taken by teachers and school administrators to cultivate the support of prominent citizens. Published accounts noted the presence of colonial governors and their wives, members of government bodies and public officials, members of the clergy, and prominent landowners and businessmen. Early examination ceremonies required the active participation of well-educated men as examiners. The importance of this network of support was revealed by the way in which the accounts of these ceremonies were constructed. Special guests were invariably listed at the start of the account. Reports of subject examinations named examiners, who were usually figures from outside the teaching staff of the school, and either quoted or summarised their comments. Even when the examination process was separated from the ceremony, information about the examiners and their findings could be included in accounts of the ceremony. These events invariably included the presence of an invited chairman, usually a long-time supporter of the head teacher or a socially prominent member of the local community. Some of these chairmen were parents of members of the student body.

Individual colonists contributed prizes, and boys' schools that survived the first flush of enthusiasm over their establishment eventually benefited from the support of old scholars. Both corporate and private venture schools for boys encouraged the development of formally constituted associations for old scholars. Members of these groups attended school prize ceremonies, and also organised fund-raising efforts to supply additional scholarships or prizes for current scholars (Munt, 1983; Young, 2005, pp.140, 281-293, 295, 318-322).

CONCLUSIONS

This account of school prize and examination ceremonies shows how colonial school ceremonies and associated newspaper accounts were deliberately constructed to attract attention to school operations as well as the aims and objectives of educators. It argues that the promotional techniques implemented by entrepreneurial colonial educators were important and influential. There was a strong connection between educational promotion and the risk-taking, entrepreneurial impulse of championing a particular activity through the use of advertising and printed literature. For teachers who had established their own private educational ventures, these events and accompanying newspaper items were part of carefully considered broader strategies developed to boost their own social and financial status. Entrepreneurial teachers were shrewd promoters. They adapted methods developed during the eighteenth century by British commercial entrepreneurs and drew upon the support of a range of social networks.

It would be foolhardy to view the development of school prize ceremonies during the nineteenth century purely through the lens of late twentieth century perceptions of educational marketing. That approach would undermine the enormous value of the primary sources that have provided us with accounts of these ceremonies. Early newspaper accounts of school ceremonies revealed that promotional activities underlined the strength of the intricate web of connections between private venture, corporate and government-supported schools in colonial South Australia. Knowledge about the presentation of ceremonies developed by teachers in private and subsequent corporate schools was adapted and taken up by public administrators and teachers to support the growth of the emerging system of government-supported education in the colony during the second half of the nineteenth century. The promotional activities of entrepreneurial licensed teachers under the Central Board of Education and subsequent Council of Education were extended under J.A. Hartley's administration of the Education Department. Accounts of school ceremonies in the South Australian press cast a beneficial glow over Hartley, his staff of inspectors, teachers and the political masters whom they served.

Educational promotion in colonial Australia revealed the links between the development of educational activities and the expansion of cultural consumption in the English-speaking world. Interest in cultural display influenced the manner in which educational promotion developed. There was an emphasis on particular elements of curricula and co-curricula activities that provided outlets for the exhibitionary complex, and opportunities for display and public performance. Some of the techniques used for the promotion of education also helped to extend the growth of colonial cultural activities.

Colonial newspaper proprietors provided outlets for entrepreneurs engaged in educational and cultural activities to publicise their work, and many of these entrepreneurs eagerly seized these promotional opportunities with both hands. Examination and prize ceremonies were special and important places on school calendars. School ceremonies highlighted the connections between educational promotion and the development of supportive and influential social networks for schools and classes. Educators were keenly aware that interest in local educational activities relied upon ongoing patronage and the cultivation of a positive reputation. School ceremonies actually helped to develop a civil colonial society.

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Multi-level selective classes for gifted students

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Research was undertaken to examine the level of support and general attitudes towards multi-level selective classes for gifted students amongst the staff and parents of an independent (non-government) boys' Preparatory school, located in Adelaide, South Australia. Questionnaires were sent to all parents and staff in the Preparatory school and approximately 50 per cent chose to participate, which equated to 90 parents and 14 staff. The responses received reflected the range of attitudes noted in the literature. This article examines some of these attitudes in the light of the research on grouping for gifted students, and evaluates the benefits and disadvantages that parents and staff expressed about the multi-level selective classes at the school in question. A general overview of current provisions within South Australia for gifted students, and findings from the Senate Employment, Workplace Relations, Small Business and Education References Committee report into the Education of gifted children in Australia (The Senate Committee, 2001) puts this provision into context.

Ability grouping, selective classes, multi-level classes, attitudes to gifted education programs

INTRODUCTION

The education system in South Australia is one that groups all children of the same age together in classrooms and presents learning experiences that are designed to progress those children through a curriculum, achieving certain standards and culminating in the award of the South Australian Certificate of Education after 12 or 13 years of schooling.

Schools are places of learning. There are few who dispute the role of the school in nurturing and developing ability. The Senate Committee (2001, p.35) stated

Above all, the duty to help all children reach their potential is a moral imperative. We should not ask children to come to school to waste their time. Equity should be viewed as equal access to an appropriate education.

Children of the same chronological age differ from each other in all sorts of ways, including academic ability. This presents a great challenge to teachers who are faced with groups of diverse learners with a wide range of academic ability and other needs, and whose task is to facilitate each student's development by providing a range of educational provisions appropriate to their diverse needs.

Gifted students are found in all classrooms. Estimates of the incidence of giftedness vary, but if measured by a threshold IQ of 125, can be approximated to 10 per cent of the total population (Gagne, 2003). Within this general group of gifted individuals, it is important to remember that a range of profiles and defining characteristics are identifiable, and many of these differences from the norm become more apparent the higher the degree of giftedness. While the literature presents a range of definitions of giftedness, the researchers in the field agree that gifted students require qualitatively different educational experiences in order to achieve positive intellectual, social and emotional development (Braggett, 1997; Van Tassel Baska, 1994; Tomlinson, 1995). The current

South Australian policy for gifted students (DECS, 1995 in DECS, 1996) highlights the importance of special provisions in the development of giftedness, stating that:

Appropriate intervention by the family, community, schools and Children's Services can help a gifted student to reach full potential.

In terms of what schools should provide in terms of 'appropriate intervention', Feldhusen (1989, p.10) concludes from his research that:

Gifted and talented youth need accelerated, challenging instruction in core subject areas that parallel their special talents or aptitudes. They need opportunities to work with other gifted and talented youth. And they need...teachers who both understand the nature and needs of gifted youth and are deeply knowledgeable of the content they teach.

The most important responsibility schools have for gifted students is to provide them with educational opportunities equal to their unique needs such that their academic development is commensurate with their natural ability, and their healthy social and emotional development is facilitated.

What sounds reasonable in theory is often fraught with problems in practice. For a start, many myths about giftedness are prevalent and present obstacles to appropriate provision. For instance, a commonly held belief (that is discredited by research) is that gifted students will be successful regardless of the quality of their education. GERRIC's submission to The Senate Committee (2001, p.15) put forward the following argument:

The catch-cries of 'talent will out' and 'the cream will rise to the top' derive from the assumption that all students of high ability will succeed, and that therefore those who do succeed (and are therefore most easily identifiable as gifted or talented) represent the full quota of those who have potential. Like most simplistic arguments, it is extremely seductive; however it is contradicted by the many studies of underachievement and serious demotivation among academically gifted children and adolescents.

Because of this belief that the gifted will succeed regardless, some parents are resentful of extra resource allocation for gifted programs that are seen to favour a few students, and some teachers assert that their time and efforts are better invested in assisting the lower ability students rather than the high ability students. What they fail to understand is that the gifted students, as different from the norm as the low ability students, are equally to be considered to be 'special needs' students. As The Senate Committee (2001:34) found, "special needs (giftedness) should be seen in the same light as special needs (intellectual disabilities) or special needs (physical disabilities)".

In some classrooms, the gifted students may be used as peer mentors to help teach the less able students in the class, rather than having their own learning extended. Winebrenner (1993, p.1) stated that:

In a class that has a range of abilities...it is the most able, rather than the least able, who will learn less new material than any other group.

While in South Australia the policy of inclusion means that the composition of classes is inclusive of a wide range of needs and abilities, it is debatable whether all teachers have been equipped with the requisite special education knowledge and skills to cater appropriately for a range of children with special needs, or even whether the task is achievable in classes of up to 30 or more children.

Teachers need pre-service and in-service training in gifted education in order to understand, identify and provide appropriately for gifted students. The Senate Committee (2001, p.79) noted that “teacher training [in gifted education] is fundamental, and is not being done well enough at present”. Many teachers lack the understanding of and strategies associated with gifted education, so are poorly prepared to cater for the gifted learners in their classroom. Without this training, teachers often equate giftedness with high achievement, and fail to cater for the gifted learner who, when presented with work that they have already mastered, or find too easy, or boring, may not engage with the work and thus do not achieve at a level which the teacher expects of a high ability student. Thus the gifted learner may be overlooked for any special provisions.

In addition, schools differ, not just in the leadership they provide for gifted education within their school, but also in the nature of the provisions put in place, that are designed to meet the needs of their gifted students. While all schools should have a range of provisions including acceleration, extension and enrichment for gifted students, prioritizing resource allocation is always difficult. Some schools may provide a pull-out program for an hour or two each week, or an extension group out of school hours for those identified as being gifted. In South Australia, most gifted students are taught within the regular classroom. Some schools use cluster grouping of several gifted students placed together within the regular classroom.

An alternative provision is to group the gifted students into selective classes for all or most of their school day. This is the principle behind the IGNITE program currently operating in three of our state’s government secondary schools, and is applied in this independent boys’ Preparatory School. Within this context, the remainder of this article addresses the provision of selective multi-level classes for gifted students, and discusses the attitudes expressed by staff and parents about their experience at this school.

MULTI-LEVEL SELECTIVE CLASSES

With about 380 boys, this school has offered two multi-level selective classes for gifted students since 2003 – one which combines the middle years of primary school (Years 3, 4 and 5) and the other which combines Years 6 and 7, each of which has about 24 students. Straight year level classes operate concurrently, and students who are identified as being gifted may choose to be placed in the multi-level class or remain in the straight year-level class. The gifted students who choose to remain in the year-level classes, and those in the junior primary years are supported with a weekly pull-out program which has a social and emotional focus.

The concept of mental age rather than chronological age is an important idea when considering multi-level classes. This means that students of differing ages but all with high intellectual ability work together, so-called ‘like minds’ together generating a relatively homogenous academic group.

In the current research study, of the 50 per cent of staff and parents who responded, roughly 70 per cent were supportive and 30 per cent were not supportive of the multi-level classes for gifted students. The parents of gifted children in the multi-level classes were unanimous in their praise for the classes. At both ends of the spectrum, there were strongly expressed attitudes, either praising or criticizing the arrangements. The 50 per cent who did not choose to respond may be neutral about the issue, but for whatever reason, were not motivated to either praise or criticize the arrangements.

Perceived Benefits of the Multi-Level Classes

Grouping gifted students in selective classes can provide them with the opportunity to work at a faster pace, with more rigorous and challenging curriculum better suited to their intellectual ability. The academic advantages both parents and teachers at this school observed were

extremely positive, including the benefits of extension, faster-paced learning and creative and challenging curriculum. In terms of academic achievement, Allan (1991, p.63) cites Kulik and Kulik's (1989) analysis of gifted and talented programs which "found that students in gifted and talented classes performed significantly better than they did in heterogeneous classes". Rogers (1991) also concluded that:

While full-time ability grouping for regular instruction makes no discernible difference in the academic achievement of average and low-ability students, it does produce substantial academic gains for gifted students enrolled full-time in special programs for the gifted and talented.

The reason for this is that in a homogenous grouping, more appropriate learning experiences can be provided. According to a meta-analysis of the research into ability grouping, Rogers (1998) found that:

High-ability and gifted students tend to benefit most from like-ability grouping, because the strategy provides them with the opportunity to access more advanced knowledge and skills and to practice deeper processing. Most likely, this access can be provided when instructors are not forced to divide their teaching energies and efforts among widely diverse levels of ability and achievement.

Grouping gifted students in homogeneous classes also has the advantage of being better able to meet their social and emotional needs. Gifted children differ from their age-peers emotionally as well as intellectually. Often it is their sense of feeling different that can make gifted students vulnerable to negative social and emotional development. As Silverman (1993, p.3) states, "Gifted children not only *think* differently from their peers, they also *feel* differently." This sense of difference is amplified the higher the degree of giftedness. Gross (2000, p.188) found that:

The problems of social isolation, peer rejection, loneliness and alienation which afflict many extremely gifted children arise not out of their exceptional intellectual abilities but as a result of society's response to them.

Because of this, they need opportunities to be with other gifted students who are like-minded peers, and not necessarily age-peers, who understand their feelings and perceptions and with whom they can feel 'normal' and accepted.

Rogers' (1998) research found that all children, not just gifted children, benefited from being grouped with other children of like ability. The opportunity to work and socialize with other like-minded students minimized the sense of 'difference' and isolation that gifted students often experience when placed in regular classrooms. Many parent responses in this current study acknowledged that their gifted children enjoyed and needed the company of like-minded boys, had formed good friendships within the class (irrespective of age differences) and were socially happy and more confident, "not being teased or called 'weird' by their classmates anymore". Allan (1991, p.63) analysed Kulik & Kulik (1982) and Kulik's (1985) research on ability grouping for gifted students and concluded that their impact on issues of attitude and self-concept were "generally positive".

In support of the classes, several parents in this current study expressed relief at finding a school that met their child's needs, such as the following from the parent of a Year 5 child who wrote:

We have spent five years battling an education system that has been unable to effectively cater for our highly gifted son, trying to find the right educational fit for him...I cannot remember seeing as much joy in my son's face at the end of his first day at [this school].

Perceived Disadvantages of the Multi-Level Classes

The most frequently mentioned disadvantage parents saw in having multi-level classes related to the gifted boys being isolated from their age peers, and the boys in the year-level classes finding it hard to maintain friendships with their age peers in the multi-level classes. Both these issues could arise simply by friends being physically separated and placed in different classrooms and were not necessarily concerned with the nature of those classrooms. One of the most common reasons why parents generally are reluctant to accelerate their gifted child is their perception that children need to stay in a class with their age peers (Colangelo, Assouline & Gross, 2004) and yet friendships are based on many factors other than age, such as common interests and shared aspirations. Class placement decisions should be made on the basis of which class best will meet the child's academic needs, while supporting their social and emotional development.

While one teacher saw no disadvantages in having multi-level classes for gifted students, three teachers echoed the parents' concerns about boys being separated from their year level peers, but most teachers saw the disadvantages as being for the students in the year-level classes when the bright students were removed. Their criticisms centred around two main issues: the perception of decreased self-esteem of the boys not selected, and the loss of academic role models for the less able students in the year-level classes.

Interestingly, Allan's (1991) research on the effects of ability grouping on self-esteem found that the positive effect on self-esteem was more significant in homogenous groups of slower learners, who experienced feelings of success and competency when in a classroom of students more similar to themselves and without the brightest students to make them feel incompetent. Students who previously were overshadowed by the brightest students are empowered, their abilities stand out in different ways and they take on leadership roles in the class when the gifted students were removed (Kennedy, 1989; Fiedler et al, 1992 in Allan, 1991). Perhaps other variables, such as an individual student's competitive nature and perception of the selection process as a form of competition, could account for a loss of self-esteem.

With respect to role models, Schunk's (1987) research found that children modelled themselves on other children with whom they could identify as being roughly similar to them and who were successful in valued tasks. According to Schunk, gifted students did not provide academic role models for average or low-ability students because of the perception of difference. This highlighted the importance of basing decisions about provisions for gifted students on reliable research rather than on limited personal values and experience. If a teacher embraced the opportunity to teach a class with a narrower range of ability and valued provisions which were designed to maximise educational outcomes for the whole spectrum of diverse learners, rather than lamenting the loss of bright students in the class, then their positive modelling would help all students to see the benefits to be accrued in these classroom arrangements.

One parent of a Year 6 child (who was not identified as being gifted) wrote: *my perception is the brighter you are, the more help you get, which is quite disturbing.*

Another Year 6 parent, whose child had not been identified as being gifted, wrote that:

I feel more remote from the so-called [school] community, I no longer want to be a class rep, attend school events and try to be part of the school community that engenders a philosophy of intellectual elitism.

This is a very negative response, and in the context of the general parent responses, this sentiment was voiced by only one parent. However, it is interesting to note that the same sense of isolation and disengagement is often reported from parents of gifted children in school communities which neither recognized nor valued gifted students, as reported by the Gifted and Talented Children's Association of Western Australia (2001, in The Senate Committee, 2001, p.29) stating that:

Many [parents]...find that public perception of the term 'gifted' means that the children and parents are ostracized, seen as 'having tickets on themselves', and parents are seen as 'pushy' parents who have 'hot housed' their children.

What both groups of parents were experiencing was a sense of difference and alienation from the culture prevalent in their school community. If parents - mature adults - were sensitive to and upset by this sense of 'lack of fit', it raises the question of what children must feel when they perceive that they are different from their peers. The parameters of this research did not include asking the students themselves about their impressions of class provisions, but this could be explored in a follow-up study. Shields' (1995) research comparing students' attitudes and perceptions in homogenous and heterogeneous classrooms found that there was no evidence to suggest that ability grouping impacted negatively on either students' self concept or attitudes.

Three parents in this study observed that the segregation of students into the multi-level classes and the associated charges of elitism levelled against such provision led to unrest and division within the school community. Several of the staff also perceived the provision of special classes to be elitist and one teacher observed that it was divisive of the school community. Such a small number of responses to this effect would suggest that the school community was *not* divided over this issue, but a few people within the community felt isolated. Communication is essential in maintaining harmony within a community, and one parent highlighted the importance of this, saying that there were no disadvantages in having the multi-level classes in the school:

As long as all parents in the school are educated in why [the multi-level classes] are necessary and are not elitist or singling out one group of boys as better than the others.

The observation that special provisions for gifted students are elitist is commonly reported in the literature and in submissions made to The Senate Committee Inquiry into the education of gifted children (2001:30). Elitist attitudes could certainly be very divisive, polarizing people into a 'them' and 'us' mentality (Elliott, 1968 in Stewart et al, 2003). A strong argument against elitism is equity and social justice. A child who is gifted needs qualitatively different educational provisions, just as the child who is a brilliant musician needs advanced tuition in music, and the child who is an outstanding athlete needs to be given opportunities to train and compete with other elite athletes. Each child's needs are important and valued. The Senate Committee (2001, p.32) recommended that:

It is essential to disconnect 'high intellectual ability' from the unwanted connotation of general moral superiority. High intellectual ability, like high sporting ability, is simply one of many morally neutral ways in which individuals can differ from each other.

One parent of a Year 7 student in the multi-age class wrote that:

Every child has a talent – you just have to find it and cater for it. Parents [of boys not identified as being intellectually gifted] may need to look at their children and see their talents lie elsewhere, for example the 'A' grade football team, and be happy that their child is gifted at sport but may not have the IQ to be placed in a multi-level class, just as my child does not have the skill to be placed in the 'A' grade football team.

Changing negative attitudes towards giftedness is an important precursor to providing the necessary educational experiences in an atmosphere of recognition and acceptance.

CONCLUSIONS

Grouping is only a starting point for meeting the needs of the gifted students. The significant element is the provisions that are developed for the students once they are in the group. Full-time

ability grouping on its own does not produce any increases in academic achievement, nor necessarily any benefits to social and emotional development (Kulik & Kulik, 1992; Rogers, 1993). It is only when the provision of a differentiated curriculum and the quality of the instruction and learning environment within the grouped classroom matches the needs of the gifted students that significant benefits are achieved. Gross (1997, p. 21) stated that:

A program which allows academically gifted students to undertake a fast-paced, intellectually rigorous curriculum matched to their abilities and interests, in company with other students of similar abilities, provides what Robinson and Robinson (1982) termed the 'optimal match' between gifted students, the curriculum developed for them, and the environment in which their talents are being fostered. A program of fulltime grouping...meets Gagne's (1993) criteria for content, setting and density, and is the optimal environment for academically gifted children (Van Tassel-Baska, 1985).

The attitudes and values expressed by the parents and staff surveyed at this school mirror many of the findings in the research literature. The majority of responses favour the multi-level class provision for gifted students, and the parents of boys in the multi-level classes are unanimously supportive of the classes and the programs they offer because of the positive outcomes their children experience.

The Senate Enquiry Committee (2001, p.66) "accept[ed] the predominant evidence that ability grouping is beneficial for the outcomes of gifted children" and recommendation 7 of their report stated that:

MCEETYA [the Ministerial Council on Education, Employment, Training and Youth Affairs] should develop a consistent policy exploring the options for ability grouping and supporting ability grouping as a way of meeting the needs of the gifted.

With provisions put in place for gifted students that are soundly based on well-researched theories and practices, and implemented by trained and effective teachers, gifted students are given every opportunity to be successful, the rest of the students are not disadvantaged – in fact, all learners are given educational opportunities more equal to their needs.

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Extending the multiple-goal perspective to tertiary classroom goal structures

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The multiple-goal perspective has recently been applied to teacher behaviours in primary school classrooms through experimental intervention (Linnenbrink, 2005) and objective observation (Sideridis, 2005). However, there is evidence suggesting that rather than centered only on teacher behaviour, classroom goal structures are a whole class feature (Urdan, 2004c). Despite intended or observed classroom goal structures, students' perceptions of the same classroom can vary (Wolters, 2004). Furthermore, students' pre-existing personal goal orientations may shape their perceptions of classroom goal structures (Lyke & Kelaher Young, 2006). An investigation with tertiary students in naturalistic learning contexts will extend achievement goal theory to a multiple-goal perspective of classroom goal structures.

Achievement goal theory, multiple-goal perspective, classroom goal structures, tertiary students

INTRODUCTION

Historically achievement goal theory has served as a prominent perspective of students' personal academic motivations. More recently goal theory has become a lens through which the motivational emphasis of classroom environments has been viewed. Consistent with the interest in concurrent student endorsement of different levels of different personal achievement goal orientations (e.g., the interactive pattern of high mastery and high-performance goals, see Barron & Harackiewicz, 2001), the investigation of multiple classroom goal structures has emerged in primary school settings using experimental techniques (Linnenbrink, 2005) or observations of teacher behaviours (Sideridis, 2005). There is currently no research that provides field-based evidence that students themselves perceive interactive multiple goal structures in classrooms. Moreover, relations between perceived interactive multiple classroom goal structures and other student variables are not known, nor are the causal directions of these relationships. An investigation with tertiary students in actual classroom settings can address such issues. However, before these questions can be answered, there are a number of methodological concerns that must be clarified and overcome. This paper identifies several important factors that require consideration before the multiple-goal perspective can be extended to student perceptions of tertiary classroom goal structures. First, an overview of the multiple-goal perspective is provided. The need to capture holistic views of classroom goal structures is then identified before the importance of student perceptions, and the significance of causal relationships between students' personal attributes, such as goal orientations, with perceived classroom goal structures and other environmental variables are discussed.

THE MULTIPLE-GOAL PERSPECTIVE

Achievement goal theory is a conceptual tool for understanding motivation in academic contexts (Kaplan & Middleton, 2002). Mastery and performance goals are considered the primary reasons **why** students engage in academic behaviours. Mastery goals reflect students' pursuit of developing academic competence while performance goals are held by students whose primary focus is on competing and demonstrating their ability relative to others (Ames, 1992). Early work suggested that mastery goals were associated with beneficial learning patterns such as a focus on effort and strategy to meet academic challenges, whereas performance goals were either not linked or had a negative relationship with such adaptive patterns (Dweck & Leggett, 1988). A revision of this normative theory saw the division of performance goals into approach and avoidance forms (Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997; Skaalvik, 1997; Wolters, Yu, & Pintrich, 1996). When students adopt performance-avoidance goals and try not to appear worse than others, research consistently reveals an association with unfavourable outcomes such as a negative impact on academic performance and intrinsic motivation (Church, Elliot, & Gabel, 2001; Elliot & Church, 1997). However, it is debatable whether the effects of performance-approach goals, or those goals that students adopt when wanting to demonstrate high relative ability, are good or bad in comparison to mastery goals (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Kaplan & Middleton, 2002; Midgley, Kaplan, & Middleton, 2001). For example, although performance-approach goals appear to be associated with higher grades, it is often at a cost of factors such as interest, which is consistently related to mastery goals (Elliot & Church, 1997; Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Harackiewicz, Barron, Tauer, & Elliot, 2002).

Aside from whether factors such as the heightened comparative academic achievements associated with performance-approach goals should be perceived as beneficial over mastery goals, the performance-avoidance and -approach distinction has certainly advanced achievement goal theory beyond a dichotomous framework. In fact, an investigation of a mastery-avoidance goal orientation, whereby students aim to avoid misunderstanding or not learning, has resulted in a four factor achievement goal model (Elliot & McGregor, 2001). In addition to the academic motivations of mastery and performance goals, the importance of social goal orientations, based on a long theoretical tradition (e.g., McClelland, 1955 cited in Covington, 2000; see also Urdan & Maehr, 1995), is also emerging (e.g., Dowson & McInerney, 2001; Dowson, McInerney, & Nelson, 2006; Elliot, Gable, & Mapes, 2006; Nelson, O'Mara, McInerney, & Dowson, 2006; Wentzel, 1993). Although there is a need to extend further achievement goal theory through the continued investigation of mastery-avoidance and social goals, it is the distinction between approach and avoidance forms of performance goals that are central to the current multiple-goal perspective and therefore the focus of this paper through its extension to the classroom environment.

The multiple-goal perspective asserts that both mastery and performance-approach personal goal orientations can and do have positive effects. Four potential multiple-goal patterns between mastery and performance-approach goals have been suggested (Barron & Harackiewicz, 2001). An **additive goal pattern** may exist when each goal independently has a positive main effect on the same outcome (e.g., Wolters et al., 1996). A **specialised goal pattern** is thought to be evident when mastery and performance approach goals are positively associated with different outcomes (e.g., Elliot & Church, 1997). The **interactive goal effect** suggests that a combined high mastery and high performance-approach goal orientation may be more advantageous (e.g., Pintrich, 2000b). A **selective goal pattern** would be evident if students chose different goals based on situational cues (e.g., Linnenbrink, 2005). To test these four multiple-goal patterns of personal goal orientations against normative goal theory, the multiple-goal perspective not only requires the investigation of the independent versus interactive effects of mastery and performance-

approach goals on multiple outcomes (Harackiewicz, Barron, Pintrich et al., 2002), but the selective goal pattern also calls for an appreciation of the learning context relative to personal goals.

Two popular approaches of evaluating situational cues in school classrooms have been the TARGET (task, authority, recognition, grouping, evaluation, and time) system (Ames, 1992; Epstein, 1988) and *Patterns of Adaptive Learning Survey* (PALS, Midgley et al., 1996). Based on student reports of the salience of teachers' instructional practices and policies in creating an emphasis on particular goals in the school and classroom, the original PALS instrument has been used extensively in primary (e.g., Anderman & Midgley, 1997; Kaplan & Maehr, 1999; Ryan, Gheen, & Midgley, 1998; Urdan, Midgley, & Anderman, 1998; Young, 1997) and secondary (e.g., Kaplan, Gheen, & Midgley, 2002; Roeser, Midgley, & Urdan, 1996) contexts. It is this application of the achievement goal theory to evaluate the goal-related messages that students receive from teachers in classroom environments that has provided the foundation for the potential to extend the multiple-goal perspective to the classroom. By measuring classroom goal structures the four personal multiple achievement goal patterns could potentially be applied directly to the learning environment rather than only to personal goal adoption.

Like much of the early personal achievement goal research under the normative perspective, many investigations measuring students' perceptions of their classrooms goal structures have been based on hybrid performance-approach and avoidance measurements (e.g., Gutman, 2006; Turner et al., 2002; Urdan & Midgley, 2003). This has meant that although some earlier classroom environment work has measured student perceptions of both mastery and performance goal structures, without a defined approach and avoidance distinction of the performance goal structure, the results cannot be directly conferred with the multiple-goal perspective. In order to apply empirically the multiple-goal perspective to investigations measuring students' perceptions of actual classroom goal structures, the first step is the development of a survey instrument with a distinct approach form of performance goal structures. The PALS instrument has provided an opportunity for this development.

Some researchers have attempted to distinguish items pertaining to performance-approach high school classroom goal structures from the confounding avoidance items in the PALS instrument (Kaplan et al., 2002; Urdan, 2004c; Wolters, 2004). It seems, however, that they have done little more than separate out the approach from avoidance performance goal structure scales. For example, Urdan (2004c) identifies the two forms of performance goal structures, but does not empirically divide them. In addition, mastery goal structures were not used in any analyses, therefore precluding the application of the multiple-goal perspective. Conversely, Kaplan et al. (2002) and Wolters (2004) report a moderately reliable performance-approach ($\alpha = 0.79$ and $\alpha = 0.69$ respectively), as well as mastery classroom goal structures ($\alpha = 0.83$ and $\alpha = 0.70$ respectively), based on PALS scales from respective English and mathematics high-school student perceptions. While both studies report findings consistent with some patterns of the multiple-goal perspective as applied to classroom goal structures, neither study locate their findings as such.

For example, while at a student level Wolters' (2004) study can be interpreted as demonstrating some multiple classroom goal structure patterns, the unintentional application has meant that to date there has been no field investigation of the interactive multiple classroom goal effect. It is not known, therefore, whether combined perceptions of high mastery and high performance-approach classroom goal structures are advantageous, as suggested by proponents of the revised goal theory (e.g., Barron & Harackiewicz, 2001), or whether the most adaptive associations occur with mastery only goal structures, as recommended under the normative goal tradition (e.g., Kaplan & Middleton, 2002). Consequently, the question of whether or not students actually report multiple contextual goals remains unanswered (Pintrich, Conley, & Kempler, 2003). Wolters'

(2004) study, however, does confirm an additive multiple classroom goal pattern with mastery and performance-approach goals each having independent, positive main effects on self-reported cognitive and metacognitive learning strategies. A selective pattern also appears through the relationship between perceived mastery and performance-approach goal structures and students reports of their respective personal goal orientations. However, while mastery classroom goal structures were positively associated with confidence in mathematics ability, motivational engagement including effort and persistence and grades in mathematics, because performance-approach classroom goal structures were not positively associated with different outcomes a specialised goal pattern cannot be inferred. Without comparison against the interactive effects of high mastery and high performance-approach classroom goal structures, these results from Wolters' (2004) study support the normative position that mastery only goal structures are most favourable.

While substantial PALS-based classroom goal structure research has been conducted in primary (e.g., Anderman et al., 2001; Ryan et al., 1998; Turner et al., 2002; Urdan et al., 1998) and secondary (e.g., Kaplan et al., 2002; Urdan, 2004b; Wolters, 2004) settings, there is one such study known in a tertiary classroom (Lyke & Kelaher Young, 2006). However, unlike some of the school classroom research, the single tertiary study conducted in an American college, did not consider the nested nature of students within classrooms. Similarly, other non-PALS studies associated with perceived contextual classroom characteristics conducted at the tertiary level have not considered the amount of variance within and between tertiary classrooms (e.g., Barron & Harackiewicz, 2003; Joiner, Malone, & Haines, 2002; Karabenick, 2004). In order to reduce this notable gap in post-school classroom environment research, an investigation of Australian university students' perceptions of classroom goal structures and other classroom climate variables at the student and classroom-levels must be conducted.

An investigation of tertiary students self-reported classroom goal structures will extend achievement goal theory to a multiple-goal perspective of classroom environments which includes the unexamined interactive multiple classroom goal structure effect. Questions of whether tertiary students perceive multiple contextual goals and what is the most adaptive contextual goal structure must be addressed. Testing of all multiple classroom goal structure patterns is possible through an investigation of multiple potential outcomes including academic self-concept, study strategies, and achievement. Additionally, indications of the influence perceived classroom context and personal characteristics have on one another is possible through the measurement of personal variables before and after semester long classroom interactions. However, to design such investigations several methodological issues grounded in the major underlying assumptions of previous work require careful consideration. The classroom goal structure is predominantly accentuated by teacher behaviour. Between classroom differences should be the primary unit of analysis. Furthermore, the learning context is the primary influence on student outcomes including personal goal orientations. The following sections of this paper address these assumptions.

WHOLE CLASSROOM GOAL STRUCTURES

Having a sound instrument to measure performance-approach as well as mastery classroom goal structures is vital for extension of the multiple-goal perspective to learning environments. However, it is important to consider whether the definition and meaning of the measurements are representative of the construct. The popular method which assumes that it is the teacher's approach to instruction that dominates the classroom context, for example PALS (Midgley et al., 1996), may not be best practice. This is reflected in the revision of the original PALS scales (Anderman & Midgley, 1997; Midgley et al., 1996) to include additional scales that consider perceptions of classroom goal structures that are not entirely based on teacher behaviour (Midgley et al., 2000). Nevertheless, the original teacher-focused PALS instrument is still prominent in

recent studies (e.g., Gutman, 2006; Kaplan et al., 2002; Turner et al., 2002; Urdan, 2004b; Urdan & Midgley, 2003).

Teachers who involve students, encourage interactions between students, emphasise effort in task engagement, and show support and concern about student learning are thought to exhibit a high mastery focus. A high performance emphasis on the other hand suggests that teachers champion a public comparison of students' performances (Patrick, Anderman, Ryan, Edelin, & Midgley, 2001). While much attention has been given to such teacher behaviours, there is limited support for the notion that what a teacher aims to emphasise, or appears to emphasise, in a classroom is consistent with the messages that students receive. Although one study found that teachers' reported instructional goal emphases were significantly associated with high school students' aggregate perceptions of respective classroom goal structures (Kaplan et al., 2002), other studies are less convincing. For example, research in primary classrooms has been unable to confirm correlations between self-reports or observations of teacher goal referenced practices with student perceptions of the same salient classroom goal structures (Anderman et al., 2001; Urdan, 2004b; Urdan et al., 1998). Rather, students' views of their common learning context varied considerably. Inconsistent teacher-student views of the classroom suggest that there are other factors which contribute to students' perceptions of classroom goal structures in addition to the teachers' self-determined or objectively reported classroom goal emphasis. While these between-student differences are important, and may be influenced by the manner in which students filter the messages based on their own personal characteristics such as goal orientations, it may also be that students themselves influence the functioning of whole classroom dynamics, not just teacher behaviours. Another concern is that students' responses to the PALS teacher-focused instrument may reflect perceptions of teacher personality and likeability rather than measuring the intended variable of the salience of the teachers' mastery or performance emphasis in the classroom (Urdan, 2004b).

The very fact that classrooms contain more than only a teacher means that the emphasis of classroom goal structures for any given student may reflect more than just their teachers' policies and practices. As Urdan (2004c, p. 255) states in an argument for tapping into students' perceptions about the shared culture of potential performance goal structures, "It is possible that students may perceive a culture of competition and social comparison in the classroom that is driven more by student attitudes and behaviors than by teacher behaviors." The conception of a shared classroom culture rather than one heavily reliant upon teacher practice reflects an interest in the psychosocial climate of classrooms (Fraser, 1980) and means that the whole classroom should be reflected in measurement items.

Urdan (2004c) presents a modified version of the revised PALS performance classroom goal structure scale that asks students to report on both approach and avoidance forms which they perceive as a function of their class as a whole. A unique feature of Urdan's (2004c) performance-approach classroom goal structure scale is its reportedly orthogonal, or slightly related, relationship to the mastery classroom goal structure scale, although further analysis of perceived mastery classroom goal structures were not conducted in the study. The orthogonal relationship is an important consideration when interested in the potential of a perceived interactive pattern of classroom goal structures (e.g., simultaneously reported high mastery and high performance-approach classroom goal structures) because orthogonal reports of mastery and performance-approach personal goal orientations are thought to increase the possibility of an interactive multiple-goal pattern existing between personal achievement goals (Pintrich et al., 2003). Orthogonally related classroom goal structure scales also reflect observational research findings from primary school classroom contexts (Patrick et al., 2001). Therefore, investigations using the slightly related mastery and performance-approach classroom goal PALS scales as modified by Urdan's research (2004c) enable a well established instrument to be used to extend the multiple-goal perspective to classroom goal structures.

A greater understanding of the ways that students view the functioning of their whole classroom environment is possible if features of the classroom other than only goal structures are also examined. Based on research spanning over a decade, Moo's (1979) conceptualised that social environments, including educational contexts, could be represented by three domains; relationships, personal growth, and system maintenance and change. The *College and University Classroom Climate Inventory* (CUCEI, Fraser & Treagust, 1986) was developed in Australia to assess specifically students' perceptions of small tertiary classroom environments consistent with Moo's three domains. Since its inception, the CUCEI has been successfully used in several tertiary contexts including classrooms in Singapore (Myint & Goh, 2001), United States (Bruck, Hallett, Hood, Macdonald, & Moore, 2001; Pulvers & Diekhoff, 1999), and Australia (Clarke, 1990; Fisher & Parkinson, 1998; Joiner et al., 2002). An investigation with tertiary students that combines the measurement of classroom goal structures with an investigation of other classroom climate variables as measured by the CUCEI can determine whether there is a pattern between perceived classroom goal structures and other classroom climate features. Such an investigation cannot only identify whether or not tertiary students' perceive multiple classroom goals, but whether those students who perceive classrooms with an emphasis on multiple or single goals report similar patterns of classroom climate variables and ways that such environmental features interact with specific personal variables.

Another requirement to apply the different multiple-goal patterns to classroom goal structures is the investigation of multiple student variables. It has been suggested that negative effects of performance goals may only be evident when students are faced with difficulty and their perceptions of competence are lowered (Dweck & Leggett, 1988). Academic self-concept is one aspect of a multidimensional construct pertaining to self perceptions of relative ability (Marsh, 1990). Thus, a shared achievement situation may present differing perceptions of difficulty for students and therefore have differential effects on their academic self-concept. Although very little is known about the interplay between self-concept and learning contexts, an investigation of tertiary students' academic self-concept and their reports of classroom goal structures, including an application of a multiple-goal perspective, may facilitate an appreciation of the relationship between these two dimensions.

WITHIN-CLASSROOM VARIATION OF PERCEPTION

In addition to the previous idea that whole classroom goal structures need to be investigated, it is now suggested that despite the intended classroom goal structures, such as those managed under experimental conditions (Barron & Harackiewicz, 2001; Elliot & Harackiewicz, 1996; Linnenbrink, 2005), or objective observations of the goal structures in classrooms (Patrick et al., 2001; Sideridis, 2005; Turner et al., 2002), students' perceptions of the same classroom can vary (Kaplan et al., 2002; Wolters, 2004). The potential for within-class variation calls for the investigation of individual, subjective student perceptions of the classroom rather than a focus on the intended or objective reality of teacher policies and practices (Ames, 1992; Church et al., 2001; Meece, Anderman, & Anderman, 2006). Survey assessments offer a resource efficient, practical, and non-intrusive method to gather such individual views (Fraser & Walberg, 2005). The investigation of student perceptions does not, however, necessarily mean that an understanding of those factors associated with whole classroom variance cannot be explained if appropriate analysis techniques are employed.

Apart from researchers being able to create puzzle tasks that emphasise one goal condition over another (Elliot & Harackiewicz, 1996; Senko & Harackiewicz, 2005) and combined goal conditions (Barron & Harackiewicz, 2001), teachers in actual classrooms are observed also to be successful at creating intended goal structures (Anderman et al., 2001; Urdan, 2004b) including multiple classroom goal structures of combined mastery and performance-approaches (Linnenbrink, 2005). It appears, however, to be difficult for teachers to enact consistently with

purpose either a mastery or performance dominant goal structure (Anderman et al., 2001; Linnenbrink, 2005; Urdan, 2004b) and experimental tasks are short-term controlled activities unlike conditions in actual classrooms. Additionally, investigations of intended and observed classroom goal conditions tend to focus on the environmental circumstances as the direct cause of student outcomes (Urdan, 2004b is an exception) while they are unable to address questions akin to “How do different students in the same classroom perceive and respond to potential goal messages?” (Urdan, 2004b, p. 230). Studies that go some way in answering such questions and explore the causal directions of the relationships between personal and classroom variables use survey data of individual student perceptions.

There are several other main reasons why when interested in environment-person associations that student reports of the psychosocial environment of classrooms are considered more important than observed assessments (Ames, 1992; Wolters, 2004). Over the course of their education most students spend considerable time experiencing a variety of different learning contexts. This is particularly true by the time that students attend university, making students somewhat experts in forming impressions about classroom environments. Student reports capture this so-called ‘expert’ data that an observer could miss or not identify as important. While day-to-day teacher behaviour and classroom dynamics may appear to be inconsistent to an occasional observer, students are in a position to obtain a long-standing, overall impression (Fraser & Treagust, 1986). It is through the examination of the psychometric properties of survey instruments, including their construct validity and reliability, that theories such as achievement goals can be applied to contextual influences and tested with confidence. Furthermore, large sample sizes can efficiently be obtained thus enabling the measurements gathered to afford generalisation (Turner et al., 2002).

Consistent with the view that survey reports of the common contextual factors operating in a classroom influence individual student learning related qualities, including personal goal orientations (i.e., the selective goal pattern) (Meece et al., 2006), a between-class model is expected to attain the best fit for goal structure variance. As a result, between classroom-level differences of students’ perceptions of classroom goal structures are often favoured over an interest in between student-level differences (e.g., Kaplan et al., 2002; Pintrich et al., 2003; Sideridis, 2005). However, if questions pertaining to whether or not the different multiple-goal patterns found with relation to individual personal achievement goals can also be found for perceived actual classroom goal structures, not only does the subjective rather than objective component of the learning environment need to be ascertained, but those individual perceptions need to be central to the data analysis rather than only aggregated into class-level perceptions. That is not to deny, however, that students’ are nested within classrooms and so the commonality of the classroom environment contributes uniquely to patterns of students’ cognition and behaviour (e.g., Urdan, 2004b). In fact, students in a particular classroom are expected to be more similar to each other and to students in other classrooms of the same school (i.e., nested at classroom and school levels) than they would be to students from a classroom located in another school. This is because students are not randomly assigned to classrooms or schools, rather students in the same classroom and school generally come from populations that are homogeneous by geographical region in the very least (Osborne, 2000). Therefore, while some variance between schools can be expected, the amount of within- and between- class variance remains questionable.

Hierarchical linear modelling (HLM) is an analysis technique that not only enables the effects of within-class variations of perception as well as between-class differences to be investigated, but it has the potential to estimate the amount of variance that classroom-level influences have on student-level differences by controlling for them. For example, school students self-reported perceived mastery goal structure (16% and 28% in respective studies) and performance goal structure (9% and 29% in respective studies) has been attributed to classroom level variability

(Kaplan et al., 2002; Urdan, 2004b). Because tertiary students spend less time each week in the same classroom than school students do for any given topic, an investigation of tertiary classroom-level variance of goal structures may be less than those reported in school based studies. Indeed, a non-PALS based investigation in tertiary classrooms reported a five percent between-class variance for both mastery and performance-approach classroom goal structures (Karabenick, 2004), far less than those school classroom studies formerly cited. However, further research using HLM techniques is clearly required to extend the understanding of within and between tertiary student perceptions of classroom environments.

CAUSAL RELATIONSHIPS

The recognition that goals are not traits, as defined by classic personality and social psychology traditions, means that personal achievement “goals are assumed to be cognitive representations or knowledge structures which are sensitive to both contextual and internal personal factors” (Pintrich, 2000a, p. 102). The capacity for the learning context to exert some influence on personal achievement goal orientations and other personal characteristics is therefore conceivable. Indeed, there is considerable evidence that a relationship exists between the same respective classroom goal structures and personal achievement goals at all levels of education (e.g., Anderman & Midgley, 1997; Karabenick, 2004; Wolters, 2004; Young, 1997). However, relations are sometimes at low levels (e.g., non-significant relationship between personal and contextual performance goals, $r = 0.24$ between personal and contextual mastery goals, Gano-Overway & Ewing, 2004) and the causal direction is less well established.

Whether the classroom environment influences students’ personal goal orientations or other personal variables (e.g., self-concept, study strategies, and achievement) has important implications for modification of the classroom environment as a tool for motivating students to learn. If the claim that the achievement goal messages evident in the learning environment can influence individual personal goal orientations, or other learning related variables, then aspiring to create a classroom where either interactive multiple-goal structures (i.e., under the revised goal theory) or mastery only goal structures (i.e., under normative theory) may lead to the promotion of adaptive personal learning goals and other positive outcomes for students (for recent reviews see Meece et al., 2006; Urdan, 2004a). However, if perceived classroom goal structures are largely due to the personal goal orientations, or other personal factors, that students hold prior to their participation in a particular classroom, then attempts to improve environmental features can yield little by way of student learning gains. This may be particularly true for older students because context may have less of an influence with age. Postsecondary students are assumed to be more able to self-regulate (Pintrich et al., 2003), therefore offering more support for the hypothesis that students existing personal goal orientations will influence their perceptions of the classroom environment at the tertiary level rather than the other way around.

While some experimental studies with college students using puzzle tasks (Elliot & Harackiewicz, 1996; Senko & Harackiewicz, 2005) have suggested that it is possible to manipulate participants to display certain goal related behaviours such as performance ability, another experimental study with college undergraduates clearly demonstrated that the effects of assigned goals were moderated by personality factors (Barron & Harackiewicz, 2001). The latter study provides some experimental support for the hypothesis that existing personal characteristics may influence student outcomes over and above the influence of environmental conditions. The pattern of interaction between classroom environment and student outcomes has been demonstrated in actual university learning environments, but generally in association with limited environmental variables, without accounting for students being nested within classrooms, and with unknown causal relationships.

Studies in naturalistic environments with university students have generally either exposed all students to the same lecture-based learning environment (e.g., Elliot & Church, 1997; Harackiewicz et al., 1997) or differences within and between smaller classes were not reported. For example, the classroom environment variables of lecture engagement, evaluation focus, and harsh evaluation of two introductory chemistry courses, one with absolute grading the other with normative grading, were considered by Church et al. (2001). However, the learning context that was evaluated combined both lectures and small discussion groups and the potential between-class variation of the discussion groups was not investigated due to too few classes in the sample.

In a series of other studies, Harackiewicz, Elliot and colleagues (Elliot & Church, 1997; Harackiewicz et al., 1997; Harackiewicz et al., 2000; Harackiewicz, Barron, Tauer et al., 2002) investigated psychology students achievement goals and educational outcomes, particularly interest and normatively graded performance based on multiple choice exams, specifically in lecture-only tertiary courses. To test the idea that it is the learning context which defines the effect that personal goal orientations have on outcome variables, Barron and Harackiewicz (2003) sought to examine the relationship between college students personal mastery and performance-approach goals and perceived classroom goal structures to their interest, and final grades (based on written assignments, class participation, presentations, projects, and essay exams) in seminar classes with a cap of 25 students. Contrary to expectations, however, the study reported the same relationships of mastery goals being linked to interest and performance goals predicting grades as for the previously investigated lecture-based, exam-evaluated courses. However, the study did not consider the nested nature of the students in tutorial classes, nor did it investigate the relationship between students' personal goal orientations at the beginning of the semester with their reports of classroom goal structure toward the end of semester, despite having collected the data to do so. Similarly, a study with college students attending physical activity classes did not directly examine whether beginning of semester personal goal orientations predicted end of semester motivational climate reports although the data to conduct the analysis was collected (Gano-Overway & Ewing, 2004).

However, there is one known PALS-based study in a tertiary context that has considered the causal direction between personal achievement goals and classroom goal structure. Lyke and Kelaher Young (2006) found that pre-tested mastery goal orientations were positively correlated with perceived mastery classroom goal structure ($r = 0.33$) and existing performance achievement goals were related to reported performance goal structure ($r = 0.19$). They concluded that "Classroom goal structure may very well be in the eye of the beholder" (Lyke & Kelaher Young, 2006, p. 487). In support of this finding is a much less recent study with younger students. It was reported that 13-18 year old science students found that personal mastery goals affected later reports of mastery goals both directly (t -value = 0.57) and through perceived teacher goals (for students to master content and to think independently, t -value = 0.46) leading the researchers to conclude that "it seems clear from this strong relationship that students' task orientation colors their perceptions of what the teacher is trying to achieve" (Nolen & Haladyna, 1990, p. 123). Consequently, while personal achievement goal orientations have long been situated with the influence of classroom context (for reviews see Ames, 1992; Blumenfeld, 1992; Meece et al., 2006; Urdan, 2004a), it may be that the causal direction of the interaction is from personal goals to perceptions of the classroom environment rather than the often suggested but unverified reverse causality.

CONCLUSIONS

While personal achievement goal orientations and classroom goal structures are distinct constructs (Urdan, 2004a; Wolters, 2004), this paper suggests that the multiple-goal perspective currently applied to personal goals can be extended to the naturalistic classroom environment at the tertiary level. Investigations of tertiary students' perceptions of mastery and performance-

approach classroom goal structures are needed to advance achievement goal theory by addressing several underlying assumptions and gaps in previous research. Such investigations can extend the work of Lyke and Kelaher Young (2006) by not only considering the causal relationships between personal and contextual achievement goals but also explore the interactions between classroom goal structures and other classroom climate variables from a whole classroom perspective. Within and between classroom differences must also be investigated.

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Students amid pedagogic change: Partners or pawns?

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Within a wider study of pedagogic change, students from two innovating secondary schools described their experiences of the changes presumed to be occurring in their schools. The students exhibited scant knowledge of the innovations. While their learning was promoted as the motive for change, their role appeared to have been peripheral at best. There were indications, however, that enthused student engagement with new learning approaches, or, conversely, apathy or resistance, had the potential to intensify, or to sabotage, any change of pedagogy. An authentic, informed partnership between learners and teachers may be an essential element of any strategy for pedagogic innovation.

Pedagogic change, secondary schools, practical theory, students, teachers

INTRODUCTION

Schools are facing intensifying and simultaneous demands: (a) for improvement of current performance, (b) for adoption of priorities relinquished by other community organizations, and (c) for innovation to meet future educational challenges (Haseloff, 2005). They are, in fact, being urged into a paradigm shift in pedagogy. Nevertheless, despite bold plans and rich resources in the literature, deep and sustained change remains partial and scattered.

The interviews reported in this article were part of a broader research project, which examined whether it was (a) the existing individual “practical theories” (Handal & Lauvas, 1987, p. 10) about learning, teaching and managing change held by participants in pedagogic change; or (b) the collective codes they shared with peers, that facilitated or blocked innovation; and, if so, (c) what factors shaped the outcome.

Participants in structured programs of pedagogic change at the secondary level described their own experiences. In the first strand, 183 trainee teachers provided reflective written comments on their intensive one-year course; in the second strand, 36 experienced teachers and 10 groups of students were interviewed.

The second strand of the investigation took place in two non-government, non-Catholic schools. Both enrolled students across the complete range from Reception to Year 12, but in each school, the study was restricted to the secondary section. Because confidentiality was an important factor both in gaining access to information and in promoting the frank exchange of opinions, the schools are identified merely as School A and School B. School B is a well-established boys' school, while School A is a coeducational school that had been opened about a decade or two before interviews took place.

There were several reasons for approaching these schools. Both were known to have undertaken programs that featured modern priorities in pedagogy, particularly the encouragement of active learning and the application of higher level cognitive skills in the middle years. School A had undertaken a careful study of recent changes in middle schooling before adopting the Middle Years Program (MYP) of the International Baccalaureate Organisation (IBO). School B had explored innovations in the management of secondary school, particularly within the Coalition of Essential Schools (Sizer, 1992), and eventually had selected Dimensions of Learning (Marzano et

al., 1997) as the basis for refreshing pedagogy throughout the school. Dimensions of Learning emphasises five types of student thinking essential to successful learning: thinking involved in (a) managing attitudes and perceptions related to learning, (b) acquiring and integrating both declarative and procedural knowledge, (c) extending and refining knowledge, (d) using knowledge meaningfully, and (e) developing powerful habits of mind. It was expected that Dimensions of Learning would provide teachers with guidelines for planning syllabus units and assessing students' use of knowledge, as well as offering a repertoire of learning strategies that they might encourage their students to use. Within a few years, School B also decided to adopt the IBO's Middle Years Program, together with the Diploma and Primary Years programs. Other factors, too, drew attention to these schools. Both stood alone in their decision making. On the one hand, their plans were less encumbered by directives or constraints that might be found within a structured school system; on the other hand, they did not have the same levels of advisory support and resources often available within a system. Each school's educational initiative was strongly motivated by the need to differentiate and promote its offering in a highly competitive environment. Moreover, levels of staff morale and commitment appeared to be high. It seemed, therefore, that these schools offered an excellent opportunity to study a single school's effort to change itself. Here, too, the roles of individual practical theories and collective codes might be seen in their simplest and clearest light. In short, the schools were ideal candidates for 'purposeful sampling' (Wiersma 1995, p.214).

In each school, interviews were conducted with (a) teachers of English, mathematics and science, (b) the heads of those subject areas, (c) the leaders of change, and (d) groups of students from Years 8 to 12 inclusive.

LISTENING TO STUDENTS

It was seen as important that students should have an opportunity to describe their experiences of change. They, too, had their own individual practical theories of learning (or perhaps, more realistically, theories of 'studenting'), which coalesced into a collective code that shaped their behaviour, motivation to learn, and attitude to schooling. Such a code could be a potent influence (for good or ill) on the outcomes of classroom activities.

Students were interviewed in small groups, for that seemed the most time-efficient, confidence-inspiring, and prudent way in which a visitor to the school might operate. From each administrative group list at each year level, one student was selected, more or less at random, but maintaining gender balance, and ensuring that only those who had experienced the innovation over at least two years were invited. Despite careful communication and reminder notices, average attendance across the ten year-group interviews was a disappointing 55 per cent. While this prompted more than the usual caution in drawing inferences from the conversations, the smaller groups enabled a smoother development of rapport and probably led to a less inhibited discussion.

Each interview was recorded and its transcript carefully examined and summarized. Each session began with introductions and the distribution of name tags, a recapitulation of the information already provided, a reaffirmation of confidentiality, and the opportunity for each student to 'break the ice' with a brief outline of his or her school activities. While this was happening, a rough seating plan was sketched in field notes to aid recall of names during the transcribing process. The interview then addressed the following agenda.

1. Have you heard about [the change project] at [your school]?
2. How would you explain to a visitor to your school what the project was all about?
3. In any of your classes, have you seen [the change project] in action? Please describe.

4. Do you think any aspects of your school life have changed because of the project?
5. Have you formed any opinions about the worth of the project?

The questions themselves and their order of presentation were soon modified when few students were able to identify the project without prompting or explanation. The sessions became much more open-ended than the agenda might suggest. Indeed, the sounds of lunch-time activities drifting into, and sometimes invading, the allocated meeting rooms might have posed later transcribing problems, but at the time certainly enhanced the informality of the sessions, even when the only available space in School A for the Year 8 meeting turned out to be the Principal's office. Discussions with these young men and women confirmed and enhanced confidence in young people; their openness, frank comments about their own schooling, and their obvious relishing of a rare opportunity to discuss core activities of their young lives were impressive.

While items on the original agenda were seldom relevant to the daily routines of the students, it was possible to discern not only what role in learning the students saw for themselves, but also the role allocated to them by teachers. In addition, it was possible to test whether students had been a bridge to innovation or a barricade against it.

WHAT THE STUDENTS SAID

Students were very clear about their role in the learning process and their involvement in the school's innovation.

Students' Collective Code for Learning

Discussions of learning addressed the roles both of teachers and of students. There was consensus that teachers should 'give us knowledge', 'pass on their knowledge [and] give us an education', 'give us information', and 'control the class'. The role of students was clear, too: they must 'attend classes ... listen ... want to learn', 'put effort in ... pay attention ... understand ... ask for help', 'remember information and write it in the test', 'write notes about what we're told ... [and] do examples and tests'. This last comment came from a Year 9 student who had realized that 'we learn the way we are taught to learn'.

Senior students described the lesson typical of their five years in secondary school:

S. 2: You just go to the class and the teacher goes through the book and you write down what she's said. [*A good way to learn?*] Sometimes. It used to be because you've got to go through content. A lot of teachers are like that.

S. 3: In subjects like maths you basically go through it in class and go off and do the practice problems to find out if you understand it and know how to apply it ... in your own time.

Younger students told the same story:

What is the most frequent activity in your classroom?

S. 1: Writing in your book. Copying from the board.

S. 3: Listening to the teacher.

How do you gain information most frequently?

S. 2: The book. The text book. Or the teacher tells you.

Perhaps a Year 10 student summed up the dominant student theory of learning when he declared it was best to 'sit and let things happen'.

Nevertheless, acquiescence to a traditional view of teaching and learning was not complete. Rumblings of discontent were detected in Year 8 groups for whom the pedagogy of primary education was a more recent memory. One student observed that his secondary experience provided less time and less individual assistance for his learning:

Back at the old school ... we were doing stuff—like we were studying it for longer, so you got used to it a bit more. Like the fractions—we would have done that for longer than we're doing it right now. I got used to that a bit more so I was pretty good at that ... but algebra and stuff, we hardly did any of that and we get a fair bit of that in Year 8. I just don't seem to understand most of it—it's really difficult.

Is teaching different in Year 8?

Sort of. I mean, you've got more people in these Year 8 classes so they can't single you out and help you, unless you actually go up and ask for it sometimes.

How many in your Year 7 class?

23 or 24.

How many in Year 8?

27 or 28. So, it's not a big difference, but it's still a difference.

One inevitably suspects that a particular pedagogy rather than four additional students is the factor shaping learning in this student's classrooms. It may be relevant to note that his peers in the other school complained of too much sitting and too much writing. Students at both schools looked for teachers who could explain well, offer plenty of support and show them how to learn, and promote active learning that was 'more fun'. Senior students had come to realize the importance of teaching that helped them 'understand as well as know'. They valued teachers who could boost motivation through varied approaches and accommodate late developers, and who encouraged mature interaction between teachers and students.

Students' Knowledge about the Change Project

Students develop insights into learning and teaching that seem rarely to be acknowledged. During the interviews, an attempt was made to ascertain whether students involved in innovation had been kept fully informed about the project and drawn as full partners into the new approach to their learning. The answer to both questions in both schools was an unarguable negative.

It is possible that students from the school adopting Dimensions of Learning were more alert to pedagogic matters; certainly, these were the interviews that mentioned understanding as crucial to new learning, and a variety of approaches as central to catering for diverse learning styles. Additionally, in the conversations there was a faint undercurrent of the concepts and vocabulary of Dimensions of Learning:

You make **links** between—they'll, I suppose, give you an algebra equation and you've got to make the **link between that and the basic learning**. So, I suppose, instead of having a long drawn-out formula to do something, you can use a quicker one that will work for everything. And you **extend** everything and make links between it. (My emphasis)

Despite these hints of the subliminal influence of the second and third of the Dimensions of Learning, it has to be acknowledged that attempts to elicit detailed understanding drew embarrassed silences, and indeed an inability to even name the dimensions. The scorecard for this school would have to read: No Idea: 1 (the Year 8 group) vs Very Fuzzy: 4.

In the other school, the score for understanding the innovation might be: A Vague Idea: 1 (the Year 12 group) vs No Idea: 4. Year 8 students, now in the third year of their Middle Years Program, were surprised to hear that the IBO was an international organization:

The International Baccalaureate Organization is worldwide. You are part of a network that spans the world and not just this city. Does that come as a surprise?

All: (An animated chorus) Yeah. Yup. Yes.

What do you know about the IBO?

S. 1: Didn't we get a big thick folder of information?

S. 3: Yeah.

S. 2: Yeah, we did.

S. 3: Yeah, we had information, but it was too big.

(Laughter)

So you didn't read it?

All: No.

S. 3: Wasn't it for our parents?

S. 1 & S. 2: Yeah.

But isn't it about your learning?

S. 3: They can tell us.

Is the folder still available at home?

S. 3: I think so ...

S. 2: Somewhere.

S. 3: ... somewhere.

Perhaps you could read it sometime.

S. 1: I read the first page.

A little later, the conversation turned to the Middle Years Program:

What do you know about the MYP?

S. 2: They give a points system, 1 to 7. That's all.

S. 1: When you get a project there's all like criterias.

S. 3: Yeah, and it tells you how to get a B and C.

What are criteria?

S. 3: Something that, when you do your work, you need to meet up to, something you need to complete to sort of get assessed on. To get a high mark or low mark depends on what you've done for the criteria.

This was a commendable effort on the part of Year 8 students to catch the essence of a reasonably sophisticated approach to assessment, and their confusion between the 1–7 and A–F scales echoed the misunderstandings of some teachers. It was what they did not mention—the attempts to meet their pastoral and pedagogic needs, the centrality of Approaches to Learning, the focus on the environment, and the *Homo Faber* component, for example—that showed how slight their grasp of the Middle Years Program was.

Similarly, for other year groups at this school there were no indications that initiatives in middle school pedagogy or inclusive teaching were made explicit to students. When they met them, they recognized some of the inclusive teaching strategies, such as the six box framework for planning essays, but seemed unaware of the role of students in applying the principles of the middle school template. In this respect, they were like their peers in the other school, who might have a few blurred recollections of Dimensions of Learning but, in general, were unwitting participants in a change of pedagogy.

Students Explained Their Non-Participation

Students, themselves, explained this situation in a variety of ways. Some suggested that they were not interested at the time, or that students' interests were directed away from macro issues to those that impinged most directly or forcibly on their immediate concerns, such as the Tuck Shop or the Year 12 Common Room. It seemed clear, however, that they were seldom taken into their teachers' confidence (except by a few enthusiasts) and that the patchy nature of communication and implementation persuaded students that the innovation had no relevance for them. While discussing Dimensions of Learning, a Year 12 student put it this way:

I was just thinking ... Dimensions of Learning was something that I hadn't heard about since my first few days in Year 8. And when I'd come to the school previously when I was in Year 7, and we were sitting around in the Assembly Hall, people were telling us this is Dimensions of Learning. It was almost as if it was a direct explanation to parents, which kind of seemed like it was more advertising the school, like this is our plan, but I don't think the students have ever had any really direct contact.

Perhaps, this is one of those rare occasions when the last word is left to the students!

STUDENTS AS BRIDGES TO INNOVATION

It is clear that students themselves were only minimally aware of the pedagogic innovations thought to be surrounding them, and that they exerted little influence on the outcomes of the projects. Nevertheless, there are grounds for suggesting that students are potential allies or adversaries for innovators, as well as being perceptive commentators on the process.

At the very least, students in the two schools being studied seemed content to comply with teachers' demands, betraying a practical theory of learning that ceded almost all authority on pedagogic matters to teachers. The pockets of discontent in Year 8 and the maturing insights of Year 11 and 12 students, however, pointed to a readiness to do things differently. This was revealed in the somewhat nostalgic accounts of learning experiences that had been engaging and valued. A Year 12 student spoke enthusiastically about his Group 4 Science Project:

I looked at the effect of caffeine on physical ability. Me and another guy got tanked up on coffee and ran up and down stairs. That's the one thing where they said, 'Go your own way and bring us back your results'.

Can you comment on the quality of learning in that context?

Well, the results were an abysmal failure, because I drink coffee a lot, so it had no effect on me, and the other guy is one of the fittest guys in the school. So, we didn't do a very good job of selecting out our variables, but we learnt a lot about how you go about doing a practical, especially about planning.

In the same interview, another student described her satisfaction with an art project:

I had to develop the project, conduct different tests and come back with the conclusion. It was a good project and was very interesting.

A third member of the group said of an English assignment:

We could come back and ask for suggestions, but most of it was just us doing it. I learnt so much more than probably I would have just doing it in class. I spent about 20 hours, but I was doing something I was interested in.

Words on the page offer only a faint suggestion of the lively enthusiasm that bubbled into these segments of the interview, but the experiences being described appeared to have been rare. Indeed, a question that had earlier sought to find out how frequently they had been challenged to work something out for themselves, rather than being told the principle or formula, drew the response, 'That's a bit revolutionary!'

Students in other year groups seemed also to glimpse the potential for more active and engaging learning. A Year 11 student, for example, supported her peers' wish for more facilities but added:

Sometimes I think I need more research stuff and sometimes I think I could achieve something quite good like that.

A girl in Year 10 probably voiced the views of many when she described her appreciation of the opportunity to influence the choice of topics that she investigated:

Some teachers sort of compromise with what they want to do and with what the students want to do. You might have an idea of what you want to do and it might be different from what the teacher said ... Sometimes a compromise is made where you do part of what the teacher wants and part of your own idea.

One of the most interesting, and possibly most relevant, responses was the joy and satisfaction that accompanied episodes of effective learning. Some of this was revealed in the extracts already quoted from the interview with senior students, but the following exchange with Year 8 students best caught the freshness and sense of achievement that might be the innovator's strongest allies:

What, would you say, were the best bits of learning you've done in recent weeks?

S. 2: Art. We did print making. I did a dolphin. [*What made you feel good about it?*] I was happy with what I did. [*Did you learn new things in order to do this?*]

S. 2: (confidently) Yes. We learnt the process of printmaking and how to do it.

S. 3: Well, I finished all my sheets in maths. There's, like, 18 to do. [*Why pleased?*] Most of the things we did, I've never done before, so I had to, like, learn them, like how to do algebra. I took weeks to do them—like all last term—eight weeks. [*Relief or sense of achievement?*] Bit of both. I'm relieved I've finished them all.

S. 1: In art we were starting to make puppets. We started collecting all the stuff. We're in the middle of it now. [*Enjoying?*] Yes! [*Learning?*] Yes! A lot.

In summary, the strongest student-based facilitators of innovation are likely to be the excitement, the fulfilment, and the recognition of successful learning promoted by the innovation. Other factors provide useful support. The content has to be seen as interesting and worth the effort of learning, and teachers must be able to strike some spark of motivation. Surpassing all other factors is the academic trust that students place in their teachers—the comments reported earlier might well be repeated in this context: the Year 10 boy was content to 'sit and let things happen', while the Year 9 told us that 'We learn as we are taught to learn'.

STUDENTS AS BARRICADES AGAINST INNOVATION

As attention shifts to factors that block innovation, it soon becomes apparent that academic trust is a double-edged sword. In six of the ten group interviews, students indicated that typical

learning activities required sitting, listening, writing notes and doing tests. Teacher talk may, at times, have been excessive, too; as Year 12 students put it:

S. 2: ...the teacher talks all the time, and it gets really boring, like we say can we have a bit of discussion but he just keeps talking. You just get so bored, and people fall asleep. Maybe, sometimes, there should be class discussions on different topics.

S. 1: You need a balance between the two 'cos too much of either one and you won't get anything done.

Isolated or frequent occurrence?

S. 2: Oh, I've had a few ... like, I remember back in Year 9 we had [a subject] where the teacher talked most of the time. It got boring. The class eventually went wild and was naughty all the time...

Nevertheless, in spite of hints of mutiny when provocation became extreme, students generally were compliant, especially when hand-outs and work-sheets filled lesson time with busy work, and success was attained through recall of information and practice of skills. The group interviews indicated that, in many classrooms, often over a span of years, teachers' and students' expectations had coalesced into a shared code that protected the *status quo*. It was probable that the persistence of that prior code posed the strongest barrier to any paradigm shift in pedagogy, for it continued to govern decisions made about learning.

Assessment policies were potent forces, also. Reflecting a more widely held idea, Year 10 students saw the purpose of their schooling as 'getting good grades'; to do so, they had to 'remember information and write it in the test'. Such an emphasis on grades rather than learning outcomes, on memorizing rather than understanding, on teacher effort rather than student activity, could only strengthen resistance to approaches that advocate unfamiliar and threatening learning processes.

Even though there were spirited efforts to establish a new approach to learning in both schools, powerful influences locked students into the existing paradigm. For example, few of them had more than a passing interest in the actual processes of learning, deeming this to be the territory of parents—'They can tell us'—or teachers—'The teacher gives you information and you store it'—rather than a matter of great relevance to their daily activities. Careful explanations of Dimensions of Learning or the goals of middle schooling had been lost on most students interviewed, or at best recalled in part and incoherently. Year 12 students, for example, struggled to describe an innovation which was thought to have influenced their five years of secondary education:

S.4: All I know about it, it was some five-step thing. We were told about it by some teachers in the first few weeks when it was brought in, but since then we haven't heard a thing about it. You're not really conscious they're using it at the school.

S. 6: Occasionally you see a poster about it.

S. 3: It hasn't been much really. It hasn't been enforced in the classroom. Basically, I learnt about it in the Outdoor and Transition Education Week in Year 10.

S. 5: To be perfectly honest, I'd forgotten about it. It's just not really applied in the classroom ... Maybe they are applying it, but there's certainly not much talk about it around the school.

In a similar conversation, Year 11 students offered useful insights into student thinking about changes in their school:

S. 1: The problem with change is [that] most often it's gradual, so most often you say, 'Oh, they're doing that next year', and it sort of happens gradually, so you basically make an impact for the younger people. If you're at the senior level, you impact on them more than for yourself ... the change can't be immediate; it has to be got round ...

S. 3: I think some of the changes that are going to be made will happen after our time.

S. 2: The other thing is, like the air pollution thing, any change made now is going to make a difference down the track. If you want to make a difference now, it should have started before you had a chance to. It's always going to keep changing because what we think's good now will change by the time the Year 8s become the Year 12s.

The indication here is that students may have assumed a future orientation for the current innovation, and have sensed that their involvement needed only to be avuncular and altruistic, failing therefore to see the immediate gains available for the quality of their own learning.

Given that students recognize the capacity of enthusiastic teachers to lead them into new experiences (for example, the Year 10 student who enjoyed Geography because 'the stuff was worth learning ... and the teacher just made the subject interesting and showed us just lots of things about it and the way to do it'), questions ought to be asked about why students weren't engaged in discussions of their important and daily tasks. Students have some suggestions to explain this state of affairs.

The perception of Dimensions of Learning held by Year 12 students was that the program attracted mere lip service from many teachers, and was, therefore, only partially and spasmodically implemented. Year 11 students put the same point more devastatingly:

S. 1: With certain teachers, like, I mean, you notice [Dimensions of Learning] with some teachers who, sort of, not ram it home but just say this is declarative knowledge. One thing that just sort of triggered something in my mind is [Name] who—she would use that even now, even though I'm doing the IB. She would still use that or say this is Dimension Five. I had [Name] a year or two ago; he would do that too, but some other teachers, especially the new ones, don't have a clue, to put it bluntly. You wouldn't know they were doing anything different or whether they knew anything about it or not ...

S. 3: Just then you were saying about graphic organizers [as one of the Dimension Two strategies for organizing declarative knowledge]. The only time that I really encountered that wasn't from a teacher—it was from a past Year 12 who came back to speak to the school and said he remembered all his stuff for Year 12 exams (he was dux of the school) and he put posters up on his walls of what he wanted to know ...

S. 2: I think ... students have become—they're not really sure what it is—unless they actually sat down and read it for themselves and tried to get a grasp on what it is, they don't—because they see a bit here and a bit there and then a whole chunk of it here, and they have to, sort of, piece it together to try and get an idea of what Dimensions of Learning is.

Moreover, it became clear during this last interview that a four-hour mini-course for Year 10 students about students' use of Dimensions of Learning had been cut from the previous year's program, thereby signalling an administrative shift of priorities and, probably, a confirmation of student perceptions that the place of Dimensions of Learning in the curriculum was not really important, despite what school leaders might be saying to the contrary. A Year 11 student summed up the significance of the innovation when he suggested that Dimensions of Learning

was 'not ... the icing on the cake, it's the eggs and stuff'. However, a Year 12 student went to the heart of the matter:

S. 5: It kind of sounds as if it's a little bit—it's almost as if the teachers are saying it because they feel, like, it needs to be said, and it's not really enforced, if that makes sense. It's touched on at the beginning of the year, and now when exams are coming up it's touched on again, but it doesn't really seem like it's a really enforced kind of concept.

Students were aware, however, of the contrast between the low profile of Dimensions of Learning and the frequent reminders about assessment procedures required by the International Baccalaureate Organization:

S. 4: I first heard about this Dimensions thing in Year 7, but—no offence—I don't think it's done anything, because teachers haven't used that within their teaching as much. If they were to incorporate that into everything they do, I think we'd look at the Dimensions of Learning, then attack whatever we were doing. It's just that the IB, because it's a whole lot of different criteria [and] because we keep using that criteria and get reminded to use it, we know it's different and approach something differently and to how we learn it. Because Dimensions of Learning isn't really talked about much at all, I think that's why it hasn't had too much of an impact.

CONCLUSIONS

Senior students appear to be saying that pedagogic innovation is more likely to be successful if students are helped to perceive the immediate, personal gains that they may achieve, and if the basic principles are both clearly understood and kept at the forefront of their minds. No students, in any of the ten group-interviews, gave any indication that these conditions had been met in their experience. Again, the question ought to be asked: Why did these things not occur? Other questions inevitably follow. Are the students correct when they claim that their opinions are not valued or heeded by teachers and parents? Do teachers remain silent about the principles of learning because they believe that students are incapable of understanding them? To what extent does the non-involvement of students release the pressure on teachers to be innovative? Do teachers avoid public descriptions of new teaching approaches in order to protect themselves from accusations of failure? Is it a reluctance to share power? Or is there an outmoded but intransigent collective code operating in this situation?

The change initiatives that formed the background for this article recommended that students be regarded as valuable allies for pedagogic change rather than encumbrances. The IBO requires that their middle years' curriculum feature Approaches to Learning as a precursor to the senior subject of Theory of Knowledge. The Dimensions of Learning model also values students' informed involvement in the learning process, and urges teachers to encourage metacognition in their pupils. Elsewhere, the incorporation of students into school restructuring programs is a feature of the Coalition of Essential Schools (Sizer, 1992) where students may write their version of the principles that underpin school activities, be informed guides for visitors to their schools, and mingle constructively with teachers at the annual conferences or, indeed, attend their own student-led conferences.

Are these or similar features characteristic of Australian secondary schools? In some, probably, but we can't be sure how widespread they are. Perhaps it is time to take note of the broad and longitudinal study of 1,000 children mentioned by Csikszentmihalyi in his interview for *Educational Leadership* (Scherer, 2002, p. 12), and to use his model to conduct an extensive census of Australian students' school experiences. Would Australian students prove to be partners in the process of pedagogic change—or pawns?

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Cognitive concomitants of interactive board use and their relevance to developing effective research methodologies

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This paper addresses the need for systematic and replicable research methods for the examination of student learning using so called interactive whiteboard technologies. As a basis for these methods a model is developed of the cognitive concomitants evident in students' use of these technologies. While interactive whiteboards are shared spaces, it is important for educators to recognise individual cognitive outcomes from the interactions. Through extending an existing model of cognitive concomitants that has been used in the successful analysis of interaction in shared online discussion spaces, this paper outlines a systematic approach to the analysis of whiteboard interactions that can provide insights into the cognitive processing occurring. Recent notions of imprinting and cognitive tracks, drawn from research into online interactive behaviours, in the context of such methods, may inform the development of effective pedagogies for interactive board use.

Interactive whiteboards, research methods, interactions, cognitions, computer mediated learning

INTRODUCTION

From the cave paintings at Lascaux to today's interactive board technologies homosapiens have used public displays for the inscription of information, concepts and procedures. Indeed these visible boards have been historically critical for presentation to learners and to the creative processes of scientists, inventors and artists. Often such creative processes have been collaborative with the board inscribing the mutual insights of the collaborators. Until recently such boards have taken a passive role in presentation and creativity. The advent of computer supported interactive board technologies and their widespread uptake suggests new possibilities for learning and creativity with supporting computer technologies potentially enriching interactions and shared online connections expanding the notion of the publicly visible.

Various types of passive boards have long been traditional tools in the classroom with the whiteboard and marker more recently displacing the original blackboard and chalk. However, when using such boards the teacher remained at the front, directing much of the learning. With the introduction of computers there was a shift towards placing learning in the hands of the student and the teacher moving to the role of facilitator. While interactive virtual boards (IAVB) have been available for some years, (e.g. NetMeeting) more recently so-called 'interactive whiteboards' have been developed and are being adopted enthusiastically by teachers, schools and education systems. To avoid confusion we describe the latter as computer supported interactive physical boards (IAPB) and refer to both jointly as interactive boards. IAPBs allow participants to interact directly with the board assisting a more student-centred approach to learning. Despite this both interactive boards also allow teachers to develop more engaging presentations and re-assert teacher centred practices. Of critical importance in the uptake of these

interactive boards is the extent to which student learning actually occurs when students themselves use them. However while there is much literature on case studies of student use with IAPBs (Curhell, n.d.; Glover, Miller, & Averis, 2003; Lee & Boyle, 2003) there is a lack of systematic and replicable studies that actually demonstrate student learning, linking it to the specifics of student interactive board activity and theoretically underpin findings in our current understanding of cognition and learning. There is thus a need to develop research methods for interactive board use that have a firm basis in learning theory and that can establish findings capable of informing teacher pedagogical practice.

INTERACTIVE BOARD TECHNOLOGIES

It is important to consider the interactive boards in relation to their passive predecessors. There has been a tendency for passive boards to be more the domain of the teacher and not used extensively for student interaction. Where such boards are shared it is necessary to adopt agreements or practices that address processes for board use. Agreements about erasure are a definite consideration. Courtesies and consideration of other user practices will be important. For multiple users, agreements about writing and erasure can be quite complex. Such agreements, tacit or otherwise, could be considered as 'protocols' governing board uses. There will be at least an equal need for analogous protocols in the shared use of interactive whiteboards. Such protocols ensure that teachers can focus on their teaching and student learning.

Researchers have tried to understand the variables in classroom instruction and have found that teachers have a significant and lasting impact on student achievement (Rivers & Sanders, 2002 cited 2006). Wenglinisky (2002) also found that student learning was "a product of interactions between students and teachers with both parties contributing to the interaction". He suggested that classroom practices had the greatest effect on student performance which supported the importance of utilising effective pedagogies. Hence IAPBs, which have found their way into classrooms, may offer the capacity to enhance teaching supported by effective instructional practices. They are able to offer specialised utilities that can scaffold teaching, such as screen highlighting, moving objects around and printing the screen, thus expanding on the teacher based instructional effectiveness of traditional passive boards.

The growing recognition of the value of computer supported interactive whiteboards in the classroom led to the development of specific classroom software for various curriculum areas which helped to optimise student participation. The multiple representations and explicit modelling cater for the range of learning styles evident in every classroom. A primary benefit of IAPBs in the classroom is the students' increased motivation due to their presentation capabilities, their high level of interactivity and their capacity to present and discuss students' work. (British Educational Communications and Technology Agency (BECTA), 2003). Qualitative research currently suggests that the use of IAPBs has a positive impact on student engagement and hence on student achievement (Beeland, nd, cited in Tom Snyder Productions, 2006). Thus there is a need to develop pedagogies that exploit interactivity (Glover et al., 2003). Some notable outcomes of investigations through observation and videoed lessons into the use of interactive whiteboards (Glover et al., 2003) showed that students became attentive immediately the teacher spoke suggesting that students had little opportunity to move off-task when using IAPB (observed pupils were seen to be 'on-task' on average for 87% of the time). Further observations also indicated that effective use of IAPBs is still in its infancy. With increased experience, teachers will be able to match their teaching methods with students' learning styles and will be more fluent in managing episodes of interaction within the focus of the lesson duration.

A further study on the use of IAPBs (Miller, Glover, & Averis, 2004) suggested that there were three major features that encouraged student motivation and these included, intrinsic stimulation, sustained focus and stepped learning. Intrinsic stimulation came from the dynamism and attraction of the lessons which resulted in neater exercise books, greater use of colour and

presentational techniques not previously seen with more conventional boards. Sustained focus was possible because of the constant interactivity that was occurring which maintained the pace of the lesson and helped students to stay on-task. Stepped lessons were possible with the ready recall of previous lessons which allowed a revisit of earlier concepts to strengthen understanding. The immediacy of the responses and fewer behavioural issues were recognised as further benefits.

While it would appear that IAPBs are a powerful teaching tool there are practices that underpin their effectiveness. Research by BECTA (2005) has identified a number of tips on how to use interactive boards effectively. However, it would appear that there are other interaction protocols that also need to be identified, such as, who has the right to erase another student's work or make changes, whether minor or major. Other considerations include the management of the interface and function and skills with the tools.

There is no reason why such physical interactive whiteboards are limited to a single classroom, some versions allow multiple computer input and some allow internet connectivity between multiple boards, considerably expanding the number of interactive modes and transcending the distances between users.

The shared online interactive virtual boards, which may also be referred to as a conferencing board, offers an online environment where participants from multiple locations can communicate and develop their ideas cooperatively or collaboratively. Typical products of this type are NetMeeting and Centra, where the board display is combined with conferencing tools. Various aspects of these three technologies are summarised in Table 1.

Table 1. Comparison of various whiteboards

	Passive Board	Computer Supported Interactive Physical Board (IAPB)	Computer Supported Online Interactive Virtual Board (IAVB)
technology	passive board	physical active board	online virtual board and conferencing
typical product		ActivBoard, SmartBoard	NetMeeting, Centra
basic writing and drawing tools	colour markers, erasers	physical colour pens, physical erasers and virtual pens and erasers	cursors, virtual colour pens, virtual erasers
the shared space	the display surface	the screen of a computer shown on the board surface	application windows displaying a board and conferencing components
other interactive modes	face to face	face to face or online through multiple boards and computers	conferencing tools, chat, email, video, voice
advanced writing and drawing	none	software supported visual effects, OCR	software supported visual effects
other resources		digital pictures, sound and maps etc. on board	files and applications not on board
teacher presence	nearby	nearby and/or on computer	lurking or participating online
archiving	no facility	stored screens and saved files, no direct facility for capturing discussion	archives of conferencing, stored screens

Participants in online environments may not know each other personally nor be privy to the body language of the other person. IAVBs will be successful as a collaborative tool once certain protocols have been established that thus require the identification of common ground. After a basic introduction, if needed, certain codes of behaviour need to be established to ensure successful collaborative goals are attained. Once such awareness has been established a number of participants can work together successfully on ideas and design.

The virtual environment allows each user to act independently with the shared space that may only take up a part of the user's screen. A sense of common intent may be absent due to the proliferation of application windows and non-board applications. In order to improve this sense of immersion investigations have been undertaken in the use of avatars to identify users in this virtual setting where the goal is to provide a convenient environment for participant interactions

(Tseng, Shae, Leung & Chen, 2001). IAVBs in such an environment allow users to interact with their virtual applications. The board behaves as a display surface and responds to pen strokes which may be more comfortable for users who struggle with the rigidity of computers. For some applications the whole board session can be recorded and later replayed to show users how they arrived at the design that was finally generated.

In order to understand better the difficulties encountered in shared spaces it may be convenient to discuss the use of the shared interactive boards in the context of an exemplar task and learning purpose. Consider children being given the task of designing a house using a white board. The task may be, at least initially, that each student should design their own room in various parts of the board and bring these together to form a workable house. As part of the task students will need to discuss and negotiate roles. There should be learning outcomes for students in terms of scale and measurement, design, living skills, sustainability and basic science (among others). When discussing the design students need to ensure that they are talking about the same room or area of the house. There may be a need to indicate who has the control for a particular period of time. The establishment of early protocols will allow students to attain their final goal more successfully and efficiently.

With the evolution of new technologies there is much to learn about effective pedagogies that will ensure enhanced learning for the student. Further development of such pedagogies comes from an investigation of the learning theories and research literature on the value of interaction, collaboration and cognition in learning.

THEORETICAL UNDERPINNINGS

This article draws on both cognitive and social constructivist learning theories with cognitive constructivists focusing on the individual and thought processes of the mind and the social constructivist emphasising the impact of social and cultural contexts that take into account other people's perspectives in their learning. Henri (1992) and Garrison (1992) have outlined models with discrete indicators that provided guidance on identifying cognitive learning processes, with consequently less attention to the type of interaction occurring. Hence the need to consider the social constructivists' interest in the interactions that support the learning.

Research into learning has shown that students learn best when they are actively engaged with the content and build their own knowledge based on prior experience through interaction with the social environment (Anderson & Garrison, 1995). Through interaction and collaboration, learners can discuss, interpret and negotiate, so that together they co-construct their understanding. This is made possible through the use of interactive technologies where through collective efforts students can create exciting learning experiences. Learning occurs when participants are active in shared activities while bringing different experiences and perspectives into the socio-cultural context.

The theory of social interdependence (Johnson & Johnson, 1996) emphasises the importance of relationships within groups. It identifies the types of relationships that should be encouraged and fostered in cooperative environments where higher order cognition is a desired outcome. A supportive community where strong collaboration is evident will more readily integrate learners from diverse backgrounds. Learners are more likely to be motivated and committed if they experience constructive encouragement and support. Such theories recognise the potential of technology to support interactive and collaborative activities.

Interaction and collaboration are considered key ingredients in both the traditional classroom and in online learning communities and can have powerful influences on learning (Gilbert & Moore, 1998; King & Doerfert, 1996). Interaction can be defined from many perspectives and takes on new dimensions with the emergence of interactive technologies, such as shared and interactive whiteboards, which add to the complexities of devising suitable pedagogies. Dynamic interactions support learners in their development of higher order cognition. An analysis of cognitive

development provides insight into the quality of the learning outcomes. Insight into the learning occurring when using various interactive boards may be gained from the research on shared discussion spaces and on technologies for collaborative activities.

INVESTIGATIONS OF INTERACTIVITY: THE EXAMPLE OF SHARED EMAIL DISCUSSION FORUMS

An investigation of the discourse of approximately 275 students across 15 discussion forums in a first year teacher education course found that students exhibited consistent interactive behaviours (Geer, 2005b). In this study students were required to respond to four classroom related topics through the discussion forums held at various times throughout the semester. In order to analyse the behavioural and cognitive interactivity that was occurring in the discussion forums an evaluative tool, 'A Model for social behaviour, cognitive development and interactive analysis' (SCIA), was developed by Geer (2005) to assist in the analysis of archived discourse. This model originated from a tool used by Gunawardena, Lowe and Anderson (1997) who drew on Henri's (1992) and Garrison's (1992) cognitive indicators of critical reasoning and thinking to examine the social construction of knowledge in computer conferencing. Such indicators provided a reliable basis for examining the cognition of digital archives no matter what the technology. However, it was recognised that different technologies may require an expansion of the indicators to identify interactive and cognitive behaviours specific to the characteristics of the technology.

The model, SCIA (Table 2 – non-asterisked items) proposed that certain types of interactive behaviours could be extracted from the digital archives which captured the learner's sense of social presence and their learning preferences as they discussed the four topics in their first year course. Thus by utilising SCIA an analysis of the discourse showed that students tended to adopt a particular type of orientation (social, individual or group) in their first interactions, and which was repeated in their future interactions. From an analysis of the discourse it was possible to determine whether the students were responding as individuals or whether they acknowledged others in the forum and saw themselves as being part of a group. Those students who were group oriented also tended to be more social. Students with an individual orientation adopted an approach that saw them contributing to the discussion but with no appreciation of being part of a group. They had less understanding of using multiple perspectives to build their own understanding. Overall, the communication patterns established in their first interactions appeared to flow through to other interactions.

The effect of initial communication patterns being replicated in subsequent interactions led to the notion of 'imprinting'. Hence initial communication patterns are shown to be powerful in determining subsequent interactive behaviours in the forums. The effects of imprinting then become a consideration in the formation of discussion forums or online learning communities. This has implications for the instructional design where interaction is encouraged and particular outcomes required. Therefore the research highlights the importance of developing appropriate pedagogies to ensure that desired learning outcomes are evidenced in the first interactions. Time must be spent ensuring that students understand clearly the purpose of the interactions. There was also sufficient evidence from the investigation to suggest that imprinting may be a valid predictor of students' academic achievements (Geer, 2005b).

Using the evaluative model, SCIA, the discourse was also analysed for evidence of cognitive indicators. An analysis of cognitive development provided insight into the quality of the learning experiences. A pattern of indicators emerged which showed the development of what has been referred to as cognitive tracks as successive learning-related cognitions (Geer, 2005a). A canonical correlation analysis was performed between cognitive indicator on Topic 1 and the aggregated scores on the other three topics (Geer, 2005b). Further examination of the cognitive indicators showed that students appeared to exhibit particular interactive and cognitive behaviours over time.

Table 2. A model for social behaviour, cognitive development and interactive analysis in interactive board use

S. Participation and social behaviour	S1 Individual disclosure	S1-a Basic introduction. S1-b Extended revelation S1-c Self evaluation
	S2 Social behaviour	S2-a Courtesy S2-b Level of dominance/authority S2-c Seeking help S2-d Willingness to initiate
	S3 Common Ground *	S3-a Agreed purpose S3-b Speaking the same language S3-c On the same page S3-d Distinguishing work level and meta level
	S4 Protocols *	S4-a Distribution and ownership of work S4-b Indicating assent and understanding S4-c Assigning tool control
	S5 Mutual Consideration	S5-a Identifying mutual interest S6-b Willingness to exchange S6-c Valuing others' views
I. Cognitive behaviour analysis at individual level:	I1 Elementary clarification	I1-a Observing/studying a problem I1-b Identifying its elements I1-c Observing/studying their linkages
	I2 Computer Tools Competence*	I2-a Understanding and managing the interface I2-b Appreciating the functions of tools I2-c Transparent skills with tools
	I3 Elementary Contribution*	I3-a Initiating a contribution I3-b Making changes I3-c Minor additions I3-d Major additions I3-e Extensive changes
	I4 In-depth clarification	I4-a Analysing a problem I4-b Identifying assumptions I4-c Establishing referential criteria I4-d Seeking out specialized information I4-e Thematic changes and additions*
	I5 Synthesis and application	I5-a Drawing primary conclusions I5-b Proposing an idea based on links and relevant information I5-c Value judgment on relevant solutions I5-d Making final decisions and deciding on the action(s) to be taken I5-e Suggesting protocol changes and new common ground*
G. Interactive and Cognitive behaviour analysis at group level:	G1 Planning	G1-a Organizing work/planning group work/setting shared tasks G1-b Initiating activities/setting up activities for group work G1-c Setting protocols*
	G2 Sharing/ comparing/ contributing of information	G2-a Defining and identifying a problem G2-b Stating opinions regarding the problem G2-c Asking and answering questions to clarify details of statements G2-d Sharing and exchanging knowledge, resources and information G2-e Corroborating examples provided by one or more participants G2-f Challenging others to engage in group discussion G2-g Help and feedback giving G2-h Identifying and discussing common ground*
	G3 Inconsistency of ideas, concepts or statements	G3-a Identifying and stating areas of disagreement G3-b Asking and answering questions to clarify the source and extent of disagreement G3-c Restating the participants' position and advancing arguments supported by references G3-d Recognising and communicating differences about protocols* G3-e Recognising and discussing new common ground*
	G4 Negotiation of meaning/ co-construction of knowledge	G4-a Negotiating the meaning of terms, areas of agreement and disagreement G4-b Proposing new statements embodying compromise and co-construction G4-c Integrating or accommodating metaphors or analogies G4-d Negotiating new protocols and new common ground*
	G5 Testing and modifying of proposed synthesis or co-constructing knowledge	G5-a Testing against existing knowledge and information G5-b Testing against personal experience G5-c Testing against formal data collected
	G6 Agreement statement(s) and application of newly constructed knowledge	G6-a Summarization of agreement(s) G6-b Application of new knowledge G6-c Statement of new common ground and protocols*

*New indicators appropriate to interactive boards denoted with asterisks in bold type

The cognitive levels achieved in the first response were predictors of cognitive levels achieved in later responses. The pattern of indicators provided insight into the type of cognitive track students had adopted while further supporting the notion of imprinting. Two types of imprinting were evident with some students manifesting the dominance of one particular cognitive indicator over time and across interactions. This type of track was referred to as a static and narrow cognitive track, while others demonstrated a set of cognitive indicators for each topic that were repeated for subsequent topics, referred to as static but broad. Where imprinting may not be a desired outcome a dynamic and broad cognitive track may be a preferred outcome with students moving through various cognitive indicators that indicate students are utilising differing strategies and developing further cognitive skills over time.

It is an important finding that such a methodology and analysis provides educators with the opportunity to influence students' cognitive behaviour (Geer, 2005b). From a teaching and learning perspective this implies that the cognitive behaviours that occur in the first topic therefore need to reflect the desired learning outcomes, if the discussion forums are to meet course objectives. Educators need to be clear about the purpose and the type of interactions they wish to encourage and the desired outcomes including cognitive development. Educators must build into the design strategies that will ensure desired outcomes are evident. Thus the notion of 'imprinting' assumes the need to 'get it right' from the start to ensure cognitive development is supported and sustained. This then has implications for the instructional design where scaffolding and modelling are critical to ensure adoption of a suitable cognitive track that supports cognitive developmental processes over time.

Such findings have possible implications when using other types of technologies including board technologies. Careful consideration needs to be given to the development of practices and protocols that ensure participants understand suitable interactive behaviours that can further the cognition of students. Hence relevant indicators need to be identified to ensure effective use of the technology leading to desired learning outcomes.

It is significant to note that the notion of imprinting is not confined to the types of interactions and cognitions that students experience but also to the actual choice of technologies in group work contexts. Huysman, Steinfield, Jang, David et. al. (2003) found that the type of technology used by students for early collaborative tasks continued to be used throughout their interactions. Students exhibited a type of media 'stickiness' related to the initial choice of and competency with interactive computer tools.

EXTENDING COGNITIVE ANALYSIS OF DISCOURSE TO INTERACTIVE BOARD TECHNOLOGIES

The foregoing suggests that an analysis of the discourse generated in use of interactive board analogous to that of SCIA may provide a clearer picture of the learning occurring as well as be suggestive of pedagogical strategies that might optimise that learning.

Interaction has been shown to be critical in effective teaching and learning. However, it is important to go beyond the mere acknowledgement that interaction is occurring and analyse its impact on learning and the cognitive development of the individual. It is important that processes be examined that help students to arrive at the end product rather than just attain the end product itself. Analysing these processes at the group and individual levels is often very difficult, time consuming and costly thus highlighting the importance of instructional design and the achievement of desired learning outcomes from the beginning.

The above research points to the importance of establishing protocols or strategies that will support students in their collaborative interactions. Educators must be able to model good practice and provide sufficient scaffolding that will enable students to attain the learning outcomes. Also it may be important to establish certain protocols from the start to ensure the effectiveness of the various tools. Although interactive boards have been around for a long time and certain implicit

protocols are evident this does not necessarily mean that established protocols will necessarily be applied to online and varied forms of interactions. Good practices need to be developed and established to ensure that the greatest benefit is gained from the use of these tools and that good habits are established allowing for higher cognitive development and more collaborative interactions. For example there are certain board etiquette rules for the passive board which need to be followed to enable learning to occur for other users, for example, don't use permanent markers or tape things to the board as it can ruin the surface, and also you should erase your work once it is no longer needed; just to name a few. By abiding by such simple principles time can be saved and learning can occur. If such rules are not established from the beginning bad habits can form which affect the effectiveness of the tool and the efficiency of the teacher. The establishment of such protocols become more critical in the online environment where students do not know each other and assumptions cannot be made that participants are talking about the same aspect.

Research is still very much in its infancy when considering the type of modelling and etiquettes relevant to the various interactive board technologies. There exists a further challenge in establishing appropriate strategies that will allow higher cognition to be present in online interactions. The logging of the individual interactions would provide some indication of the cognitive development but this appears to be more complex than the recording of textual exchanges in a discussion forum. Hence this emphasises the importance of establishing clear goals and ensuring that there is some likelihood of these goals being achieved from the outset.

Based on the studies that have raised the notions of imprinting and cognitive tracks, consideration must be given to establishing appropriate practices before the initial interactions. Protocols should be instigated from the outset to ensure that the full benefits of interactive technologies are attained. Established patterns need to be set early because they may be difficult to change later on.

A NEW MODEL FOR INTERACTIVE AND COGNITIVE CONCOMITANTS OF INTERACTIVE BOARD USE

Successful application of SCIA in a number of different technological contexts suggests its value for developing a model for interactive board use. Observation and initial research in the use of interactive boards implies the need for additional indicators to be presents in a new form of SCIA appropriate to such technologies. The use of SCIA with the addition of indicators for board use may offer further insight into the development of research methods when using various technologies.

Designing a model that extends beyond email discussion to tools such as interactive boards and preserves a linkage from the discourse generated to the implied cognitions and learnings is a considerable challenge. A convenient artifice is to consider all three boards (passive, IAPB and IAVB) as positioned along a number of dimensions such as technology complexity, proximity and virtuality (as in Figure 1).



Figure 1. Dimensions for considering boards

As the proximity of participants moves from face to face to online there is increasing reliance on various technologies to carry the communication. Hence what was once perhaps implicit in face to face interactions may need to be made explicit in online interactions. Aspects of the social interaction such as dominance and courtesy may need direct attention. At a deeper level it will be important to be clear on the common ground of the participants, hence the need for a new section on common ground S3. The purpose needs to be mutually agreed (S3a) and the language needs to be the same (S3b). A given individual needs to know what another is alluding to. As the board itself has more items on it, uncertainty about the intention of others can grow. With the use of off-

board applications (e.g. WWW), confusion about “being on the same page” (S3c) both conceptually and physically can abound. Importantly participants need to be able to draw attention to such matters and be able to discuss them. Hence they need to be able to recognise what the exchange has to do with the work and purpose, or how to proceed, and what is the basis of agreement (the meta level) (S3d). Inability to attend cognitively to the meta level will stymie higher levels of interaction such as cooperation and collaboration. It is important not to see ‘common ground’ as a ‘given’ at the beginning of the interactions but as a dynamic and growing aspect of the interaction. As interaction (and perhaps collaboration and cooperation) proceeds mutual understanding of what has been achieved should grow.

Another critical feature of IAPBs and IAVBs is the need for agreed protocols, hence the new section S4. Some of these relate to uses of the tools such as erasers but agreed protocols about eraser use becomes much more critical in a more virtual environment, where capacity totally to erase is a click away and in a more online environment where one participant cannot physically stop another from an action. Protocols may need to be in place about the divisions of work and tasks (S4a). They are also needed in relation to the ownership of work and the related nature of assessment (group, individual, etc.). Participants need agreed signals for indicating assent or non-assent and understanding or misunderstanding (S4b). Such protocols can more easily be established in the face to face mode than online. Participants also need protocols about tool use and transfer of control (S4C).

Individual participants using whiteboards need some basic skills in tool use, hence section I2. As these tools become more virtual the degree of skill needed to achieve the same result generally becomes higher and will require an understanding of the function of the tool (I2b). However, many more extensive tools are available, some such as copy and paste with no analogue in the passive board. Importantly successful interactions will occur for IAPBs and online IAVBs when all participants’ skill levels move beyond a threshold to become routine and transparent to the task involved (I2a, I2c).

Through the use of tools participants will actually demonstrate their understanding of the task and the purpose, hence section I3. Elementary contributions ranging from minor to major changes (I3b, I3e) and additions (I3c, I3d) should be visible in any archived history of the board. Some whiteboards such as Centra support a form of archiving. But deeper understanding of task would be demonstrable with thematic changes. In the context of our example of participants each designing a room of a house, a thematic change might be the repositioning of the rooms and adjusting window positions to give the bedrooms the morning sun. Finally in terms of individual cognitions, suggestions for protocol changes and restatement of newly developed common ground indicate deep levels of synthesis and integration.

Similar sorts of indicators should be evident in interactive behaviour that are more the results of group rather than individual effort (hence G1b, G2h, G3d, G3e, G4d, G6c). In our house example a group outcome might be the relative position of participants rooms around the hall and corridors, ensuring adequate distance of bedrooms from entertainment areas. Such changes may require individuals to reduce their aspirations for door and window positions and negotiate with each other. The capacity of the group to set up new protocols and agreeing on new common ground (e.g. no bedroom adjacent to the family room) may be critical. The new common ground is indicative of a new learning about the house as a social space not just a collection of individuals and their bedrooms. Teachers who are alert to evidence of G4d and G4c in the discourse of participants are more likely to be assured that such learning has occurred.

CONCLUSIONS

An attempt has been made to develop a model of the cognitive concomitants of students’ use of interactive board technologies. As these technologies populate our class rooms and become important in distance education, teachers will need ways to assure themselves that they are achieving the desired levels of interaction and the targeted learning outcomes. They also need to

be assured that their pedagogical approach is successful and they are achieving the type of interactive learning desired. We know, however, that higher levels of cooperation and collaboration are difficult to achieve and that group activities make it difficult to see if individual learnings are occurring. Whole group outcomes may be evident in the final board result but it will be impossible to untangle individual cognitions without examining the interactions among participants. The approach above provides a useful model for examining this discourse of interaction. Indicators of certain cognitions should be evident in the interactive discourse. Certain key indicators appear to be critical for performance within specific interactive pedagogies. The absence of these indicators within the early interactions of participants should be a signal to teachers that their direct engagement in the process of learning is needed. The dangers of imprinting and media stickiness may jeopardise creative use of these technologies.

The model is also useful in helping to frame a discussion of the many unanswered questions about board use. How do imprinting and media stickiness manifest themselves with these technologies and what teacher practices should be adopted? How do we best support the development of effective protocols and a sense of common ground in online environments? To what extent do these agreements need to be explicit or implicit? The focus on specific cognitions also allows us to discuss developmental capacities of children to use such technologies. Can junior primary students actually achieve a group orientation and whole group learning outcomes? What social skills are needed for successful participant engagement and what are the specifics of the successful protocols. Do imprinting and stickiness impact on younger children to the extent they appear to do on adults? What is the impact of off board activities on the sense of common ground in the online domain? The full realisation of the extensive possibilities felt by many teachers for interactive board technologies awaits a systematic program of research into these and other questions.

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Can indicators on school websites be used to determine the level of ICT integration and ICT leadership in schools?

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As schools continue to invest resources into the integration of Information Communication Technologies (ICTs), many are also utilizing the Internet as a medium for promoting and marketing their facilities and educational programs to prospective families. Tailored and personalised school websites provide a wide range of information for members of the school community and for any interested members of the public. As a preliminary stage of a larger scale research project, guidelines and evaluation criteria have been formulated to determine if website content and design can be used as an indicator of either novice or expert ICT leadership within a school, and in addition if it reflects the level of ICT integration.

Information communication technologies (ICTs), ICT integration, school websites, novice, expert, ICT leadership

INTRODUCTION

An increasing number of schools are investing considerable time and resources into the development and maintenance of school websites, in order to promote their school and communicate not only with their school community, but also with members of the public. However an examination of school websites reveals that the quality of the websites, both in content and design vary significantly between schools. Leask (2001) acknowledges that "A good school website will reflect the development of ICT within the curriculum and support the school's ICT activities and policies." The actual extent to which school websites do reflect ICT integration and school leadership is of broad interest to parents, the community and policy makers. One of the aims of this paper is to discuss the type of content and the elements of school website design that may contribute to the development of functional, engaging and informative websites. Examination of school websites was also conducted to determine if evidence of ICT leadership and integration existed on school websites and if effective criteria could be established that measure these aspects. This investigation was predominately exploratory in nature, with the intention of acquiring an understanding of the type of content and design viewed on school websites, in order to enable the synthesis of criteria discussed in the novice expert literature with the criteria discussed in the literature on ICT integration and leadership.

DESIGN OF THE STUDY

The research presented here is part of an initial stage of a larger scale research project investigating the impact and influences of leadership styles and management strategies on transformative ICT integration, using the methodology of novice-expert contrast. "Comparing experts with novices makes it possible to specify how experts and novices differ in understanding, storing, recalling, and manipulating knowledge during problem solving" (Bruer, 1993). One source of evidence and information collected has been drawn from school websites, as they are

readily accessible, and have enabled preliminary investigations to be conducted to further dimensionalise the novice expert contrast. General preliminary analysis of school websites in the area of ICT leadership and ICT integration has led to the identification of four categories.

Category 1: Those websites whose main purpose is to disseminate information.

School websites in this category tend to:

- (a) provide a general overview of the school's curriculum policies and a brief explanation of facilities; the information reflects mostly what one would expect in a school prospectus;
- (b) no interactive elements or engagement with the audience is evident.

Category 2: Those websites whose main purpose is to inform and communicate.

Schools in this category provide features on their websites such as:

- (a) external access to school's infrastructure (e.g. by school Intranet);
- (b) correspondence by Email;
- (c) communication by means of chat rooms, blogs, and message boards.

Category 3: Those websites whose main purpose is to inform, communicate and entertain.

Schools in this category:

- (a) provide features on their websites such as video, animation, graphics, pod casts, and virtual tours;
- (b) exhibited students' work, where there is very much recognition of the importance of engaging and entertaining the wider school community as an audience.

Category 4: Those websites whose main purpose is to inform, communicate, entertain and showcase innovation.

Schools in this category:

- (a) describe and promote innovative concepts in education, innovative design both in the structure of their website and in the structure of their educational organization and overall innovative practices, processes and implementation not only of ICT but of education in general;
- (b) demonstrate an understanding not only of the potential of ICT in education, but also of the educational philosophies required to support integration that reflects expertise in ICT integration and ICT leadership.

Preliminary analysis suggests that schools in Categories 1 and 2 demonstrate a novice approach to ICT leadership and ICT integration on their website, while schools in Categories 3 and 4 demonstrate an expert approach to ICT integration and ICT leadership on their website. From the initial analysis a total of 15 novice and 15 expert schools in the area of ICT leadership and ICT integration were chosen by categorising school websites. Other considerations in the selection process included the geographic location of the schools; schools were selected to represent each region in the Adelaide metropolitan area: northern, southern, eastern, and western. One school in a rural setting was also selected for both the novice and expert group, although findings for this group might not be entirely generalisable, the inclusion of rural schools was deemed valid as it might provide indicators and issues not considered or evident in schools from metropolitan areas.

School size was also taken into account, with the schools selected grouped into those that had student enrolments less than 150 students, schools with student enrolments between 150-300 and schools with student enrolments above 350. The sample group contained schools from education systems across South Australia, namely five novice and five expert schools from The South Australia Education Department, five novice and five expert schools from Independent sector and five expert and five novice schools from The Catholic Education Department. It is important to note that this selection process has been considered and applied in order to achieve a broad representative sample. The intent of this stage of the research project is not to make comparisons between schools, regions or systems, but rather to identify the elements associated with ICT

integration and leadership that are pertinent to novice and expert schools, irrespective of their size, geographic location or affiliation with a particular education system.

THE NOVICE-EXPERT CONTRAST METHOD

The novice-expert contrast method was selected for the initial stage of the research project as it provided a basis for comparative analysis between the two groups. It also enabled the testing of constructs such as survey instruments developed later in the research project. In addition it provided a means by which to identify and categorise those skills, qualities, attitudes and strategies utilised, demonstrated and practised by experts that could potentially be transferable to other school contexts, in order to assist with the wide scale improvement and progress in ICT integration and leadership. The process might also help to explicitly identify and address the needs of schools that were classified as novice in the area of ICT leadership and integration and to provide subsequent support for schools in this category, targeting the identified needs and areas requiring improvement. Research and literature including Leinhardt, (1989); Sternberg and Ben Zeev, (2001); Schunk (1991); Bruer, (1993); Hogan, Rabinowitz and Craven (2003) that compared the characteristics and traits of novices and experts was analysed and considered. Examination of the research and literature provided a basis from which to develop understandings of the practices and metacognitive processes experts and novices undertook when completing tasks and problem solving. The information extracted from previous research and literature that addressed issues associated with novice and expert has been applied to the task of developing criteria for the selection of the sample group for the novice expert contrast.

When considering the qualities, skills and attitudes attributed to experts in any given field Sternberg and Ben Zeev, (2001) identified that experts utilised their knowledge base, this required not only having the knowledge but also applying knowledge as required and analytical thinking, namely being able to analyse problems even if the field was unfamiliar.

Particularly pertinent in the field of ICT, is the rate at which innovative technologies are introduced onto the market and their complexity. Experts exhibit creative thinking, which is characterized by the application of innovative skills and approaches to tasks and finding creative ways of gaining people's attention. Experts also exhibit practical thinking, strategies and skills whereby skills and knowledge are processed and applied to situations and tasks in a logical and methodical way in order to achieve outcomes.

Schunk (1991) wrote, "compared to novices, experts possess more declarative knowledge, have better hierarchical organisation of knowledge, recognise problem formats more easily, monitor their performances more carefully and understand the value of strategy uses." Bruer (1993) explained that expert chess players saw patterns and relationships between pieces and long-term consequences of actions. Anderson and Leinhardt (2002) discussed that "experts' performance can be differentiated by the reasoning in which they engaged." They further elaborate explaining that experts frequently knew the solution instantly, or had mastered strategies for arriving at a solution. In contrast, novices and pre-service teachers were not able to resolve promptly the problems; they had fewer strategies to draw on and could not construct functional rules to help resolve the issue.

When considering the qualities, skills and attitudes attributed to novices in any given field Hogan, Rabinowitz and Craven (2003) argued that novices "tend to focus on short-term plans, tend to generate highly scripted and mentally well-rehearsed instructional strategies." Novices also tended to not be as well prepared for unanticipated situations and have less complex schema and often provide less alternatives in any given situation. Glass, Kim, Evens, Michael and Rovic (1999) found that "novice tutor dialogues were less organized, so that effort needs to be tried again in a different way." The authors also discussed the difficulties of explaining the "novice tutors' transcripts using the same style of goal structure" used for the expert tutors. Daley (1999)

found that “novices and experts identified different organizational factors that facilitated or hindered their learning. Experts were able to articulate systemic issues that affected their learning, whereas novices identified disparate individual issues.” Bransford, Brown, and Cocking (1999) discussed the value of understanding expertise, acknowledging that it provided information about thinking processes and approaches to problem solving.

Investigations into the novice expert literature reveals that some of the characteristics displayed by experts are evident irrespective of the context or setting, for example an expert in a medical field may share similar traits with a computer game expert, such as the systematic approach to problem solving and the organisation of schema. Similarly characteristics displayed by novices are evident irrespective of the context and setting, for example a novice teacher shares similar traits to a novice engineer. This suggests that the characteristics displayed by both novices and experts can be applied to different contexts and settings. This is supported by research conducted by Anderson and Leinhardt (2005) who concluded, “that similar observations and conclusions concerning expertise can appear in very different subject areas”. As a result a selection of novice and expert indicators have been extracted from the literature and referred to during the preliminary selection process of the sample group.

GENERAL CONSIDERATIONS IN DEVELOPING INDICATORS OF EXPERTISE IN ICT INTEGRATION AND LEADERSHIP

An important linkage in expert novice literature to ICTs is the widely used four types of ICT integration, first proposed in the influential Making Better Connections study (Downes 2002).

Type A: Encouraging the acquisition of ICT skills as an end in themselves.

Type B: Using ICTs to enhance students’ abilities within the existing curriculum.

Type C: Introducing ICTs as an integral component of broader curricular reforms that are changing not only how learning occurs but also what is learned.

Type D: Introducing ICTs as an integral component of the reforms that alter the organization and structure of schooling itself.

‘Type A’ indicates a relatively basic approach (novice approach) to the integration of ICT in comparison to ‘Type D’ which indicates a relatively complex and confident approach to the integration of ICT (expert approach)

The content on school websites was analysed and indicators, including the type and provision of ICT facilities provided for students and the wider community of the school, were examined in order to determine the approach to ICT integration adopted and practised by the school community, and the priority given to the integration of ICT. Examination of school websites was also conducted to determine if policies, content, and practices described on the website supported a particular type of integration. For example, some websites explained ICT as a curriculum area taught specifically by an ICT specialist teacher in a computer pool, then the likelihood is that the type of integration would be closer to a Type A or Type B than the more expert levels of Type C and Type D.

Other indicators such as clarity of purpose, clear plans and directions for current and future integration of ICTs, and information value and relevance can be applied to school websites. It is relevant to determine if the purpose of the website is evident and clearly identifiable and if the school portrays not only its strengths, but also its intentions with regards to future development of ICT. Private School Resource Exchange Program (PREP), (2006) explained that “good school website reflects the needs of prospective families, students, faculty, administrators, parents, alumni, and friends of the school”. And that “Each constituency needs to be represented and catered for in the vision, design and content of the website”. The inclusion by schools, of content

on their websites that addresses the needs of the wider school community and demonstrates evidence of consultation with various members of the school community indicates an intention to provide an informative relevant website. Investigations into school websites help to determine if information value and relevance is evident on either or both novice and expert school websites, and if it can then be considered an indicator of an expert or novice in the area of ICT integration and ICT leadership.

Furthermore, in the process of evaluating websites in general some of the criteria suggested by Schrock (2006) and Beck (2006) were considered relevant and were applied to the task of formulating the selection criteria for determining expert and novice school websites. The criteria included:

- *Currency*: How current is the content and is there evidence that the content is regularly updated?
- *Bias and Objectivity*: is there any bias or sponsorship evident? Is information provided in an objective manner?
- *Authority*: Who is responsible for providing the information on the website? What are the credentials of the author? Can the credentials be verified?
- *Coverage of Content*: Is the information superficial or does it comprehensively address what it claims to address?
- *Website Design*: Is the site easy to navigate, appealing and is information easy to locate? Are there any broken links?
- *Accuracy*: Is the information provided accurate and reliable?

INDICATORS OF EXPERTISE IN ICT INTEGRATION AND LEADERSHIP

In developing the indicators for novice expert school websites, consideration was given to the four types of ICT integration outlined in Making Better Connections study (Downes, 2002) and the evaluation criteria suggested by Schrock (2006) and Beck (2006). These indicators were then synthesized with criteria identified in the novice expert literature, in particular the criteria identified in Leinhardt, (1989); Sternberg and Ben Zeev, (2001); Schunk (1991); Bruer, (1993); Hogan, Rabinowitz and Craven (2003). The aim of the process was to develop a comprehensive list of indicators, formulated by marrying the novice expert literature with the literature available on ICT, in order to assist in the identification of novice and expert school websites.

The following are website indicators formulated for identifying novice and experts in the area of ICT Leadership and ICT integration:

When evaluating the ability to **utilise knowledge base** the following indicators were considered.

- (1) Was there evidence of school leadership applying knowledge of relevant pedagogies and innovative practices in their school setting?
- (2) Had leadership demonstrated an understanding of relevant pedagogies for cohesive ICT integration? This could be evidenced in school policies, and in the general approach to schooling and education promoted and practised within the school context.
- (3) Did the infrastructure described on the school website support transformative ICT integration?

When evaluating the ability to **think analytically** in various situations the following indicators were considered.

- (1) Was there evidence that leadership have thought through potential issues that might arise in ICT integration?
- (2) Had leadership provided possible solutions or discussed logical consequences for actions related to the integration of ICT?
- (3) Was there evidence that leadership had anticipated future directions in ICT integration? For example did the school have wireless broadband or interactive whiteboards?

When evaluating the ability to apply **creative thinking skills** in various situations the following indicators were considered.

- (1) Had leaders demonstrated a creative approach to ICT integration? For example were examples of innovative practices evident on the school website whether through students' work samples or by the design of the school's website?

When evaluating the ability to apply **practical skills** in various situations the following indicators were considered.

- (1) Had leadership demonstrated that it had thought through the practical issues and implications of the way their school was portrayed on the internet?
- (2) Was there logic and structure and a sense of cohesiveness and clear purpose on the website?
- (3) Did leadership demonstrate innovative practical, achievable and manageable solutions to ICT integration?
- (4) Had leadership demonstrated their personal self-efficacy in ICT on the school website?
- (5) How much evidence was there that leadership had contributed to the school website?

When evaluating the ability to **plan effectively** for the long and short term the following indicator was considered.

- (1) Did policies predominately address current ICT related issues with no evidence or discussion of future directions or was there clear evidence of short and long term objectives?

When evaluating the ability to **provide alternatives** in any given situation and evaluating the merits of each alternative the following indicators were considered.

- (1) In the process of ICT integration did the school demonstrate a broad or narrow focus?
- (2) Was the focus on one identified priority or were there multiple priorities organised in a manageable time frame?
- (3) Did the ICT integration process reveal a cohesive approach?

When evaluating the **flexibility** and the willingness of leadership to deviate from the initial planned pathway the following indicators were considered.

- (1) Was leadership supporting integration at a higher level (Type C and D) or at a basic level, (Type A and B)? Downes (2002).

When evaluating how **well prepared and organised** leadership is for unanticipated situations the following indicators were considered.

- (1) Were ICT policies provided on the school websites?
- (2) Were ICT policies comprehensive, did they reveal how thoroughly they had anticipated possible scenarios related to ICT integration?

When evaluating the **complexity of schemas** leadership developed in the area of ICT integration the following indicators were considered.

- (1) Was there comprehensive coverage of issues related to the integration of ICTs?
- (2) To what degree did ICT related decisions impact on the school community?

When evaluating the **currency** of the website content the following indicators were considered.

- (1) Were current newsletters available?
- (2) Was information about current school events available?
- (3) Were past newsletters archived and still accessible?
- (4) Was there evidence of maintenance? (e.g. updated information about current or future school events.

When evaluating the **coverage** (depth and organisation of information) of the website content the following indicators were considered.

- (1) Were links to useful information, resources, and contacts provided?
- (2) Was information available for parents?
- (3) Was information available for students?
- (4) Was information available for staff?
- (5) Was information available for the wider community?
- (6) Was the information provided for each of these groups relevant, current and organised in such a manner that was easy to locate?
- (7) Were school policies available online? Were ICT policies available online? And if so did the website confirm the policy claims and content? Was the philosophy driving the integration process explained?
- (8) Was the intended audience clearly identified? Had clear consideration been given as to what was being offered and for whom it was being offered? (Helmschrott, 2006)
- (9) Did the information meet the needs identified by the target groups?
- (10) Were there examples of students' work or regular contributions from various members of the school community?
- (11) Was there a reason to return to the website on a regular basis? (Freyer, 1997)
- (12) Was there access to the intranet on the school website? Were there any interactive aspects? How did the website engage the audience, blogs and Chat rooms?
- (13) Were curricular goals and plans for ICT integration evident on the website?

When evaluating the **authority** of the website content the following indicators were considered.

- (1) Was it obvious as to who had contributed information, content to the website?
- (2) Were there external links to resources? If so were the authors of these websites clearly identifiable and credible?

When evaluating the **quality of the design** of the website content the following indicators can be considered:

- (1) Had a design template been adopted or was the design tailored to reflect the school community?

(2) Did the design reveal an innovative approach to promoting the school?

Although the above list was not exhaustive it did provide a reference, which suggested indicators that addressed a broad range of issues in the area of novice and expert in the area of ICT integration and ICT leadership.

GENERAL FINDINGS

The investigations into school websites revealed that school websites that demonstrated a **novice approach** to ICT leadership and ICT integration, as determined by analysis of the identified criteria tended to:

- display basic web design and at times an adaptation of a template (e.g. SINA or at times no website at all i.e. no online presence);
- provide a Category 1 website, (i.e. the main purpose being to inform its audience, for example school providing a home page only with contact details);
- contain broken links (e.g. either within the website or to external links);
- show no evidence of maintenance and not be updated (e.g. links only to outdated newsletters);
- describe infrastructure and setup to be of Type A (e.g. ICT teaching by a specialist teacher in a computer pool once a week);
- consist of contributions from a selected few (e.g. by leadership only);
- reveal policies that predominately address surface issues in the process of ICT integration;
- provide incomplete information on the school website (e.g. sentences not completed and blank spaces left)

The investigations into school websites revealed that school websites that demonstrated an **expert approach** to ICT leadership and ICT integration, as determined by analysis of the identified criteria tended to:

- share or pool resources across schools and systems (e.g. shared lesson plans);
- demonstrate proficiency at utilising innovative ICTs;
- experiment with innovative technologies;
- contain contributions from a large number of staff and the wider school community (e.g. class pages);
- promote the website as a community forum;
- demonstrate a clear attempt to meet the needs of the learning community, and demonstrate flexibility;
- reveal sound policies and clear future directions;
- reveal partnerships with the wider community;
- demonstrate an understanding of the various components and potential of ICT in education;
- provide comprehensive coverage of information- organised so that it is easy to locate and navigate.

- describe and provide evidence of a well established infrastructure;
- provide access to an intranet and provision for online communication;
- be appealing and interactive;
- reveal integration of innovative technologies (e.g. in students work samples);
- provide broad coverage of associated issues (e.g. safety, ethical considerations, and flexible learning).

CONCLUSIONS

Evaluation of websites revealed significant differences between the novice and expert groups. This included differences in the coverage of content on the website. Websites ranged from those that mentioned the existence of an ICT policy to websites that revealed innovative practices in the area of ICT integration both in their policies and in the design and structure of their website. Those websites that were categorised as experts did not necessarily display a level of expertise in all areas related to ICT integration and ICT leadership, but often demonstrated specific expertise in an area or two, (e.g. ICT facilities, website design). It was interesting to note websites that tended to fall in the novice category were more easily identified, some because there was no current website available and some because the main purpose was purely to inform. In comparison, expert websites were more difficult to identify (i.e. the aspects that indicated expertise were not as evident on the school website). The reasons contributing to this observation require further research.

The investigations conducted into school websites have raised the following important research questions.

- (1) **Does ICT leadership, or a lack of leadership, determine the development of school websites?**
- (2) Does a lack of funding and resources impact on the quality of school websites?
- (3) What type of support structures and training programs can assist schools to develop further their school websites if identified as a priority?
- (4) Do leaders feel that school websites reflect the schools attitudes towards ICT integration?
- (5) Are school websites an indicator of the level of ICT leadership and ICT integration?
- (6) What processes are required to make the transition from novice school website to expert school website?
- (7) What external influences impact on the development of school websites? (e.g. the employment of professional website designers).

The preliminary allocation of schools to expert and novice groups will be further analysed in subsequent stages of the research project. This will provide additional measures of the novice-expert contrasts, with the broader aim of continuing to develop a deeper understanding of the thinking processes, attitudes and approaches both of novices and experts towards ICT leadership and ICT integration.

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DBRIEF: A research paradigm for ICT adoption

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The concern that educational research is often divorced from the problems and issues of everyday teaching practice, is strongly influenced by the chosen paradigm in which the research is framed. Modelled on design-based research methods, this paper presents the development of a theoretical research framework that accommodates complex interventions, such as the adoption of ICT into mainstream classroom practice, which can be informed and improved through empirical study. It is hoped that in developing the Design-Based Research in Innovative Education Framework (DBRIEF), the desirable outcome of providing a practical and adaptable instrument with the potential to find applicability, currency, and promote the sharing of knowledge in the wider educational research community, is achieved.

Design-based research, educational research framework, paradigm, innovation, ICT adoption

INTRODUCTION

The concerns of educational leaders and researchers that educational research is often divorced from the problems and issues of everyday teaching practice, resulting in “unusable knowledge” (Lagemann, 2002, p.1), is strongly influenced by the chosen paradigm in which the research is framed (Bauder et al., 1997). The United Kingdom’s leading agency for ICT research in education raised this issue:

A common framework should be developed for evaluating ICT in schools which incorporates a core set of measures, which can serve the needs of schools themselves as well as policy-makers and researchers. (Becta, 2003, p.2)

In order to produce professional knowledge that can be applied in practice, Haertel and Means (2004) called for (a) research that addresses the questions that educational leaders and teachers care about, (b) integration of local understanding driven by researcher-policymaker partnerships with disciplinary knowledge, and (c) the use of research findings to inform and transform practice. In response to the concern to produce usable findings, this article argues for research that is born out of the collaborative partnership between researchers and policymakers focused around inquiry that is of interest to educational leaders and teachers with the intention of informing practice. Moreover, this article argues that such research needs to be framed in an appropriate paradigm that furthers the understanding of how and why an innovation works within and across settings over time (Bauder et al., 1997; Brown and Campione, 1996; Terashima et al., 2003). Accordingly, this paper presents the development of a theory-driven research design that accommodates complex interventions that can be informed and improved through empirical study. The recent emergence of an important research method, called ‘design-based research’ (Design-Based Research Collective, 2003), provides a sound basis from which a more explicit framework is developed.

DESIGN-BASED RESEARCH

The premise of design-based research, to promote, sustain, and understand innovation in the world, particularly in an educational context, has maintained a close synergy with the development and adoption of ICT in educational practice. Design-experimentation has become,

over the past decade, an increasingly accepted mode of scholarly inquiry appropriate for the theoretical and empirical study of change in everyday educational settings brought about by complex educational interventions (Bell, 2004; Cobb et al., 2003). In particular, Bell (2004) states:

Scholars came to engage in design-based research in order to better understand how to orchestrate innovative learning experiences among children in their everyday educational contexts as well as to simultaneously develop new theoretical insights about the nature of learning. (Bell, 2004, p.244)

Design-based research brings together research on educational practice and its effects by employing the scientific processes of discovery, exploration, confirmation and dissemination (Kelly, 2003). This interconnection of research and practice complements the fundamentally interventionist nature of education and provides practical and theoretical progress in the field by conducting empirical research in naturalistic settings. Cobb et al. (2003) suggest:

Design experiments ideally result in greater understanding of a *learning ecology*—a complex, interacting system involving multiple elements of different types and levels—by designing its elements and by anticipating how these elements function together to support learning. Design experiments therefore constitute a means of addressing the complexity that is a hallmark of educational settings. (Cobb et al., 2003, p.9)

The importance that context and local interpretation plays in the successful adoption of ICT becomes salient when examining cases in which teachers develop different strategies to achieve similar learning outcomes. Just as there are many guiding principles when it comes to effective teaching and learning, there is no single right approach when it comes to embedding ICT into the curriculum successfully. The differences brought about by school, teacher, and student characteristics result in many models of successful implementation that yield positive outcomes. Accordingly, by not externally imposing a set of instructional methods of embedding ICT into teaching practice, research is underpinned by this philosophy and indicative of good design.

In order to explain the context and conditions associated with change in educational practice, design-based research should exhibit the following five characteristics (DBRC, 2003).

- (1) The design of learning environments and learning experiences are intertwined with theories of learning.
- (2) Development and research take place through a continuous cycle of design, enactment, evaluation and redesign.
- (3) Research on design leads to sharable knowledge and practice that can be communicated to practitioners and other designers.
- (4) Research must account for how and why designs work in authentic settings.
- (5) Accounts of research must describe and connect processes of enactment with outcomes of interest.

However, because of these characteristics, there are a number of challenges faced by design-based research, centred around the issue of credibility and arising from unscientific research approaches in educational research (NRC, 2002), and the detachment of research from practice (Lagemann, 2002). Providing further clarification, Robinson (1998) argues that educational research is detached from practice when it does not account for the influence of contexts, the emergent and complex nature of outcomes, and the lack of understanding about which factors are relevant for prediction. In order to promote credibility and generalisability, the effective use of ICT in learning requires that the effects of ICT need to be studied across a number of contexts over time (DBRC, 2003). Furthermore, the research design needs to view educational innovation holistically. The design process is enacted as a product of the context in which the innovation is

adopted and emergent as one of the outcomes. By doing so, the disparity between well-designed research and that of unscientific detached research that is unable to claim credibly success or failure of an innovation in context is lessened.

Typically, design-based research relies on techniques used in other research paradigms in order to maintain objectivity, reliability, and validity. Triangulation of multiple sources of data to connect intended and unintended outcomes to the innovative practice is commonly employed. When data are collected using standardised instruments repeated on a number of occasions, validity can be tested. Since it is not logistically possible to pursue all possible factors equally that may contribute to the outcomes, particularly in complex longitudinal studies (for example, Dix, 2006) that span multiple settings over a number of years, the reliability of findings depends on the triangulation of data and repeated use of standardised instruments (DBRC, 2003).

A further logistical problem in design-based research results from the need to maintain a productive collaborative partnership between researcher and participants over a long period of time (Cobb et al., 2003). In maintaining these relationships, by the negotiation of a shared enterprise, regular opportunities for debriefing and further planning are necessary (Dix, 2006). Moreover, because a single line of research investigates multiple cycles of design, enactment and research, the study often spans years and potentially challenges teachers' and researchers' closely held beliefs. Successful examples of design-based research (for example, Dix, 2006; Linn and Hsi, 2000) minimise the potential tension between researcher and teacher to sustain a cooperative partnership. This tension is best summarised by the Design-Based Research Collective:

The challenge for design-based research is in flexibly developing research trajectories that meet our dual goals of refining locally valuable innovations and developing more globally usable knowledge for the field. (Design-Based Research Collective, 2003, p.7)

Furthermore, the success of design-based research should be measured by its ability to inform and improve educational practice. Its choice as a paradigm for educational research, lies in its potential to explore novel learning and teaching environments that support and promote the adoption of ICT in real settings, and to increase human capacity for innovation through the exchange of ideas and expertise across academic and educational communities.

TOWARDS A RESEARCH FRAMEWORK FOR ICT ADOPTION

In developing a research framework that positions design research as a socially constructed, contextualised process resulting in educationally effective outcomes that can inform teaching practice, a review of existing theoretical models on the teaching and learning process and emerging frameworks used in design-based research was conducted. However, during the review process, it was evident that the terms 'framework' and 'model' were generally not defined and were often used interchangeably, resulting in a need for clarification.

Frameworks and Models

Dictionaries generally define a framework as a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality. Smyth (2004) reflected on the purpose of a framework as a:

... research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate this. As with all investigation in the social world, the framework itself forms part of the agenda for negotiation to be scrutinised and tested, reviewed and reformed as a result of investigation. (Smyth, 2004, p.168)

For the purposes of this paper, a framework provides a fundamental structure and a practical instrument that enables a researcher to think through ways of doing things. Frameworks are

commonly presented as structured tables with clearly defined interrelated concepts. However, frameworks are also portrayed in diagrammatic form and are often referred to as models.

Keeves (1997, p.386) defines a model as a hypothetical structure, that “is used in the investigation of interrelations between the elements”. In investigating such interrelations, a set of hypotheses, “developed from intuition, from earlier studies, and from theoretical considerations” are proposed, tested and confirmed or rejected (Keeves, 1997, p.386).

A distinction can then be drawn between a framework, as a general structure that provides an overarching set of concepts and processes, and a model, as a specific structure of interrelated factors hypothesised to be tested. Indeed, a framework may include or reflect a model, or guide the development of a model or number of models. Such a distinction is necessary, particularly with the emergence of design-based research, where interrelated processes are represented alongside concepts and factors.

A Review of Educational Research Frameworks and Models

All models are wrong, but some are useful. (George Box, 1976)

Of the many models reviewed for this paper (for example, Jones and Paolucci, 1998), those of Carroll (1963), Biggs (1989), and Huit (1993), in addition to the frameworks of Orrill (2001), Keeves (2003), Bannan-Ritland (2003), and Sandoval’s (2004), are considered pertinent to the development of the framework presented in this paper.

Carroll introduced a model of school learning in 1963 that still has currency in educational research, some four decades later. The original model, presented in Figure 1, is formal and quasi-mathematical in design (Reeves, 1997). Carroll’s (1963) model explains variance in school achievement through three time-related variables, namely aptitude, opportunity to learn and perseverance, and two classes of variables that focus on a student’s ability to understand instruction and the quality of instructional events.

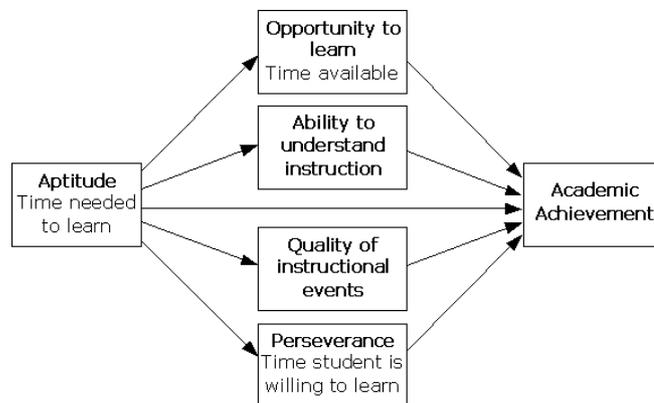


Figure 1. Carroll’s (1963) model of school learning to explain school achievement

Biggs (1989) proposed the 3-P model, which posits presage, process, and product as the main features of a learning system. Figure 2 presents the 3-P model and the paths of influence. The overarching assumption is that learning outcomes are a result of the interactions of teaching and learning contexts with student approaches to learning. Presage, what comes before the learning situation, involves student learning characteristics and teacher characteristics, which are embedded in the context of the learning environment, set by teacher and school. Both student and teaching presage factors interact to produce an approach to learning that produces characteristic outcomes. In the process phase, what happens in the learning situation, particular approaches to learning result in either deep or surface learning (Entwistle and Ramsden, 1983). Accordingly, processes used in learning are not simply a fixed attribute of the learner, but a function of both learner characteristics and teaching factors. The product phase of the 3-P model, the outcome of

learning, suggests that study approaches influence qualitative differences in learning outcomes. Deep approaches to learning produce high quality learning outcomes, while surface approaches result in lower quality outcomes.

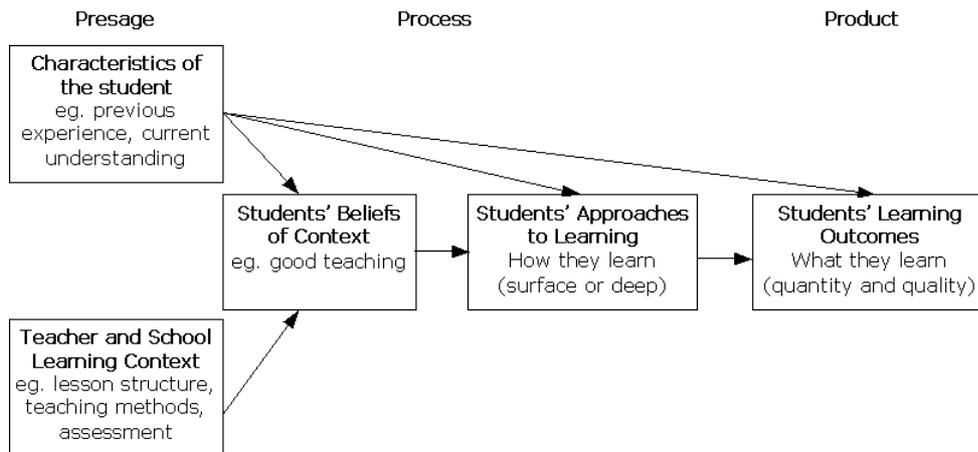


Figure 2. Biggs’ (1989) 3-P model of the learning process consisting of presage, process, and product features

A useful review of models (including Carroll, 1963; Proctor, 1984; Cruickshank, 1985; Gage and Berliner, 1992) on the teaching and learning process, culminated in the development of Huitt’s (1993) transactional model of the teaching and learning process, shown in Figure 3 as reported in McIlrath and Huitt (1995). The transactional model was developed to categorise factors that influenced variance in student learning and academic achievement in the context of classroom and school. According to the model, the factors were classified under four categories: context, input, classroom processes and output. Context included all those factors outside the classroom that might influence teaching and learning. Input was defined as those qualities or characteristics of teachers and students that they brought with them to the classroom experience. Classroom processes examined what was going on in the classroom and involved teacher and student behaviours as well as other variables such as classroom climate and interpersonal relationships. The last category, output, measured student learning separate from the classroom learning process (Huitt, 1993).

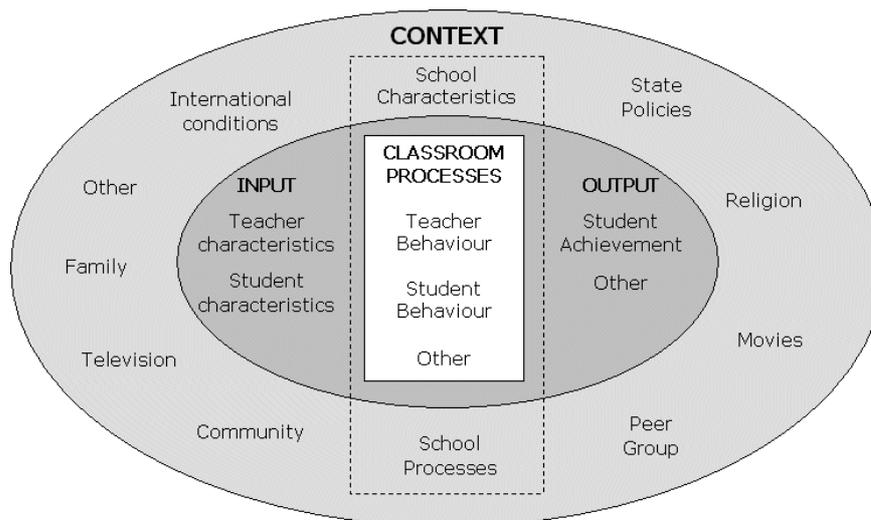


Figure 3. The transactional model of the teaching and learning process (McIlrath and Huitt, 1995)

Orrill’s (2001) professional development framework centred around a context-based three-way interaction between the processes of enactment, reflection and goal setting. The objective of the

framework was to support middle-school teachers to become more learner centred when implementing computer-based instruction in their classrooms, and was grounded in the belief that “change is individual and needs to be supported in context and over time” (Orrill, 2001, p.15). The five key aspects of the framework, presented in Figure 4, included reflection, proximal goals, collegial support groups, one-to-one feedback, and support materials for the teacher.

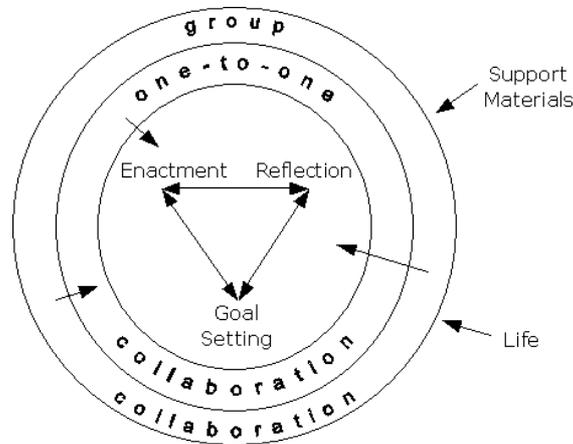


Figure 4. The professional development framework (Orrill, 2001)

Applying the ideas presented by Cobb et al. (2003) and the Design-Based Research Collective (2003) to extend the work of Turner’s (1991) analysis of Giddens’ (1984) theory of structuration, Keeves (2003) developed a design-based research framework, presented in Figure 5. The framework consisted of inter-linked but discrete concepts that proceeded through five phases of design. Reading the diagram from right to left, the phases moved through an exploratory mode of operation with structural freedom, to a confirmatory mode with imposed structure reflecting good design.

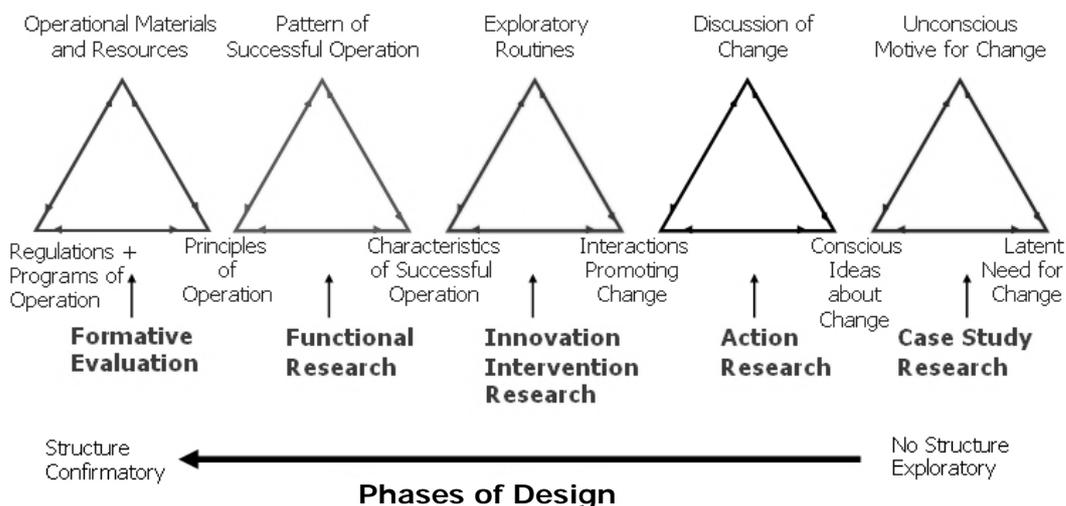


Figure 5. Design-based research phases of design (Keeves, 2003)

During the case study phase, in Keeves’ (2003) framework, the researcher examined the unapparent needs for change and helped to make conscious the underlying reasons and motivations for the desired change by identifying and specifying the nature and the purpose of the innovation. The action research phase collected evidence that would further assist in identifying the appropriate processes of change by promoting discourse about planning and designing the change. During the intervention research phase, the researcher and practitioners explored the different possible modes of change and sought to identify and introduce successful types of

change. At this stage, the intervention was designed and detailed, and the nature of implementation was planned. The functional research phase examined the operation of change and related the context and conditions of enactment to the outcomes achieved. In the final stage, the formative evaluation phase, iterative cycles of innovation and intervention allowed the researcher to examine how and why the changes introduced succeeded or failed to deliver the desired outcomes. Informed decisions guided modification of the subsequent cycle in ways that leads to better design.

Bannan-Ritland (2003) proposed the integrative learning design framework. This model emphasised the stage of sensitivity of (a) research questions, (b) data and methods, and (c) the need for researchers to conduct analyses at earlier stages in the research that could then be profitably used to inform later stages. The framework drew from product design (Ulrich and Eppinger, 2000), usage-centered design (Constantine and Lockwood, 1999), instructional research (Dick and Carey, 1990), and diffusion of innovation (Rogers, 1995), in addition to established educational research methods (Isaac and Michael, 1990; Keeves, 1988). The integrative learning design framework consisted of four broad phases: (a) informed exploration, (b) enactment, (c) evaluation – local impact, and (d) evaluation – broader impact. The first phase provided the foundations of the research by undertaking the fundamental processes of problem identification, literature review and development of research questions, supplemented by the identification of contextual factors through needs analysis and stakeholder perceptions. These activities were informed by the views of the researcher, school leaders and teachers, but also by school and classroom observation. Based on these findings, appropriate methods of intervention would emerge. The enactment phase was an iterative process, where the intervention was conducted, reviewed and refined, and might involve multiple cycles of design. At the evaluation phase, the local impact was assessed through data collection and analysis using an iterative process of formative and summative evaluation, and might well necessitate revisiting the enactment phase. The final phase, that of evaluation on a broader scale, extended the dissemination stage of educational research, which typically saw publication of findings as an end-point, by promoting ongoing research practices and interventions.

In Sandoval's (2004) framework of design-based research, presented in Figure 6, learning theory was developed through an iterative process of refining conjectures embodied in educational designs. Theoretical principles or conjectures were embodied in tools and materials, and structures of tasks and participants. These predictors of intermediate outcomes, which were embedded in the learning context, informed and modified the theory and the nature of the intervention in a micro-cyclical process. The refined intervention then led to the prediction of outcomes, which might, for example, examine the effects on learning motivation. These outcomes, in turn, re-inform the original conjectures and the intervention in a macro-cyclical process.

In undertaking a review of educational research frameworks and models, similarities and differences emerge. The similarities exist because the frameworks and models have been born out of the same field of research, that of the educational sciences. The differences exist because each framework or model considers a particular aspect or is designed to serve a specific purpose. They can be considered as part of a greater whole, or rather, the pieces of jigsaw puzzle, where the different pieces interlock at similar edges. It follows then that any new aspect of educational research potentially requires the development of a new framework or model, another piece of the puzzle. Driving the development of new educational research frameworks is usually the insufficient ability of previous frameworks or models to anticipate and embody the parameters of new studies.

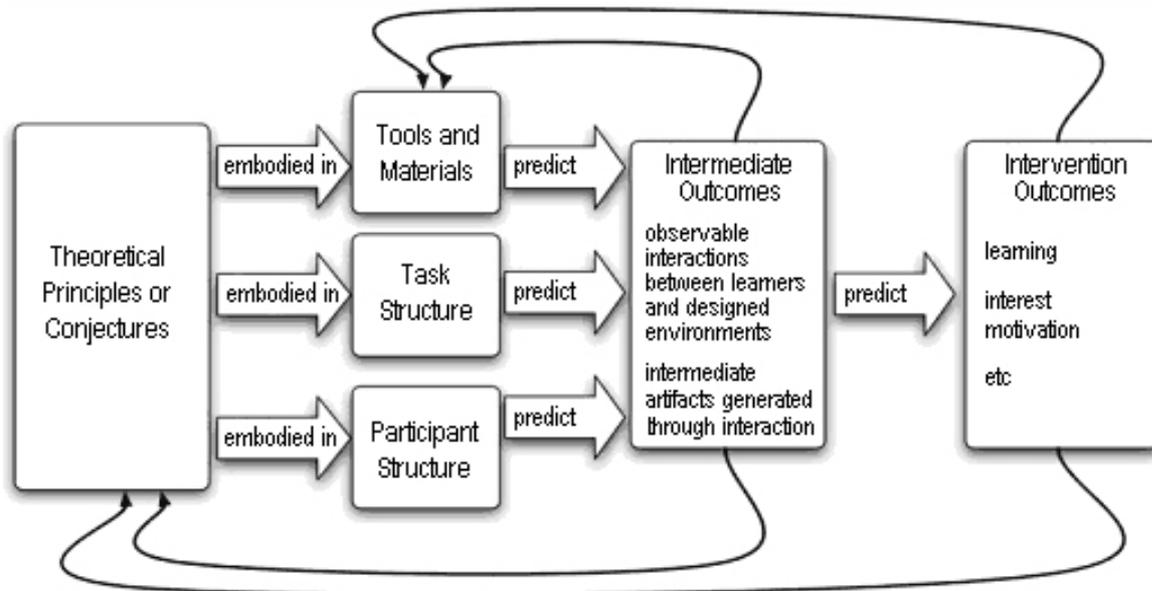


Figure 6. Design-based research embodied conjectures of learning (Sandoval, 2004)

Rather than just develop another piece of the puzzle however, the question begs, are there enough pieces to anticipate the greater picture and develop a framework with general application? This author contends that there are enough pieces, and through the synthesis of previous frameworks and models, presents the resulting ‘picture’ of educational research, aptly named, *DBRIEF*.

DBRIEF: DESIGN-BASED RESEARCH IN INNOVATIVE EDUCATION FRAMEWORK

In order to provide a theoretical foundation to guide the development of a study, in addition to encapsulating the major features of the research design, a general framework is generally required. Influenced by previously developed educational research models and frameworks, detailed in the previous section, the resulting framework builds upon the emerging field of design-based research but remains firmly grounded in existing theory about the factors that influence teaching and learning in an innovative environment. This section presents the new framework and details its features.

The Design-Based Research in Innovative Education Framework (DBRIEF) is presented in Figure 7, and combines influential elements from previous research in the field of education (Carroll, 1963; Biggs, 1989; Huitt, 1993; Orrill, 2001; Keeves, 2003; Bannan-Ritland, 2003; Sandoval, 2004). For example, the stages of presage, process, and product are attributable to Biggs (1989), while the concept of moving from unstructured exploratory analysis through to structured confirmatory analysis originates from Keeves (2003). In fact each feature, discussed in detail further below, can, in one form or another, be attributed to a previous model or framework, but it is their presentation in this paper as an integrated whole, that offers new worth.

More importantly, DBRIEF attempts to provide a visual representation of a research paradigm that embodies what is currently considered good research design. Gage and Berliner (1992) argue that diagrammatic models make the process of understanding a domain of knowledge easier because it is a visual expression of the content. They found that students who studied models recalled as much as 57 per cent more conceptual information than students who received instruction without the benefit of seeing and discussing models. In accordance with Gage and Berliner’s (1992) findings, the presentation of DBRIEF in diagrammatic form is chosen in order to, as the acronym implies, share knowledge.

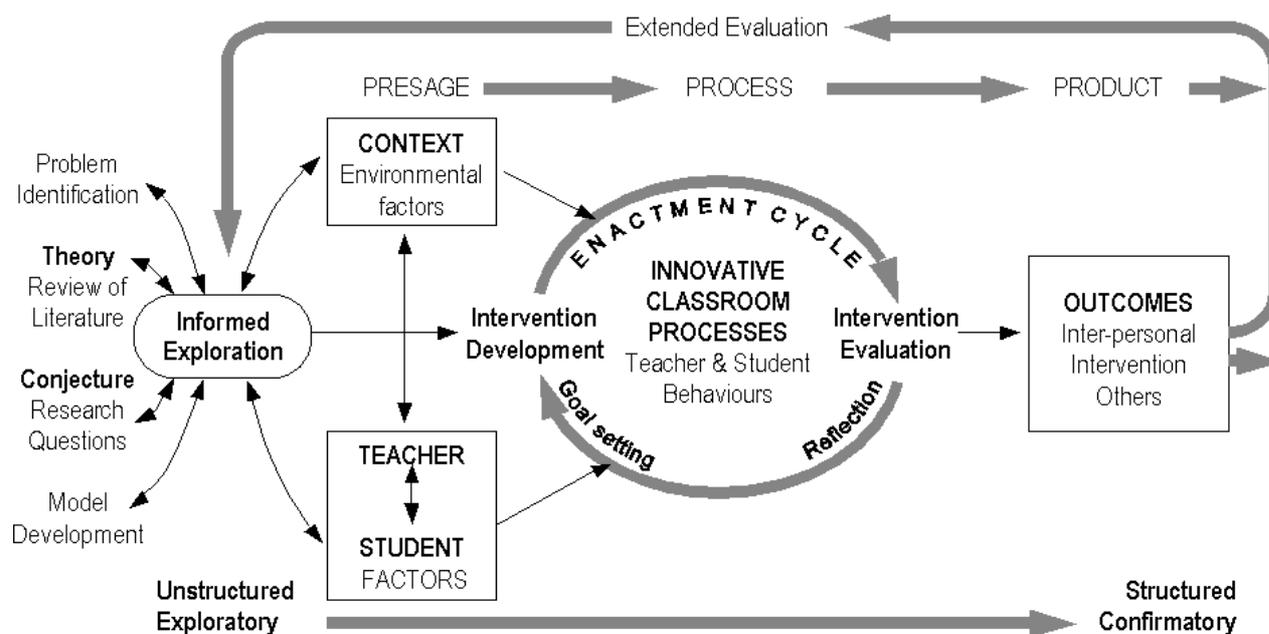


Figure 7. The Design-Based Research in Innovative Education Framework (DBRIEF)

DBRIEF proceeds through five main phases: (a) informed exploration, (b) presage, (c) process, (d) product, and (e) extended evaluation. The elegance and power of DBRIEF is realised when an entire study can be mapped upon its main features.

Informed Exploration. Most educational research studies follow a standard format. Figuratively speaking, they begin in an unstructured exploratory mode by identifying the problem, usually presented in the first chapter, followed in the next by a review of related literature. In the following chapter, conjecture, informed by contextual factors derived from school and classroom observation, and stakeholder perceptions, leads to the development of research questions and model hypothesis (Bannan-Ritland, 2003; Keeves, 2003; Sandoval, 2004). All of this activity, conducted as an intuitive and iterative process and represented in Figure 7 by curved two-way arrows, is conceptualised under the banner of ‘informed exploration’.

Presage. Reflecting Carroll’s (1963), Bigg’s (1989), and Huitt’s (1993) models of the learning environment, the interrelationship between the presage factors of context, teacher and student are presented in a causal model defined by straight arrows or paths of influence. From these basic components, combined with process and product factors, detailed models are hypothesised for subsequent testing, and by doing so, more structure is imposed. Chapters containing rich descriptions of context and participants are presented along with discussion about data collection methods and instruments used.

Process. At the heart of DBRIEF is the ‘enactment cycle’, where innovative programs of classroom intervention, such as the adoption of ICT in learning, are developed and evaluated in an iterative process of micro-cycles. Contextual factors along with teacher and student behaviours are measured to provide intermediate outcomes that support reflection and further development of proximal goals, and refinement of the intervention (Orrill, 2001). The complexity of studying such activity is best represented by Keeves’ (2003) framework (see Figure 5) of educational change through the use of multiple research strategies. Such a framework is too complex to embed in DBRIEF but does provide an example of one of many suitable methodological approaches. Related chapters would contain observation, descriptions of interventions and intermediate outcomes generated through interaction, and data collection.

Product. During the product phase of research, quantitative longitudinal data are rigorously analysed and hypothesised models, informed by qualitative data, are tested. By this stage, analysis takes a highly structured form and is confirmatory in nature. Other outcomes, such as intervention

programs and implications, are prepared for dissemination and evaluation to the broader educational research community. But rather than viewing the publication of findings as the end-point of the research, a final macro-cycle phase is necessary and fundamental to the design-based research method.

Extended Evaluation. Similar to those models of Bannan-Ritland (2003) and Sandoval (2004), this final stage is designed to promote ongoing research and development of further theory and interventions. Accordingly, the outcomes, findings and implications feed back into and re-inform the original theory and conjectures with the underlying premise that change is sustainable and that innovation in classroom practice should be ever evolving. With this outlook, long-term relationships between practitioners and researchers better ensure that educational research does inform teaching practice.

SUMMARY

The Design-Based Research in Innovative Education Framework (DBRIEF), developed and presented in this paper, derives from the early works of Carroll (1963) and Biggs (1989), and more recently from the works of Huitt (1993), Orrill (2001), Keeves (2003), and members of the Design Based Research Collective (2003). It is hoped that in developing DBRIEF, the desirable outcome of providing a practical and adaptable instrument with the potential to find applicability, currency, and promote the sharing of knowledge in the wider educational research community, is achieved.

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Students' critical thinking skills in a Thai ICT schools pilot project

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This study is exploratory, examining to what extent the Thai ICT (information and communication technology) schools have classroom learning environments that are associated with certain teacher characteristics using questionnaires, interview surveys, and computer-based classroom observations in order to collect data from 13 Thai ICT model schools. The data analysis was carried out using statistical analysis techniques as well as using descriptive analysis. It is proposed that students can be assisted to learn critical thinking skills that have particular supportive learning environments. The significant findings offer opportunities to develop and support students' critical thinking skills through co-operation between students and their peers to achieve their student assignments among cooperative classroom learning environments with ICT. In particular, the findings of this study have major implications for teachers and school management where ICT schools are being established and incorporated in Thailand.

Information & Communication Technology (ICT), critical thinking skills,
ICT model schools, ICT-integration into teaching and learning process

INTRODUCTION

One of the intentions of the *National Education Act of B.E. 2542 (1999)* ('the *NEA*') in Thailand has been trying to provide principles and guidelines for educational reform. It is hoped that Section 24 in Chapter 4 of the *NEA* will:

- (a) provide training in thinking processes, management, how to face various situations and the application of knowledge for obviating and solving problems;
- (b) organise activities for learners to draw from authentic experience; drill in practical work for complete mastery; enable learners to think critically and acquire the reading habit; and develop a continuous thirst for knowledge (Office of the National Education Commission, 1999, p.11).

In particular, this statement aims to ensure that the learning process for students starts with curiosity and is followed by planned learning activities. Through teacher-student interaction, it is also expected that students should be assisted to learn critical thinking skills, such as gathering knowledge, comprehension, application, analysis, synthesis, and evaluation in classrooms where supportive learning environments are presented.

Considering the essential role of technology for education in enhancing the competitiveness of Thailand and its people in a knowledge-based economy and society, both the *1997 Constitution of the Kingdom of Thailand* and the *Amended National Education Act 2002* identified the possible importance of computer technology for education (Office of the National Education Commission, 2002).

Sections 40 and 78 of the *1997 Constitution* and Section 63 to 69, in Chapter 9, of the *1999 National Education Act* proposed that major action should be taken to promote the use of technology for education. These actions included: (a) the establishment of an organisation to introduce ICT, (b) the development of ICT policies and plans, (c) the planning of infrastructure and networking systems, (d) the construction of materials and other technologies for education, and (e) the advancement of educational personnel and learners in the use of ICT. Therefore, the introduction and implementation of ICT strategies have become essential for Thai people, in particular, under the educational reform in Thailand.

Recently, Thailand has placed an emphasis on the use of technology in education to facilitate the advancement of teaching and learning processes (Office of the National Education Commission, 2002). It was anticipated that the adoption of new technology would also enhance higher-order thinking skills, critical thinking skills, systematic, and other relevant thinking skills for all students (Office of the National Education Commission, 2003).

In order to investigate the effectiveness of new technology, the Thai Government in 2003 set up the ICT Schools Pilot Project. It was a three-year pilot project (from fiscal year October 2003 to fiscal year October 2006) to be conducted in six primary and six secondary schools, which were the pioneer ICT schools in Bangkok and surrounding suburbs. One year after the project began, in 2004, two new schools applied to participate in this pilot project. One of them was in Chiangmai in the northern area of Thailand. The main objectives of the ICT Schools Pilot Project were to apply and integrate ICT into teaching and learning processes within classroom learning environments with ICT by developing the students' body of knowledge and promoting students' self-learning through the development of learning activities in elementary and secondary model ICT schools under this project (Office of the National Education Commission, 2002). Therefore, the purpose of the project was to provide a model in teaching and learning by integrating ICT through the teaching and learning process into classroom learning environments. The aim was for these model ICT schools to use ICT as a teaching and learning tool. In addition, they would use ICT to facilitate independent self-paced learning for all students.

Thus, this present study aimed to investigate how effectively ICT was being used to support students' critical thinking skills by ICT that was integrated into the teaching and learning in the elementary and secondary schools involved in the ICT Schools Pilot Project in Thailand. This exploratory study sought to examine to what extent these model ICT schools had classroom learning environments that were related to students' critical thinking skills; and to what extent the classroom learning environments were associated with certain teacher characteristics.

PURPOSE OF THE STUDY

In order to achieve the purpose of this investigation, the current study examined relationships among predictor variables at the student level, including student gender, computer experience, academic background, computer usage, and students' perceptions of ICT classroom learning environments and at the class-teacher level students' in classes with different teacher personal backgrounds, different teacher attitudes toward ICT, and different teacher critical thinking skills which might impact on students' critical thinking skills. These relationships are presented in Figure 1.

RESEARCH METHOD

Sample

Both analytical and descriptive research methods were used to investigate relationships in the research model. Data were collected from 13 Thai model ICT schools by means of questionnaires (150 students and 16 teachers from eight ICT schools), interview surveys (30 students and 5 teachers from 10 ICT schools), and computer-based classroom observations in 22 classrooms from all 13 ICT schools.

Hypothesis for Two-Level HLM Model

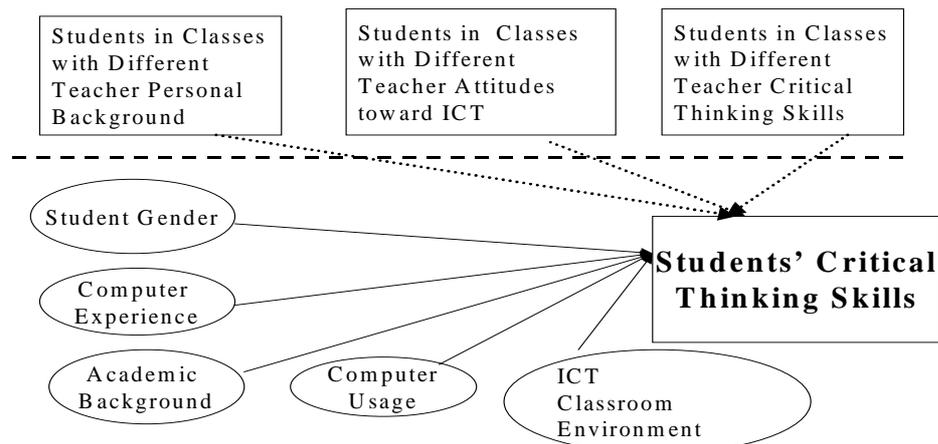


Figure 1. Two-level model of students' critical thinking skills

Variables Used in the Study

Table 1 lists the student level (Level-1) variables as well as the classroom-teacher level (Level-2) variables that are examined in this investigation.

Table 1. List of variables

Variable Name	Description	Value
<i>Student Level</i>		
GENDER	Student Gender	0 = boy student; 1 = girl student
COOP_ENF	Perceptions of the Actual-Preferred Interaction on Scale of Co-Operation	High value means high perception degree of Co-operation
CRI1	Deduction-Assumption Critical Thinking Skills	High value means high degree of deduction-assumption critical thinking skills
<i>Classroom-Teacher Level</i>		
TOTALCT	Total Scores of Teachers' Critical Thinking Skills (Induction, Deduction, Evaluation, Inference, and Analysis)	High value means high degree of total critical thinking skills
COMCLASS	The Use of Computer in the Classroom	High value means high perception degree of attitudes on the use of computer in classroom
COM_EX1	Computer Experience	0 = Teacher who had computer experience equal or less than 3 yrs 1 = Teacher who had computer experience more than 3 years
NET_H1	Use the Internet at Home	0 = accessed the internet at home 1 = Did not access the internet at home

DATA ANALYSIS

Statistical techniques as well as qualitative analysis were used to examine the research propositions that were constructed from the research model. Because of the hierarchical nature of the data, hierarchical linear modelling (HLM) was used to examine the relationships between the student outcome and the independent predictors, which were influenced by teacher factors such as their teachers' individual backgrounds, teachers' critical thinking skills, and teachers' attitudes toward ICT.

As shown in Figure 2, the impact of teachers at the classroom level (class-teacher level or Level-2) on student outcomes (students' critical thinking skills) at the student level (Level-1) is examined. As has also been documented in prior studies (Rowe, 2001), a multilevel statistical modelling technique that was more appropriate in such cases was employed (Bryk &

Raudenbush, 1992; Goldstein, 2003). These techniques are now commonly referred to as applications of hierarchical linear modelling (HLM).

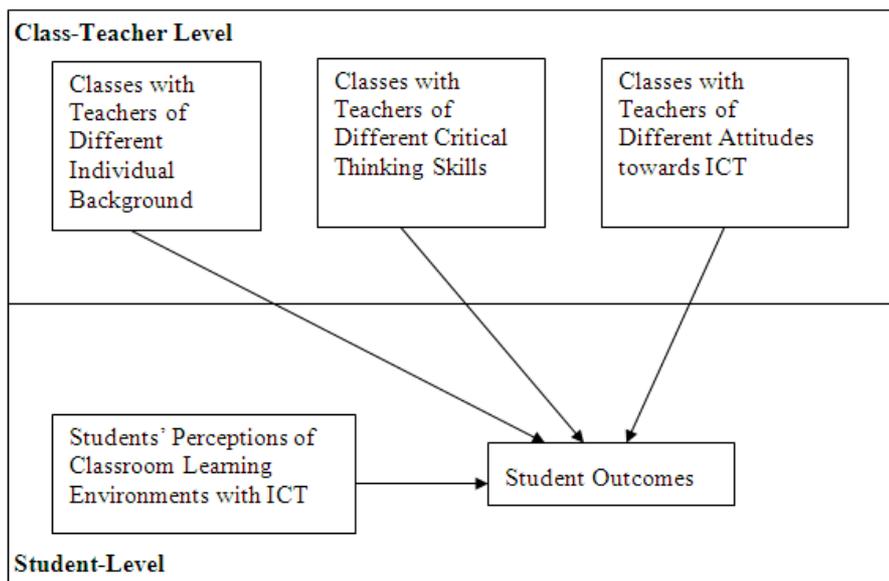


Figure 2. Diagram showing the impact of teachers at class-teacher level on student outcomes at the student level

In this way, the HLM analyses was able to produce better results, with each level estimating the effect of every predictor variable in the model on the student level outcome (students' critical thinking skills). Moreover, the HLM procedures not only provided the direct effects from the various levels but also the cross-level interaction effects between predictor variables and outcome variables at the two levels (student and class-teacher levels).

Therefore, this current study examined various potential relationships among predictor variables at the student level (Level-1) and at the class-teacher level (Level-2) on the students' critical thinking skills as the outcome variable using two-level hierarchical linear modelling (HLM) procedures.

RESULTS

The fixed and interaction effect is presented in Figure 3. Only *COOP_ENF* was found to be a significant predictor of *CRI1* at the student level (Level-1). Two variables at the class level (Level-2), including *COM_EX1* and *NET_H1* also influenced *CRI1* directly. In addition, *TOTALCT* and *COM_CLASS* at Level 2 interacted with *COOP_ENF* at Level 1 influencing *CRI1*.

The final model for the variable, deduction-assumption critical thinking skills, at student level (Level-1) and class-teacher level (Level-2) can be denoted in Equation 1 and the results are shown in Figure 3.

Level 1 Model

$$\text{Critical Thinking Skills} = \beta_0 + \beta_1 (\mathbf{COOP_ENF}) + e$$

Level 2 Model

$$\beta_0 = \gamma_{00} + \gamma_{01} (\mathbf{COM_EX1}) + \gamma_{02} (\mathbf{NET_H1}) + u_0$$

$$\beta_1 = \gamma_{10} + \gamma_{11} (\mathbf{TOTALCT}) + \gamma_{12} (\mathbf{COMCLASS}) + u_1 \quad (\text{Equation 1}^1)$$

¹ Bold Italic: Grand-mean centred

As shown in Figure 3, at the student level, students who had high perceptions of cooperation between themselves and their peers to achieve their assignments (COOP_ENF) had higher scores on students' deduction-assumption critical thinking skills (CRI1). Thus, the deduction-assumption critical thinking skills (CRI1) were positively influenced at the student level by COOP_ENF ($\gamma = 0.20$, $p \leq 0.05$). This finding implies that students who had positive perceptions of co-operative classroom learning environments were more likely to have higher scores for the deduction-assumption critical thinking skills.

Class-Teacher Level

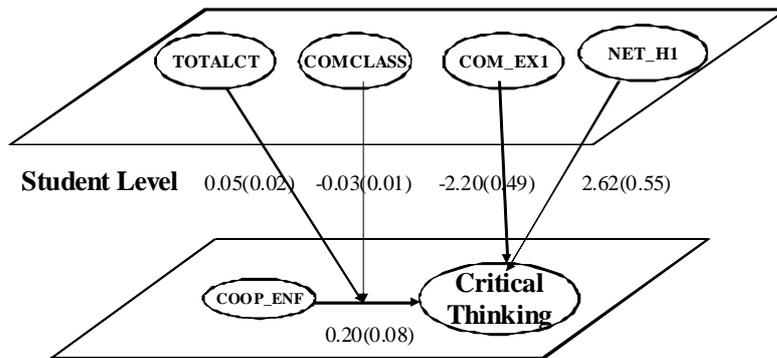


Figure 3. Direct and interaction effects for students' critical thinking skills

Moreover, scores of critical thinking skills are affected negatively by teachers' computer experiences (COM_EX1 $\gamma = -2.20$, $p \leq 0.05$) and positively by teachers' internet accessibility at their homes (NET_H1 $\gamma = 2.02$, $p \leq 0.05$). The negative effect of the differences in the length of teachers' computer experiences indicated that students in classes with teachers who had less computer experience performed at a higher level in deduction-assumption thinking skills. It may be that students in classes with teachers who had shorter periods of computer experience had more opportunity to share learning experiences and worked together with the students, using their own limited technological knowledge and skills to develop students' critical thinking skills. They perhaps were more likely to share instructing and learning resources and computer experiences with one other in their classroom, by using other ICT material such as television, video, camera, and multimedia equipment. In addition, NET_H1 shows a positive effect on students' deduction-assumption thinking skills (CRI1). It is possible that students in classes with teachers who did not access the internet at their home generated learning and instructing material resources, together with their own students, through accessing the internet during class hours. It seemed that students were more likely to develop and improve their deduction-assumption thinking skills by searching for information or knowledge together with their teachers to complete class assignments.

According to participant students' views, the ideal teacher to develop students' critical thinking skills needs to have a high understanding of the skills and knowledge necessary to teach their students, to search effectively for new information from any sources such as the internet, books, articles, and other material resources, and to provide attractive lesson materials to apply this modern technology in their classroom. In particular, there is a need for teachers to develop students' critical thinking skills through the use of the internet in classroom environments in all subjects. This is consistent with prior research. Admiraal et al.'s (1998) research similarly found that the use of technology in the classroom through computer conferencing, in particular the use of the internet, could support and develop cooperative learning between students and between students and teachers. Moreover, the teachers' constructive understanding of skills and knowledge enabled their students to have a high quality learning outcomes, such as the students' achievement of critical thinking skills.

In addition, at the class-teacher level, there are two cross-level interaction effects. Teachers' critical thinking skills (TOTALCT $\gamma = 0.05$, $p \leq 0.05$) and teachers' attitudes towards the use of

computers in the classroom (COM_CLASS $\gamma = -0.03$, $p \leq 0.05$) interacted with students' perceptions of cooperation between students and their peers (COOP_ENF) in influencing students' deduction-assumption thinking skills (CRI1).

Figure 4 shows the positive interaction effect between cooperation among students and their peers to achieve their assignments (COOP_ENF) and teachers' critical thinking skills (TOTALCT) on students' deduction-assumption thinking skills (CRI1). The effects of students' perceptions of the actual-preferred interaction on the scale of Co-Operation (COOP_ENF) on deduction-assumption thinking skills (CRI1) had a greater impact in classes with teachers who had high scores for overall critical thinking skills (high TOTALCT). The results indicated that it would be more beneficial for students with high COOP_ENF to be in classes with teachers who had high overall scores for critical thinking skills. That is, teachers with high TOTALCT appeared to facilitate the participation between students and teachers or between students and their peers through class discussion, student tasks and class activities, in using ICT instructional material in their classroom environments.

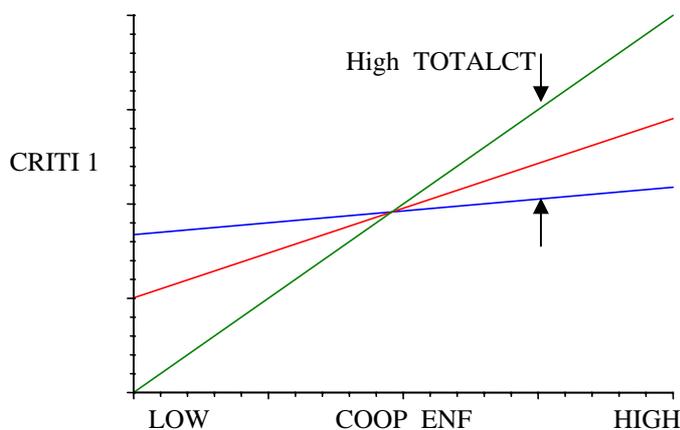


Figure 4. Effect of teachers' critical thinking skills on cooperation between students and peers to achieve their assignments

Figure 5 shows the positive impact of COOP on students' critical thinking skills is lessened when the students were in classes where teachers were perceived to be high in the use of the computer in their classrooms. In addition, the negative interaction effect for COOP_ENF and COMCLASS on the deduction-assumption thinking skills (CRI1) implied that where students were taught by teachers who were less interested in using computers in their classrooms, they could share learning resources and work together through individual or group activities and student tasks, using a computer outside their classroom, such as the school library or the school computing room. Another possible explanation is that students with teachers who were more interested in using other instructional ICT equipment, such as television, video, camera, slides, and multimedia in their classroom with ICT, may have developed higher deduction-assumption thinking skills through the use of equipment other than computers in the classroom. They further expressed the opinion that the best teacher, in their students' eyes, to develop critical thinking skills in their students, needs to have high technological skills and knowledge to teach their students in an active way. In particular, there is a need for teachers to develop technological literacy, including basic computer operation, professional use of technology, and the applications of technology in instruction. They strongly agreed that the most important factor is that all teachers ought to try to teach their students through the use of a variety of teaching procedures and skills. These teaching skills could change from complex content to simple lessons that would develop fully and clearly students' understanding of ideas with or without the ICT environment.

DISCUSSION

Findings of the study assist to establish and enable the successful implementation of ICT integration in primary and secondary schools in Thailand. On the basis of the main research findings, recommendations are made for teaching roles to advance students' learning and school management.

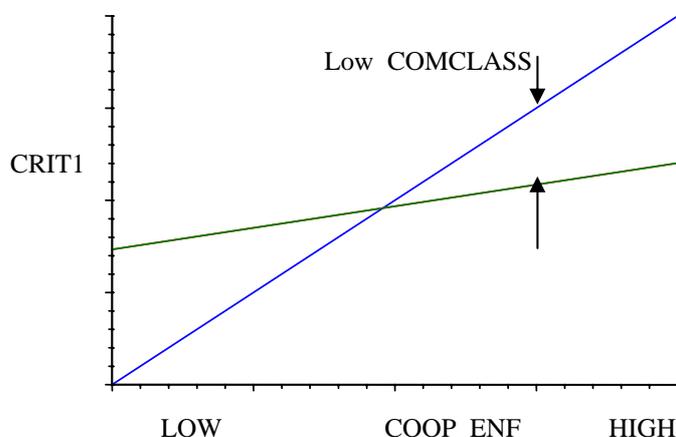


Figure 5. Effect of teachers' attitudes toward the use of computer in the classroom on cooperation between students and peers to achieve their assignments

The study's findings have several important implications for school teachers through their teaching roles, (namely, to promote active and autonomous learning, increase more cooperative learning and assignments, and assist students to construct their own knowledge and share it with other students). Recommendations that can be made include:

Teachers' efforts ought to try to promote an active and autonomous learning among students through ICT-integration into teaching and learning processes. School teachers need to transform their teaching roles from information delivery specialists to guides and facilitators of learning. This means that teacher roles must be changed from lecturer to consultants, guide, and resource providers. Moreover, teachers should make a large effort to assist their students by supporting their ideas or creating projects, such as an ICT club or an ICT camp rather than controlling or limiting the scope of their imagination or, creative learning activities.

Teachers need to try to increase more cooperative learning among students. This is achieved by supporting students working as group members, group interaction, and teamwork, because the findings showed that students who lacked computer experience would prefer more student involvement with each other to complete their assignments. In this way students would understand better what they had learned through sharing and exchanging their computer experiences with others.

Teachers ought to try to assist students to construct their own knowledge and share it with other students. Therefore subject teachers and students should work together to generate the 'Reading Circulation' or the 'Website for Learning' where they could search for new information in any learning sources and spend time on discussion through online communication tools, such as email or web board.

Importantly, the results of the present study suggest that the success of incorporating ICT into teaching and learning is fundamentally dependent on teaching roles and school management which were comprised of the allocation of school budgets for ICT, the use of classrooms' ICT infrastructure, and the establishment of schools' organisational structures. From these findings, further recommendations can be made.

School principals or school administrators need to allocate a budget or distribute money for introducing, setting up, or using ICT as a teaching and learning process in classroom environments.

School administrators, particularly principals need to support subject teachers to set or manage their classrooms' ICT infrastructure. These classrooms' ICT infrastructure needs to include the hardware, software, internet servers, networking and connectivity requirements that are necessary for the teaching and learning process. So some subject teachers developed their classroom environments by incorporating flexibility of ICT into teaching and learning in a range of subject areas by choosing portable computer, computer laptop, or wireless technologies, as they are convenient tools for the job.

Principals should establish their schools' organisational structure to build effective school environments. The roles of school principals involves the ability to bring the appropriate types of school staff, such as curriculum coordinator, teacher-librarians, technological support officers to assist other subject teachers or ICT teachers to provide the necessary balance of teachers' technological knowledge, skills, and capabilities with ICT and to incorporate ICT into the teaching and learning processes. Another interesting and important issue which was found from the findings of this study is there were some students who could not access the computer or the internet in their homes, due to budget constraints or the limitation of family support. Therefore, school principals need to focus on the importance of ensuring equity of access to computing equipment at school.

CONCLUSIONS

The overall findings showed that students could be assisted to learn critical thinking skills through integrating ICT into teaching and learning processes under the Thai ICT Schools Pilot Project. The present study concluded that successfully incorporating ICT into teaching and learning is fundamentally dependent on teaching roles (i.e., to promote active and autonomous learning, increase more cooperative learning and assignments, and assist students to construct their own knowledge and share it with other students) and school management, regarding the allocation of school budgets for ICT, the use of classrooms' ICT infrastructure, and the establishment of effective school organisational structures.

In particular, the improvement of classroom learning environments with ICT involves the potential ways of providing effective and efficient instruction through both teachers' and students' integration of ICT into overall teaching and learning processes in the school classroom environments.

It is hoped that the findings of this study can stimulate future development and guide further improvements of classroom learning environments with ICT to enhance effective and efficient instruction that combines the roles of teachers' and students' learning into teaching and learning processes through the use of ICT.

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Teachers' (mis)understandings of resilience

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This study aimed to extend previous studies into resilience, by identifying the roles that teachers played in fostering resilience (N=57: females n=43; and males n=14). A quantitative scale was administered to teachers in South Australia's Catholic education sector to determine the extent to which they were involved in fostering resilience. A qualitative questionnaire followed which determined teachers' understanding of this phenomenon. The latter results suggested that teachers may be able to describe readily those circumstances which place any child 'at risk' (e.g. poverty) but they failed to recognise that those children identified as resilient also experienced circumstances in which they are potentially 'at risk'. Instead, teachers appeared to be describing some children as 'resilient' on the basis of displaying competence in coping generally but not because of experiencing 'at risk' life circumstances. This paper argues that teachers may be confusing the profile of a competent student: one who does not have 'at-risk' circumstances, with that of a resilient one, who also manages competently despite the 'at risk' circumstances in their lives. Recognising these differences is considered essential for teachers to be able to identify those children requiring intervention and support both at the personal, interpersonal, social and emotional levels.

Resilience, non-resilience, 'at risk', teachers' attitudes

INTRODUCTION

Research into 'resilience' has emerged from studies of children 'at risk', a term used by researchers to describe children who have experienced adverse or stressful life experiences (Garmezy & Rutter, 1983; Masten, 1997). Such experiences include: living in poverty, being part of a chaotic or dysfunctional family, being disabled or low IQ, being yelled at or abused, being emotionally neglected or abused, being sexually or physically abused, looking after siblings (although studies have suggested this could be a protective factor), experiencing long-term absence of a caregiver, witnessing extreme violence, separation, divorce, death of a loved one and frequent family moves (Garmezy & Rutter, 1983). Masten (1997) argued that children are considered to be 'at risk' if more than one of these risk factors are present in their lives. By virtue of their nature these adversities are often seen in multiple forms as opposed to unitary factors.

As previously highlighted, studies exploring children considered to be 'at risk' predated and consequently led to the adoption of the terms 'resilience' and 'non-resilience'. This latter concept enabled researchers to understand individual differences particularly in terms of how people respond to stress and adversity (Rutter, 1990). Consequently, researchers considered factors which enabled children to cope with stresses and adversities in their lives. Such protective mechanisms were categorised into: internal (characteristics, traits) or external (school, family, community), that reduce or mitigate the impact of, or exposure to, negative life experiences. Upon

considering protective mechanisms in these categories it is fair to say that research into resilience is strongly underpinned by Bronfenbrenner's (1979) Ecological Systems Theory. This theory views the child as developing within a complex system of relationships that are affected by multiple levels of the environment. The child, as the central being of this nested system, is consequently affected by their environment and its actions. Thus, Bronfenbrenner's system consists of the 'microsystem' which encompasses the child and their immediate environment, namely the family; the surrounding 'mesosystem' which refers to the interactions among the components of the microsystem; the 'exosystem' which includes factors in the wider community; and the outer 'macrosystem' which consists of values, laws and customs.

Rutter, Maughan, Mortimore, Ousten and Smith (1979) found that children said to be 'at risk' were more likely to be resilient if they attended a school with attentive, caring teachers. Researchers have shown that influences such as teachers' actions and expectations, school-wide policies, classroom and school climate play a key role in enhancing resilience and motivating positive attitudes towards school (Wang, Haertel & Walberg, 1997). Thus, teachers, merely by the amount of time spent with children, including children 'at risk', have the opportunity to develop strong relationships with them. These relationships can provide the 'at risk' child with a warm supportive adult figure who can act as a protective buffer against adverse circumstances. Therefore, this current study focused on one particular aspect of Bronfenbrenner's (1979) Ecological Systems theory that is the 'mesosystem' and in particular the role of schools and teachers.

In a study investigating the roles of schools in relation to fostering resilience, Oswald, Johnson and Howard (2003) examined the beliefs and perceived roles of a group of teachers randomly selected from South Australia's government education sector. Using a survey of junior primary, primary and secondary teachers they found junior primary teachers placed a higher importance on the influence and role schools play in fostering resilience and less importance on the role of the family. In contrast, primary and secondary teachers identified the individual and families as being the most important aspect. Interestingly, collectively teachers undervalued their role and that of the school in providing protective factors for students considered to be 'at risk'. Dryden, Johnson, Howard and McGuire (1998) also found that teachers lacked efficacy when fostering resilience as compared to the perceived role of the family and community. These findings highlight the importance of recognising and enhancing the interaction between all levels of the ecological system. It is therefore important to note that these complex interactions have far-reaching impacts on children's development and well-being (Berk, 1997).

A number of studies have explored the possible relationship between religious affiliation and resilience (Antonovsky, 1979; Anthony, 1987a, 1987b; Blum, 1972; Cook, 2000; Lewis & Looney, 1983; Moskovitz, 1983; Murphy & Moriarty, 1976; Regnerus & Elder, 2003; Werner & Smith, 1982). Such studies have found that resilient children tend to have a long-term relationship with a competent adult, possess a religious faith and hold perceptions of themselves as worthy and competent individuals. It has been argued that religious beliefs can act as a protective mechanism by providing an individual with a sense of coherence and rootedness (Antonovsky, 1979); an optimistic outlook (Segal, 1986); and empathy and compassion (Moskovitz, 1983). These findings leave open the question of whether the ethos of a religious school (that included many of the schools in this study) would further foster resilience in 'at risk' students; an issue requiring further research.

With particular interest to this current study, a longitudinal study, known as 'Project Competence', conducted by Masten, Best & Gamezy (1990) explored factors attributing to the successful or unsuccessful development of Minnesota children considered to be 'at risk'. In this study three groups of children were compared: competent children growing up with little adversity; resilient children growing up with high levels of adversity; and maladaptive children who had not overcome their adversities. Findings indicated that the resilient children and competent children had a history of more resources and support which helped them cope with

adverse situations. In contrast, maladaptive children lacked resources, such as individual characteristics and family support, which if present serve to act as protection for human development. This study is important as it raised the concept of a 'competent' child as a further dimension of 'adaptive development'. Although both of these terms refer to the positive development of an individual, resilience is a more complex multi-layered phenomenon. For instance, Masten (1997) argued that resilience includes a significant threat to the individual or exposure to severe adversity and also the quality of adaptation skills. Thus one significant difference between resilience and competence is that of adverse circumstances or significant risks. A further important difference is that while competence involves personal attributes, resilience requires the interaction between personal and favourable environmental factors.

While the concept of resilience has been extensively researched, it appears to be constantly evolving. This current research contributes to the body of knowledge by highlighting the perceived roles and beliefs of teachers in South Australia's Independent education sector.

METHODOLOGY

The main aim of this study was to investigate teachers' understandings of resiliency and of the factors which contribute to students being '*at risk*'. Teachers were drawn from the Independent education sector of metropolitan Adelaide, in South Australia.

A mixed method approach was used to enable a holistic picture to be gained of resiliency and the roles teachers play in fostering it. This "triangulation of method" (Neuman, 2000) enabled the phenomenon of resilience to be explored through quantitative and qualitative data analysis. Qualitative data were used to supplement and illuminate the data collected in the quantitative phase of the study.

Quantitative Phase

The sample was drawn from five primary school sites, each operating independently of one another. The quantitative phase of this study comprised of 57 participants: two principals; 46 teachers; and nine specialist teachers or teaching support staff. Following the approval of the Principal, an introductory letter together with an information sheet and a copy of the questionnaire were sent to all teachers in the selected schools.

The quantitative questionnaire was used to identify teachers' current roles with regard to interacting with students as a means of helping them cope with difficulties in their lives. A number of situations which described protective mechanisms for children '*at risk*' were posed for teachers to indicate their responses using a Likert scale. The Likert scale indicated a range from one to five; where one indicated '*never*' and five indicated '*about once per week*'. This questionnaire was modified and adapted from the questionnaire '*What teachers do to foster resilience*' (Oswald et al, 2003).

The sample for this phase of the study included 57 teachers from five separate Independent schools: 14 (25%) males and 43 (75%) females. Sixteen (28%) teachers taught junior primary, 24 (42%) teachers taught middle and upper primary years and 17 (30%) teachers were either specialist teachers or teaching support staff. The "What do you do to foster resilience" Scale listed a number of protective mechanisms and was used to identify coping strategies that teachers used to encourage students in times of adversity (see Table 1). Teachers were asked to indicate how frequently they encouraged students to use these strategies as a means of coping.

All quantitative data collected from this initial phase of the study were analysed using the SPSS for Windows, Version 12.

Table 1. 'What do you do to foster resilience' Scale**Coping Strategies**

-
- I offer opportunities for students to share their problems and gain appropriate social support.
 - I assist students in developing problem-solving strategies.
 - I encourage my students to work hard and achieve.
 - I point out the value of having good, close friends.
 - I offer opportunities and guidance to my students about ways to cope with criticism from their peers.
 - I offer my students opportunities and strategies to be actively involved in social actions.
 - I offer opportunities and guidance to my students about ways to reduce stress and tension in their lives.
 - I offer guidance, information and practice in the use of different coping skills.
 - I discourage my students from blocking out problems by ignoring them.
 - I discourage my students from blaming themselves all the time when things go wrong.
 - I offer opportunities for students to discuss issues of concern and positively encourage those who tend to keep to themselves.
 - I encourage my students to pray and seek spiritual guidance when things go wrong.
 - I teach my students to look on the bright side of things and be positive and optimistic.
 - I actively encourage students to investigate and use the various professional help organisations and personnel available to them.
 - I stress the importance of relaxing diversions such as reading, listening to music and watching T.V.
 - I emphasise the importance of playing sport and keeping fit.
 - I emphasise the importance of being involved in the school community.
 - I emphasise the importance of individual differences.
 - I emphasise the importance of religious affiliation.
 - I offer opportunities for students to discuss moral and ethical dilemmas.
-

Adapted from Oswald, Johnson and Howard (2003)

Qualitative Phase

Further to this, a qualitative study was implemented with a sample of 14 teachers; ten females and four males. Data were collected by using an open-ended questionnaire comprising six questions.

- (1) What characteristics do children considered to be 'at risk' display?
- (2) What do you understand 'resilience' to mean?
- (3) How do you identify resilient children?
- (4) How do you identify non-resilient children?
- (5) In your experience, is it possible to foster resilience in the classroom? If so, how can this be achieved? If not, why?
- (6) Please comment on your understanding of the stability of resilience over time.

These questions were designed to elicit information from teachers regarding their understanding of children considered to be 'at risk', as well as differentiating between those perceived to be 'resilient' and 'non-resilient'.

Individual responses were collated and entered into a Microsoft Word document. Responses were summarised, separated into common themes with teachers' responses categorised and reported (Fraenkel & Wallen, 2003). Specific comments were identified as relevant for enabling individual voices to be heard, thus adding to the richness of the analysis while enhancing understanding.

RESULTS

Quantitative Phase

Results showed that teachers placed more importance on ‘*working hard and achieving*’ ($\bar{X} = 4.9$) than any of the other protective mechanisms listed. On the other hand, ‘*encouraging children to investigate and use various professional help organisations*’ ($\bar{X} = 2.9$) was considered to be the least important strategy in helping students cope with difficult times in their lives. Repeated measures ANOVAs were applied to examine whether there was a significant variance between the mean gender scores and dependent variables. This illustrated that only two variables showed a significant statistical difference between mean gender scores. These variables included the extent that male participants encouraged students to be involved in sport ($F = 3.2, p < 0.05$) and social actions ($F = 3.9, p < 0.08$) as coping strategies. In both instances trends suggested that male participants placed more emphasis on the importance of sport and social activities as a means of coping than female participants. Using a similar questionnaire Oswald et al. (2003) found that both male and female participants yielded the same mean scores on the sub-scale of sport ($\bar{X} = 3.9$) thus indicating they both used this strategy frequently. However, female participants in their study recorded a higher mean score than males in the sub-scale of social activities (females $\bar{X} = 3.9$; males $\bar{X} = 3.5$).

Qualitative Phase

The sample for the qualitative phase included 14 teachers from three separate Independent schools: four (29%) were male and ten (71%) were female. Specialist teachers and teaching support staff did not respond to this survey but those involved in the quantitative phase did make additional responses which formed part of the qualitative discussion.

What characteristics do children considered to be ‘at risk’ display?

This question was used to identify teachers’ understanding of the term ‘at risk’ together with characteristics they used to identify these children. Responses were summarised and categorised into common themes and presented in Table 2, from which two main categories were evident; emotional characteristics and relationship styles.

Table 2. Common themes: Characteristics of children considered to be ‘at risk’

Theme	Frequency of responses	% of Total
Emotional		
Disruptive or aggressive behaviour	9	28
Unhappy, sensitive or anxious	6	19
Withdrawn	6	19
Relationship		
Inability to share or unwilling to participate	4	13
Lacking friends	3	9
Over-reliance on parents or lacking responsibility	2	6
Absenteeism from school	2	6
Total	32	100

What do you understand resilience to mean?

Responses to this question illustrated teachers’ understanding of the concept of ‘resilience’. When responses were summarised and categorised into common themes 12 participants (86%) stated that resilience was concerned with coping, bouncing back or moving on despite perceived adversities.

How do you identify resilient children?

Teachers responded to this question by using key words to describe characteristics or attributes that helped them identify children they perceived to be resilient. Themes were coded according to their commonality and summarised in Table 3. It is noteworthy that all identified characteristics were positive.

Table 3. Key words: Characteristics of resilient children

Responses	Frequency	% of Total
Good communication skills and openness	8	26
Being independent, confident and high self-esteem	5	16
Taking responsibility for actions and making sensible choices	5	16
Having a the ability to move on	5	16
Having positive attitude, being optimistic	4	14
Being strong willed	2	6
Having good social skills	2	6
Total	31	100

How do you identify non-resilient children?

This question elicited responses concerning characteristics displayed by children perceived to be 'non-resilient'. Response patterns fell into two main categories; 'interpersonal' and 'attitudinal' characteristics. These findings further suggest that teachers considered friendship problems, social issues, particular emotional traits and disruptive behaviour to be the major indicators of non-resilient children. The responses are summarised in Table 4.

Table 4. Key words: Characteristics of non-resilient children

Responses	Frequency	% of Total
Interpersonal		
Friendship problems	12	34
Emotional characteristics	9	26
Attitudinal		
Disruptive behaviour	6	16
Low self-esteem	3	9
Lacking effort at school	3	9
Lacking responsibility	2	6
Total	35	100

Comment on your understanding of the stability of resilience over time.

Eight of the 14 (71%) respondents gave information about resilience but did not comment on its stability as was asked in this question. Only three teachers answered both parts of the question and they believed that resilience could change and was thus unstable. Two of the respondents indicated that resilience was dependent on circumstances, experiences and the coping mechanisms of the child. Three teachers chose not to answer this question (21%).

DISCUSSION

Previous research has identified the important role that schools play in helping students cope with adverse situations in their lives. For instance, Werner and Smith (1988) articulated the important roles that teachers play in students' lives by arguing that, notwithstanding the family unit, teachers provided positive role models in the lives of resilient children. It was thus important to determine teachers' understandings of the multi-layered phenomenon of 'resilience'.

Quantitative Phase

Dryden et al (1998) in their interview survey of teachers' understanding of resilience found that teachers identified particular aspects of school life as playing a significant role, such as academic success and good student conduct. This was also illustrated in this current study where findings from the quantitative survey showed that teachers placed the greatest importance on encouraging students in 'working hard and achieving' ($\bar{X} = 4.9$). Teachers indicated that they were emphasising this strategy to students on a 'frequent' basis; as often as once per fortnight or once per week. Previously, Rutter (1987b, 1990) had identified that increased levels of self-esteem and self-efficacy through achievement acted as protective mechanisms that reduced or mitigated risk factors.

Many researchers have identified the internal attribution of success as a protective mechanism (Garmezy, 1974; Werner & Smith, 1982, 1991; Masten & Coatsworth, 1998). They further argued that children who had an internal locus of control had a belief in their ability to affect change and thus considered adverse circumstances as changeable. That is, they believed they had the control to exercise change in their lives. Therefore, by encouraging students to work hard and achieve enabled them to exercise an internal locus of control.

In contrast, teachers placed the least amount of importance on '*encouraging children to investigate and use various professional help organisations*' ($\bar{X} = 2.9$), thus indicating only occasional use of this strategy. However, it is important to note that 28 percent of the participants in this study taught children in the Junior Primary years, namely children aged 5 to 7 years of age, which may explain why this strategy was largely rejected.

In summary, teachers believed that the development of resilience was largely a product of individuals' endeavours and their willingness to work hard and achieve. However, teachers also recognised the importance of a warm, supportive classroom and school climate.

Qualitative Phase

What characteristics do children considered to be 'at risk' display?

Teachers were asked to respond to six open-ended questions to gain some understanding of their perspectives on 'resilience'. As previously mentioned in the introduction, researchers use the term 'at risk' to describe children who had experienced adverse circumstances in their lives (Masten, 1997). In order to explore further the concept of children considered to be 'at risk'; teachers were asked to describe characteristics that helped them identify such children.

The teachers indicated they had a clear understanding of the negative, observable characteristics that students considered to be 'at risk' often display. They described children who showed extremes in behaviour and were thus noticeable, especially when they were disruptive in class. All of the characteristics given were consequently negative, with no recognition that resilient children who were well behaved could also be considered to be 'at risk'. For instance 28 percent of the teachers surveyed described children considered to be 'at risk' as "disruptive, displaying aggressive behaviour" and generally being "off-task".

Cooleyquille, Turner and Beidel (1995) specifically explored the attributes of children considered to be 'at risk' and their interpersonal relationships. They argued that these children were often withdrawn or aggressive. Also, children who were vulnerable or 'at risk' because of their living circumstances, behaved in ways which often led to rejection by their peers. Teachers in this current study also identified a similar pattern of characteristics, with 19 per cent of participants stating that children considered to be 'at risk' were "withdrawn, unhappy, sensitive or anxious". Further characteristics identified included: "lacking friends"; an inability or "unwillingness to share or interact with others"; and an "over-reliance on parents".

It is noteworthy that children who choose to solve problems in various aggressive ways bring themselves to the attention of the teacher while also incurring sanctions from a school environment that discourages such behaviours. They are therefore easily identified as possibly being 'at risk' (Robertson, Harding & Morrison, 1998). However, teachers did not consider the possibility that students who were well-behaved may also be 'at risk', that is children who did not bring themselves to the attention of the classroom teacher.

In summary, research has identified a number of characteristics that helped to identify children considered to be 'at risk'. Broadly they included: depression; conduct problems; attention deficits; social maladjustment; and academic difficulties (Attar, Guerra & Tolan, 1994; Gorman-Smith & Tolan, 1998). The responses given by teachers in this current study echoed these views suggesting they recognised characteristics displayed by children deemed to be 'at risk' and not coping. However, it is surprising that no participants in this study identified the possibility that a student could be 'at risk' and yet coping. That is, teachers in this study had not identified 'resilient' children, that is those coping in their school lives as also being 'at risk'. This is an issue of concern, in that, as several studies have highlighted children who are in need of help often convincingly masquerade as 'normal' or coping thus going undetected and consequently not helped (Myers, 1994; Rush, 1980).

What do you understand 'resilience' to mean?

The results of this study revealed teachers have some understanding of the definition of 'resilience' and yet they demonstrated a limited knowledge of the broader concept of resilience. For instance, teachers' definitions of 'resilience' were limited to: "an ability to cope with perceived adversity" or "dealing/coping with life and its complexities".

However, Benard (1995) argued that the term 'resilience' includes a set of qualities that foster a process of successful adaptation (Benard, 1995). Recently Masten and Coatsworth (1998) argued that to identify resilience the following must be present:

- (a) a significant threat to the individual which is typically indexed by high-risk status. (for example, poverty.); or
- (b) exposure to severe adversity or trauma; and
- (c) quality of adaptation/development is good.

Teachers in this study failed to associate such stressful life situations and environments with resilient children while acknowledging their effective coping skills.

How do you identify resilient children?

Teachers responded to this question by using key words to describe characteristics or attributes that helped them identify children they perceived to be resilient. As illustrated in Table 3, 26 per cent of teachers characterised resilient children as being 'good communicators' thus being 'willing and prepared to discuss situations freely' and 'confidently' with adults or peers. Furthermore 16 per cent of teachers described students' ability to 'take responsibility' for their actions and be 'independent' with 'high self-esteem'. The lack of these characteristics also featured strongly in descriptions of 'at risk' and 'non-resilient' children. Werner and Smith's (1982) landmark studies offer support to this view by arguing that resilient children are usually responsible, motivated and self-confident. They also reported the absence of these characteristics in non-resilient children. Further supporting these current findings, teachers in Oswald et al's (2003) study identified the following as attributes and assets of resilient children: "being effective communicators, a strong attachment to at least one adult, holding a personal belief in being able to achieve and be successful" (p57).

The profile of a resilient child, as described by Benard (1993), Masten and Coatsworth (1998), closely resembled the attributes described by teachers in this current study. However, a number of key attributes were not identified by teachers. Those were:

- a) stable-relationships with peers
- b) well-developed problem-solving strategies
- c) high levels of self-efficacy
- d) success in at least one area of their lives.

Although teachers failed to use these attributes to describe resilient children they identified the lack of several of these to describe non-resilient children.

It is also important to note that the positive attributes teachers used to describe resilient children could be a result of observing such children's 'successes' or 'competencies'. The distinction between these concepts is critical because resilience includes the 'at risk' component whereas competence does not. It is possible that teachers in this study have identified the characteristics of a competent child instead of a resilient child. This may further explain why these teachers failed to identify resilient children in their descriptions of children considered to be 'at risk'.

How do you identify non-resilient children?

Teachers in this study were asked to describe characteristics or behaviours they used to identify non-resilient children. All responses illustrated negative observable behaviours or characteristics.

The most significant response patterns included social skills or friendship (34%). Teachers described non-resilient children as "withdrawn", displaying a "lack of social skills" such as "perspective taking, complaining about others and little eye contact". In terms of friendships teachers described these children as having "few friends, being socially withdrawn, wanting friends and yet behaviour repels them, often alone", and being the "last person chosen for a partner". Howard and Johnson (2000), as a result of their findings, argued that while non-resilient children sometimes take control of conflict situations, their solutions are often not constructive and consequently the conflict escalates. Collins (2002) further argued that non-resilient children experience an inability to cope, pessimism, peer exclusion and conflict. These findings were also supported by statements and comments made by teachers in this current study. Teachers used the following key terms to describe negative emotional states they perceived as characteristics of non-resilient children: 'anxious'; 'moody'; 'depressed'; 'hypersensitive'; 'unexplained mood swings'; 'over-reacting'; and sometimes displaying a 'bravado act'.

Comment on your understanding of the stability of resilience overtime

This question was only partly answered or not answered at all by participants. This could be the result of teachers' lack of understanding that resilient children could also be children 'at risk'. From previous questions asked in this phase of the study it would appear that teachers failed to recognise that, or were not aware that, resilient children may not remain resilient over time because of further changes in their circumstances. Furthermore it was not recognised that non-resilient children may become resilient over time as a result of development or the acquisition of protective factors.

One teacher inferred that resilience was a 'mindset', suggesting a personality trait which remained stable over time. That is, resilience would be assumed to be an attribute that one either did or did not possess and encompassed part of one's nature or make-up (Oswald et al., 2003). Supporting this view, Garvie (1998) in her study found that reports of anxiety and locus of control remained constant over time. The presence or absence of these constructs were often used to determine whether an individual was resilient or not. Due to their consistency over time Garvie (1998)

argued that resilience must be a stable construct, a view expressed by teachers in this current study.

However, contrary to this view, Rutter (1990) argued that resilience could not be considered a fixed attribute, and that if circumstances changed or the risk altered then the status of resilience would change. This capacity to change also applied to non-resilient children should they develop one or more of the protective mechanisms. Masten et al (1990) also supported the view that resilience was a non-stable construct. In their study they showed that children were subject to different risk and protective factors at different ages and stages of development. Therefore a child might be non-resilient as an infant but due to changes in age and development might become resilient.

Adding clarity to this argument, Rutter (1990) identified what he termed as 'key turning points' in individuals' lives. He argued that a risk factor might be changed to a positive protective mechanism which enabled a greater likelihood of an adaptive outcome. Conversely, a previously adaptive trajectory could be turned into a negative one thus changing the possible resilience of the individual.

If resilience was not stable, as suggested, then attention needed to be paid to key turning points in children's lives (Rutter, 1990). Thus it is important that teachers and teaching support staff are aware of the instability of resilience in children considered to be 'at risk' consequently enabling them to help students cope with adversities as and when they arise.

CONCLUSIONS

It is important to note that the teachers involved in this study demonstrated a strong desire to help students cope with adversities. However, the findings have revealed that teachers involved in this study have a limited understanding of the construct of 'resilience', despite their textbook style definitions. The qualitative questionnaire established and highlighted teachers' understanding of resilience together with characteristic profiles of non-resilient and resilient children. However, when teachers were asked to describe the characteristics of children considered to be 'at risk', the common themes included only negative attributes. Thus, there was no mention of risk factors in teachers' descriptions of resilient children. It is possible that teachers in this study have described so-called 'competent' children instead of those perceived as resilient. As previously cited in the introduction, confusion between these concepts is understandable as both share similar characteristics and attributes. There is however, one element that separates them, that is the presence of those adversities or risk factors in the lives of resilient children that are absent in the lives of competent children (Masten, Best & Gamezy, 1990; Masten, 1997). So what does this mean for schools? It is suggested that the distinction between these two constructs needs to be clearly articulated to enable teachers to identify each more accurately. Although this could take the form of professional development it is also suggested that the concept of 'resilience' forms part of teacher-education courses. This could lead to a heightened awareness thus aiding the identification of students who experience situational changes and therefore enabling teachers to act in a constructive, supportive way toward resilient and non-resilient children.

Furthermore, most researchers have identified resilience as being a fluid attribute, thus meaning that it alters as a result of developmental and situational changes. However, teachers did not recognise this attribute of resilience, instead believing it to be unchangeable over time. It is therefore further suggested that the issue of stability together with that of risk factors be addressed to enable teachers to comprehend fully the complexity of resilience and the roles they might play in assisting children considered to be 'at risk'.

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Planning for learning: An exploration of reception teachers' attitudes and practices around the South Australian School Entry Assessment Policy

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*The South Australian Education Department introduced the School Entry Assessment (SEA) Policy in 2001 to help teachers assess young learners and plan relevant learning events, to help collect information about South Australian education from Pre-School to Year 3, and to facilitate collaboration within and between educational and social institutions. Implementation of the School Entry Assessment (SEA) Policy was supported in a limited number of schools by the School Entry Assessment Mentor Project (SEAMP), which reported generally positive results and concluded that mentoring was an effective way to support new policy implementation. However, the SEA Mentor Project was discontinued in 2005, and it remains unclear how teachers and schools that were **not** mentored are implementing the School Entry Assessment (SEA) Policy, how they are feeling about its implementation, what training and supports they have received, or how they are using the accompanying documentation. This exploratory qualitative study involved comparative analysis of interview responses from eight Reception teachers currently working in South Australian public (state) schools. It was found that positive attitudes towards the School Entry Assessment (SEA) Policy have not necessarily translated into a thorough policy implementation in some schools; that the practices and attitudes of some teachers may be based on limited understandings about the aims of the School Entry Assessment (SEA) Policy; and that some Reception teachers may not be involving parents and caregivers in their considerations about the policy. It also appears that some teachers believe the School Entry Assessment (SEA) Policy only concerns the first year of school (Reception in South Australia). Data collected for this study lends weight to concerns about the disenfranchisement of teachers and about teachers' workloads, especially concerning non-teaching or administrative expectations, and suggests that more inclusive policy-development processes may engender more commitment to shared goals. The argument is made that new policy must include an adequate budget for initial training and ongoing support to facilitate a successful and thorough policy implementation, and that the savings made in initial expenditure may be a false economy, leading to less efficient long-term use of limited public resources.*

Qualitative comparative research, Junior Primary, elementary education, policy implementation, supports for teachers, South Australian education

INTRODUCTION

Policy focus on assessment, standards, and accountability in education is occurring as part of the globalisation of our world, and Bottery and Wright (2000) argue this focus has implications both for teachers' professional practice and the nature of democratic society. The professional practice of South Australian Reception teachers is influenced at three levels: the school-community level (often led by principals, senior staff and school-community leaders); the State level (eg: *The South Australian Curriculum, Standards and Accountability (SACSA) Framework* – see DECS

2006a); and the national/federal level (eg: the Australian *National Literacy and Numeracy Test* – see MCEETYA 2006). This paper concerns the *School Entry Assessment (SEA) Policy* introduced in 2001 by the South Australian Department of Education and Children’s Services (DECS). This policy was devised to help inform the ongoing development of the State’s *Early Years Literacy Program* (DECS 2006b) which aims specifically to improve literacy outcomes for children from Birth to Year 3.

This exploratory study involved interviewing eight Reception teachers, working in eight different public Primary and Junior Primary schools within the Adelaide metropolitan area in 2006. I designed the study to explore how teachers were feeling about the *School Entry Assessment (SEA) Policy* (DECS 2006c); and how they were using the accompanying *Learner Record* booklet (DETE 2002a). Results gathered through interviews with this small sample cannot be generalised to the broader population of Reception teachers, however issues and themes explored may be relevant to other educators, and some insights might be gleaned about effective policy implementation.

RESEARCH METHOD

This qualitative research project used comparative analysis techniques to explore themes and issues in the interview responses of participants. Qualitative research uses words instead of numbers to describe and explore issues and ideas which are revealed through the “lived experience” of participants (Patton 2002; Lichtman 2006). Interviews were “guided” (Patton 2002) but based on a set of mainly open-ended questions about attitudes and practices. Participants’ responses were transcribed, categorised and explored using the coding systems of Grounded Theory Analysis, but this project was also phenomenological in that it explored participants’ experiences of the same event (Patton 2002) – that is, the introduction of the *School Entry Assessment (SEA) Policy* in South Australia.

This undergraduate honours project was supervised by an experienced tertiary-level researcher and the ethical protocols of educational research were followed in this study; this includes strict confidentiality, and all names have been changed to protect participants’ anonymity.

Exploring the Aims of the School Entry Assessment (SEA) Policy

Implementation of the *School Entry Assessment (SEA) Policy* included the development and publication of the *Learner Record* booklet (DETE 2002a) and accompanying *Information for Educators* (DETE 2002b) handbook. The *Learner Record* booklet (DETE 2002a) was designed to fulfil two major functions: to act as a tool for teaching; and to be a platform for communication between educational and social contexts. The South Australian Education Department stated five aims in the *School Entry Assessment (SEA) Policy*:

- a) the collection of information about the competencies and learning dispositions of beginning students within the first ten weeks of schooling (the mandated part of the policy – the actual School Entry Assessment);
- b) providing a platform for home-school communication and communication between pre-schools, schools, and other institutions;
- c) providing an ongoing record of each child’s development and progress Towards Standard 1 in *The SACSA Framework*, with focus on appropriate and timely intervention to meet diverse needs;
- d) providing state-wide data for research into better education practices and policies (including informing the *Early Years Literacy Program*); and,
- e) informing teacher’s beliefs, planning and practices through ongoing training and supports.

In the following sections of this paper, I will outline the major findings of this study around each of the stated aims (above) of the *School Entry Assessment (SEA) Policy* and then explore the major themes and recommendations arising from my analysis of participants’ responses.

The Ten-Week School Entry Assessment (SEA) in Reception

The *School Entry Assessment (SEA) Policy* mandates that Reception teachers should use *Learner Record* booklets (DETE 2002a) to do thorough formative assessments of each child's literacy and numeracy within the first ten weeks of the child starting school in South Australia.

It is important to be clear: this study concerned the implementation of **one** specific policy; and I found that, whether currently using *Learner Record* booklets or not, all Reception teachers interviewed for this study are collecting information about the competencies, preferences and experiences of beginning students. All participants exhibited a passionate commitment to the learning and welfare of the children.

That said, I found that five out of the eight Reception teachers interviewed had done formative ten-week School Entry Assessments using the *Learner Record* booklets in 2006. This aim seemed to be well-understood by all eight participants, yet there was a difference in opinion about whether or not there was an educational purpose for this policy. While some participants were not convinced, others were more sure:

...you know, if you're blasé about these books [*Learner Records*]... ...then when the child gets to Year 1 or Year 2 and the teacher is talking about... ...oh, [the student] can't do this, they can't do that. [pause] You haven't really done your job properly! [laughs] (Felicity)

I found that implementation of the policy had regressed at two schools:

...that's all petered out now, and then we heard that they were changing it anyway, so that's where our school sits with it... ...no-one looked at it, and we don't use it as a whole school for anything, so we just thought, well that's a waste of time. No data's fed into the department... (Eileen)

Rumours of the demise of the *School Entry Assessment (SEA) Policy* were common in this study, and a sense of frustration was evident in some interview responses that a personal professional commitment to effective use of *Learner Records* was being undermined by a lack of commitment to the policy by others. Perceptions of a lack of commitment to the policy may have contributed to some teachers' decisions concerning their use of *Learner Record* booklets. The web-site dedicated to the *School Entry Assessment (SEA) Policy* (see DECS 2006c) has recently been changed, and it appears the policy has merged with the *Early Years Literacy Program* (DECS 2006b) and Education Department services in general.

Providing a platform for Communication

The *Learner Record* booklet (DETE 2002a) was designed to act as a platform for communication between teachers (as students move from class to class and/or school to school), between teachers and parents and caregivers, and also between teachers, schools and the South Australian Education Department. By summarising their assessments according to a staged developmental paradigm, comprising five stages, from 'Awareness' to 'Application' (DETE 2002a&b), teachers were encouraged in the *School Entry Assessment (SEA) Policy* to contribute to the formation of a State-wide data-set through the internet. This study did not focus on this aspect of communication, but instead focussed on the teacher-teacher and teacher-parent communications. I found some major mis-matches between these stated policy aims and current practices at the schools explored. While two participants had mentioned *Learner Records* to parents, six had not, and it appeared that a lack of initial training and ongoing supports (including release-time) may have contributed to these results.

I haven't said anything to parents. No. Even at the other schools, nuh, nothing was mentioned at any other schools. At all. (Ann)

There was a divide in opinion among participants about whether or not the *Learner Record* booklet is suitable for parents, but it appeared that some participants had not considered this possibility prior to interviews:

Researcher: How do you think [parents would] go with the language, and the size of it [the *Learner Record*], and the fact it's kind of been created for teachers?

Hannah: Um, [pause] well, probably if I explained what it was, and I actually said to [parents]... ..as a general rule, most children are, you know, performing here... ..just as a rough guide. However, your child is right down here, and that flags to me that we've got some really hard work to do to include the parent... ..I'd probably say, well this is what we need to work on at home or at school, and I'd probably use it that way.

Researcher: Do you think seeing this kind of information [indicates *Learner Record*] would help parents to help their child?

Hannah: I think so, I think so. It would be very helpful, yeah, I never thought of that.

I cannot say if the *Learner Record* should be used for communicating with parents, but recommend that if it is to be used in this role, teachers may wish to consider the “window of opportunity” (Shopen & Liddicoat 2000) parent-teacher interviews may offer for using the *Learner Record* booklets to involve parents and caregivers more deeply in their children's education, and for using parents as sources of “expert knowledge” (Graue & Brown 2003).

Teacher-to-teacher communication was also found to be quite limited at the schools explored, which leads into findings around the third major stated aim of the *School Entry Assessment (SEA) Policy*: collaboration between teachers in order to ‘track’ each student's progress Towards Standard 1 of *The South Australian Curriculum, Standards and Accountability (SACSA) Framework* (DECS 2006a).

Tracking each child's progress Towards Standard 1 of the SACSA Framework

I found inconsistencies in the way the *School Entry Assessment (SEA) Policy* appeared to be conceptualised by some participants, and there seems to be some confusion around the stated aim of monitoring every student's progress Towards Standard 1. Reaching Standard 1 of *The South Australian Curriculum, Standards and Accountability (SACSA) Framework* coincides, for most students, with the end of Year 2 (DECS 2006a), thus ‘tracking’ each child's progress Towards Standard 1 is a collaborative act which involves teachers from pre-school to Year 3.

However, I found in my study that even in the three schools where the Reception teacher interviewed is using the *Learner Record* booklet in ongoing ways, use of the booklets may be stopping at the end of the first year of schooling. While more research needs to be done, I found some evidence that *Learner Records* may be placed on file in some schools before students reach Standard 1/Year 3:

It's only done after the ten weeks, and it's not touched again... (Debra)

They [*Learner Records*] go down to the office and stay in the [students'] records... ..the teachers don't actually use them again. (Felicity)

...it's very good, and it keeps you focussed... ..but when you're the only one in the school using [the *Learner Record* booklet], you're a bit lonely. There's only you. You've got no-one to talk to about it because you're the only one doing it. And the [other teachers] don't really have time. (Hannah)

While some participants expressed positive attitudes towards the *Learner Record* booklet (DETE 2002a), some teachers interviewed were quite clear they do not believe the *Learner Record* contains the information needed to plan to meet the needs of young learners:

I don't find it's a useful document [the *Learner Record*]. I have never looked back at any information in there. If I get a child who's coming into my class who I haven't had... ..I never look back at their *School Entry Assessment* information, and there wouldn't be one teacher here in the school who's ever looked back... ..no-one ever looks at them. The information in there isn't anything that we find relevant or need to know. (Isa)

Again, I cannot say if the *Learner Record* should be used as a teaching tool, but further research is recommended to explore issues concerning the educational and pedagogical usefulness of information recorded in the booklets.

State-Wide Data Collection

The *School Entry Assessment (SEA) Policy* encourages participation by teachers in the formation of a State-wide data-set which describes the competencies and needs of young South Australian learners. Collecting information about the competencies and needs of young students seems a theoretically valuable idea for helping to plan to meet the needs of individuals and communities (see Justice, Invernizzi, Geller, Sullivan, and Welsch 2005; and Nixon, Comber, Hill, and Badger 1998), however, this study could not encompass digital aspects of the *School Entry Assessment (SEA) Policy* (the accompanying CD-ROM or the state-wide data-collection protocols) and further research is recommended. If a state-wide data-set is to be useful and valid, it must be representative of all South Australian learners, and debates about the reliability of information gathered and the cost-effectiveness of such programs must be addressed (Flynn & Rahbar 1998).

Informing teachers' beliefs, planning and practices through ongoing training and supports

The stated aim of informing and supporting teachers appears to refer to what teachers should receive to facilitate their implementation of new policy, yet I found little evidence that the Reception teachers interviewed are receiving the ongoing training and support needed for thorough policy implementation. Some participants reported having received no training at all, and reactions to the policy were divided.

Eileen: One of the teachers went to an afternoon session, you know, T and D [Training and Development], about it.

Researcher: But you didn't?

Eileen: I didn't, and she came back saying, "Ohhh, so much work, it's going to be terrible!"

Hannah described a similar introduction to the policy, but a different reaction to the *Learner Record*:

Researcher: What prompted you to start using [the *Learner Record*]?

Hannah: We got told we had to... ..it was just another thing added on to SACSA, so we did it.

Researcher: 'Cause it was from the Department?

Hannah: Yeah. But it's actually very good. I quite like it. [pause] So, we're good little vegemites – we do what we're told! [laughs]

Results from this study suggest that the construction of shared understandings about the aims of education policy might be beneficial for successful, equitable, and cost-effective policy implementation. Current training and support regimens for the *School Entry Assessment (SEA) Policy* remain unclear, and questions arising from this study include: which teachers are being trained at the moment; what training are they receiving; when are teachers supposed to engage in ‘ongoing Professional Development’; and, specifically, how much release-time should teachers receive to implement the *SEA Policy*?

It is also not made clear in the *School Entry Assessment (SEA)* documentation exactly what ‘beliefs’ and ‘practices’ the South Australian Education Department may wish to promote or change. Results suggest that desired outcomes need to be more explicit, both in documentation and in training, so that teaching professionals are able to contribute to debates around new directions in education and make informed decisions about their use of new policies and documents and data flowing from such use.

Time, professional autonomy, and the status of teachers

‘Time’ and ‘workload’ were major themes in this study. That is, all participants expressed some measure of concern about finding enough “time” to do everything they believed they needed to do in order to meet their professional obligations:

there are so many different documents coming from the Education Department, all of the time, sometimes it’s a little unrealistic to expect that you would be able to implement all of those things. (Beth)

...time. Just time. Time’s the big factor, really, and if you do all this work and don’t use it productively [referring to filling out *Learner Records*] then, there’s no point. Which is what I’ve been doing of late, in previous schools, just highlighting ‘cause I have to, and never looking at it again. (Cath)

In 1998, the Australian Senate Employment, Education and Training (EET) References Committee heard evidence that, as professionals, teachers have been “disenfranchised from decision making processes at all levels” (Senate EET References Committee 1998, p. 3). Some Reception teachers interviewed for this study did say they felt removed from policy development, and that this made them “feel bad” and “frustrated”; but some participants expressed a reluctance, and even cynicism, about being involved at a policy-development level. I also found that the teachers interviewed for this study are regularly giving up un-paid personal time to meet some policy expectations:

I usually do it in the holidays as my holiday project. Whoever [beginning student] started at the start of the Term, I take home [their *Learner Record*] in the holidays...
...so that I know I’m up-to-date... (Isa)

Solutions to problems arising from these issues are not immediately obvious, as it seems not even paid release-time can solve this dilemma for some teachers:

Researcher: Do you think it would just come down to being paid to do more hours? I mean, is it possible to fit more in the hours you already do?

Hannah: Oh, impossible. I work 50 hours a week now. I feel I do more than enough. That’s without my T-and-D [Training and Development] and stuff, that we do. Ah, I feel I do enough. [laughs]

While I found a divide in opinions, some participants suggested that with adequate time and supports there could be benefits to the *School Entry Assessment (SEA) Policy*:

I mean, if it’s another thing lumped on to do after work you tend to get a bit negative about it and probably not embrace it as much. But if there was time put aside for it I

think we'd all benefit. Well I would certainly benefit, not having been using [the *Learner Record*] in a productive way, it would be great. (Cath)

Finding the balance in Reception

Felicity, a very experienced teacher, expressed eloquently the concern raised by several participants that Reception teachers must build relationships with students, and must find a balance between ensuring beginning students have a fun and successful transition to formal schooling, and also helping each child construct the knowledge needed for mainstream scholastic success:

... you can become locked in to doing too much assessment, and forget that you're there as a Reception teacher, and that children should be enjoying being at school, and having fun experiences... ..it's having that balance; not becoming too bogged down with assessment, and thinking, yes, the children have achieved "that", and move on. (Felicity)

These concerns are consistent with contemporary arguments that the first year of schooling should not have an academic focus but that focus should be on ensuring a successful transition and acclimatisation to the new social context of school (Walpole, Chow & Justice 2004).

RECOMMENDATIONS

Results from this study support notions about the benefits of inclusive and collaborative policy-development processes, and the social and economic potential of more democratic approaches to education generally. This report includes several major recommendations which are outlined below.

1. The development of more inclusive and collaborative policy-development processes

Attitudes towards a policy can significantly influence teachers' classroom practices (Barcan 1990; Hill & Crevola 1997; Shopen and Liddicoat 2000; Raban & Ure 2006) and implementation of new policy may be hampered if teachers are not convinced, as professionals, that the policy is worthwhile. I found evidence to suggest commitment to new policy might be enhanced through inclusive policy-development and decision-making processes which involve stakeholders from the very beginning of the policy-design process so that their needs and expectations are reflected in the final policy and documentation.

Jack and Luganoff (2004) argue that by "expanding the franchise" and giving stakeholders a voice in policy development, more long-term commitment to shared goals can be engendered, leading not only to more collaborative and democratic relationships between stakeholders, but also, perhaps, to more efficient use of resources.

2. The need to incorporate adequate training and supports into budgeting for new policy

This study collected data that suggest that long-term policy implementation may benefit from a larger budget for initial training and support. The *School Entry Assessment Mentor Project (SEAMP)* did seem to offer the collaborative framework and inter-institutional support systems which could facilitate a successful policy implementation (see DECS 2006b), yet the *SEA Mentor Project* was discontinued in 2005 because of economic circumstances. More research is recommended to ascertain if it may be more effective in the long-term to increase initial expenditure, to spend more on ensuring adequate training for all those expected to comply with a new policy, rather than trying to support implementation when stakeholders may not be fully informed.

3. The need to consider the question: is Reception teaching a specialist role?

I recommend serious consideration of the notion that Reception teaching may be a specialist role which may require specific supports, especially, perhaps, the provision of extra training for effective and equitable early assessments with very young students, extra School Support Officers (or even smaller class-sizes?), and extra release-time for working with parents, families, and significant adults in the lives of children.

If Reception teachers are to be expected to make thorough formative assessments for every beginning student in the first ten weeks of school, and to use this information effectively to “support planning and programming” (*Information for Educators* handbook, DETE 2002b), it seems reasonable to expect that teachers are given the time and support they need to reach desired outcomes.

4. The need for collaboration across educational contexts and across research disciplines

This study revealed data which reinforces arguments for whole-school planning (see Hill and Crevola 1997), and the development of more holistic and collaborative conceptualisations of education and research. The tensions between different stakeholders and different perspectives in Australian education appear to contribute to a certain “stagnancy”, where the same arguments and problems appear to keep re-surfacing (Jamrozik 2001) within a triumvirate of over-lapping, and even competing policy paradigms, at Federal, State and Territory, and local levels.

5. A deeper consideration of the Principle of ‘Universal Design’

My study drew on Dillon’s (2006) work concerning equitable and effective assessment in education, and I incorporated the principle of ‘universal design’ into my analysis. Dillon (2006) describes universal design as a “reversal of traditional design”: rather than basing design on population averages and norms or “standard achievement”. Dillon (2006) argues that design should be informed by the needs of the most restricted user. I found that the principle of universal design offered a useful framework for testing a new policy based on how it affects stakeholders with the most needs. By identifying ‘universal’ needs, Dillon (2006) argues more equitable and effective assessment and policy-design is possible.

CONCLUSIONS

This study was exploratory, and further research is recommended to ascertain how the *School Entry Assessment (SEA) Policy* is being implemented in South Australian public schools, if it is to be continued. Further research is recommended to ascertain what supports teachers and schools need for a thorough policy implementation; and how Reception teachers in particular might be better supported in their professional roles.

Even if the *School Entry Assessment (SEA) Policy* is not continued, or continued but without the current *Learner Record* booklet (DETE 2002a), there are lessons which might be drawn from the experiences of participants in this study. Goffin and Lombardi (1998) argue that teachers are perfectly placed to monitor the effects of policy, and to offer insights which are helpful for the development of good education policy. I suggest that by involving stakeholders more deeply in policy-development, policy-makers might construct more universal and flexible policies which could engender more positive attitudes and long-term commitment to shared goals. However, this study found evidence that positive attitudes alone may not be sufficient for thorough and successful policy implementation, and that training and support for implementation of *the School Entry Assessment (Sea) Policy* were generally quite sparse in the schools explored. Data gathered for this project reinforces arguments that more inclusive and collaborative educational approaches could be more equitable, more productive and more economically efficient.

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Educational investment in conflict areas of Indonesia: The case of West Papua Province

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Education has become a central issue in West Papua. During the Suharto regime, the Indonesian government paid little attention to educational investment in the province which led to poor educational infrastructure and a shortage of teachers. As a result, the quality of human resources in the province is poor. Since 2001, the adoption of the Special Autonomy Law has seen education emerge as a priority program for local government. Improving the quality of human resources to match standards in other provinces has emerged as a new challenge for the province. The article highlights the critical issues relating to the education system, education investment and policy formulation to support the development of West Papua.

Educational investment, conflict, Indonesia, West Papua, teacher shortage

INTRODUCTION

The United Nations has stated that education is fundamental to enhancing the quality of life and ensuring social economic progress (Todaro, 2000). This statement demonstrates the distinct correlation between education, the improvement of human resources and economic growth. Rumbiak and Mollet (2002) argue that investment in education is more important than physical development. However, the development of human resources is not as simple as building infrastructure such as houses, bridges or roads. It takes time and is long-term. In addition, Borjas (2005) has acknowledged that human capital involves a decision to acquire formal education. Workers who invest their time in education are willing to give up earning in the present in return for a potentially higher income in the future.

Since West Papua (formerly Irian Jaya) became part of Indonesia in 1962, education has become a central issue. During the Suharto regime, the Indonesian government only gave minimal attention to education in the province. Under the centralised system, the government played a crucial role in decisions concerning the education budget at the provincial level. The Indonesian government tended to promote education in the western part of Indonesia which led to an unequal distribution of human resources between the western part and the eastern parts of Indonesia. Like other eastern Indonesia provinces, West Papua had been constrained by its geographic isolation. In 2000, the population of West Papua was 2.3 million and almost half of the total population lived in remote highland areas (*Badan Pusat Statistik* (BPS), Papua, 2003). This was a challenge for the both central and local governments in providing basic education for the local community.

The Suharto regime introduced policies that exploited the rich natural resources of Indonesia. The West Papua Province is one of richest provinces in natural resources in Indonesia in terms of mining, forestry and fishing resources which have been exploited by multinational companies that have made a significant contribution to the national economy but has not benefited West Papua. The economic situation of the people in West Papua remains poorly developed and the province has a low educational standard compared to the rest of Indonesia, especially compared with people from the western part. Based on the data from *Badan Pusat Statistik* (BPS), Jakarta (2004), West Papua has been categorised as the poorest. 916.6 thousand people or about 65 per cent of the total population earned 125,065 rupiahs as a monthly per capita salary or only about US \$14

per month. As well, about 26 per cent of the total population of West Papua had not even attended primary school (*Badan Pusat Statistik (BPS) Papua, 2005*).

West Papua was decentralised or separated from the central government in 2001 by the Special Autonomy Law (SAL). This event gave the West Papua local government personnel the authority to manage their own resources. For SAL, the most significant feature was the increased budget allocation for local government. The Governor, J.P. Salossa, in responding to decentralisation introduced four priority programs (a) education, (b) health, (c) local economy empowerment, and (d) infrastructure in response to the Special Autonomy Law (Salossa, 2006).

The implementation of the Special Autonomy Law in West Papua was like shock therapy. The local government found it difficult to spend the money for proper programs such as in education. As a result, corruption and collusion occurred not only at the local government level, but also at the legislative level. According to the SAL, the local government was supposed to spend at least 30 per cent of the total budget on the education sector (*Sekretariat Daerah Provinsi, Papua, 2001*). This percentage was relative high when compared to Malaysia and Singapore which spent 20 to 25 per cent respectively on education. Therefore under the SAL, it has been a challenge for the local government to improve human resources in West Papua and raise them up to those of the other provinces in Indonesia.

Historical and Political Contexts

West Papua is situated in Eastern Indonesia bounded on the eastern border by Papua New Guinea, the north by the Pacific Ocean, the west by the Arafura Sea and the south by Australia. The physical area of Papua is 421,981 square kilometres and lies between 130° – 141° East Longitude and 2°25' South Longitude – 9° North Longitude. The regency of Merauke has the largest area with 119,749 square kilometres while the City of Jayapura has the smallest area with 940 square kilometres. The province of West Papua consists of 27 regencies and 2 municipalities.

The name of West Papua has changed many times. During Dutch colonial times the island was called Netherlands New Guinea. When the Indonesian government assumed control the island was renamed Irian Jaya (Garnaut and Manning, 1974). When Irian Jaya was decentralised in 2001, the name Irian Jaya changed to Papua. Recently West Papua was divided into two provinces namely Papua and West Irian Jaya. The capital city of Papua is Jayapura and the capital of West Irian Jaya is Manokwari.

The West Papua topography consists of three areas namely the Bird Head, Central highland including the Northern and the Southern Jayawijaya highlands. According to Koentjoroningrat (1994) the Bird Head area includes Manokwari, Fak-Fak, Teminabuan, Stenkool, Kaimana, Kokas, Ayamaru and Windesi. The Central Highland and the Northern areas include Jayawijaya, Mambramo, Cenderawasih Bay and Jayapura. The area south of Mount Jayawijaya is Merauke.

Historically, West Papua was colonised by the Dutch from 1828 to 1961. During the Dutch period, Papuan infrastructure was dominated by the mining sector after crude oil was discovered in Sorong. Garnaut and Manning (1974) reported that during 1951 to 1952 Papua exported 259 tons of oil equal to a value of US\$2.460 thousands. The agricultural sector provided the second largest export commodity. Products such as copra, nutmeg, mace, crocodile skins and copal were exported to Singapore and the Netherlands, about 3,986 tons in total with a value of US\$788 thousand.

In 1898, the Netherlands New Guinea government expanded its administrative office to Manokwari, Fak-Fak and Merauke. As a result, government expenditure was huge because the government hired administrative officials from both Europe and Papua. In 1961, the government hired 28,000 indigenous employees from Jayapura, Manokwari, Biak, Merauke and Sorong. The number of European and Asian employees in Papua was about 15,500 and 16,600 respectively (Garnaut and Manning, 1974). Moreover, wide disparities appeared in the Papua labour market in

1957. For example, unskilled labour wages were US\$50 per month, an apprentice earned US\$57 per month, school teachers US\$65 per month and teachers with training or a diploma qualification US\$124 per month. Garnaut and Manning (1974) argued that wages in Papua were higher compared to wages in other Indonesia provinces.

Under Dutch colonisation, the Protestant and Catholic churches played crucial roles in educating Papuans. To support the education system in West Papua, both the Protestants and Catholics established foundations. The foundations still exist today and are managed by the Protestant Educational Foundation (YPK) and the Catholic Educational Foundation (YPPK). The northern coastal area was influenced by the Protestants while the south of West Papua was predominately influenced by Catholic missions. Many Papuans received a Christian education from primary to high school. The subjects the Dutch offered were vocational; for example, farming, fishing and motor mechanics. The Dutch educated Papuan basically aimed to establish pan-Papuan leadership in order to combat the nationalist propaganda of President Sukarno in the early 1960s (McGibbon, 2004).

West Papua was incorporated into Indonesia in 1963. Subsequently the Indonesian government changed the administrative structure and economic system of Papua with the Indonesian central government assuming control. The central government controlled matters such as agriculture, social welfare, health, education and culture, and public works. During the past three decades under the Suharto regime, the central Indonesian government observed indigenous rights when developing West Papua. For example, the government provided 3.82 million hectares of land for PT Freeport Indonesia by using land belonging to the Amungme and Komoro tribes which meant the Amungme tribe had to move to other places (Amiruddin and De Soares, 2003). The Indonesian government grossly exploited the natural resources while paying little attention to the development of the local community. Moreover, in terms of revenue sharing, under the centralised system, the West Papua province received only a small percentage of shared revenue, while the central government enjoyed 85 per cent of revenue obtained by exploiting Papua's natural resources such as oil (Mollet, 2002). In addition, one multinational company; PT Freeport Indonesia was the largest Indonesian taxpayer. In 1997, the mining company contributed up to 12 per cent (US\$28 million) of the total Indonesian taxation revenue (Leith, 2001).

The administration of West Papua has changed since 21 November 2001, when the Indonesian Government (Jakarta) offered West Papua the Special Autonomy Law (SAL) status providing for decentralisation. There have been three implications of decentralisation for West Papua. The first relates to power sharing between the central government and the local West Papuan government. Before West Papua adopted decentralisation; the province was controlled by the central government. All decisions about West Papuan development were made in Jakarta. At times decisions seemed to be in contradiction with the policies of the local government. Now the local government has more opportunity to make decisions when managing their own resources. The second issue is related to revenue sharing between the central and local government whereby the local government receives a large proportion of the shared revenue compared to the central government. The third is the recognition of indigenous peoples' rights. To implement these rights, West Papua has founded a Peoples' Assembly (MRP) where the membership consists of indigenous Papuan leaders, members of the religious communities, and women representatives.

An Overview of Education in West Papua

The educational situation in West Papua in the 1970s was very poor. The lack of school facilities and teachers were the major obstacles to the improvement of the education system in West Papua. To address the anticipated teacher shortages in Papua, the Indonesian government supplied teachers from Java. As a result, massive numbers of primary school teachers migrated to West Papua. The education system was changed from the Dutch system to an Indonesian model. It should be noted that the Dutch used an anthropological model for education which focussed on knowledge within the Papuan context. The Indonesian government introduced a national

education system, where teachers acted as pioneers in the improvement of the quality of education in the province.

As shown in Figure 1, the proportion of West Papua population who are were five years of age and over that never attended school or completed primary school was substantial and significant (about 36 per cent); those who completed primary school around 27 per cent; completed junior high school (JHS) and senior high school (SHS) about 16 per cent and 18 per cent respectively; meanwhile only two per cent completed tertiary education. These figures suggested that in 2004, skilled human resources in West Papua remained low due to the small percentage of the total population five years of age over who had completed tertiary education.

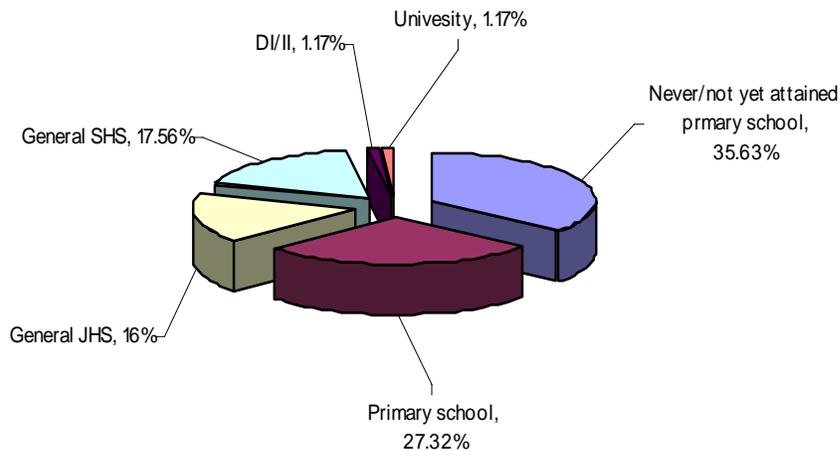


Figure 1. Population aged five years and over by educational attainment in West Papua

(2004) (Source: Computed data collected from *Statistik Kesejahteraan Rakyat Provinsi Papua* (Badan Pusat Statistik Papua, 2005)

There was uneven distribution of schools within regencies in West Papua. In the cities such as Jayapura, Sorong and Biak there were sufficient education facilities from primary to university levels of education. In remote areas such as Jayawijaya, Pegunungan Bintang and Puncak Jaya, however, there were few primary, secondary or high schools. The lack of teachers also was a major issue for the highland area of the province. As a result, there was a high proportion of people who had not attended or not yet completed primary school. The Welfare Survey indicated that in 2004, in Jayawijaya the number of people who had not attended or not yet completed primary school was about 51 per cent, meanwhile Puncak Jaya and Pegunungan Bintang there were around 49 per cent and about 40 per cent respectively (BPS, Papua, 2005).

The growth in primary schools during the 1970s was almost double and secondary schools sixfold (Manning and Rumbiak, 1989). Moreover, between 1985 and 1986 the total number of primary schools reached 1,886; secondary schools 235 and there was one university (UNPD and Indonesian Government, 1989). However, in 2000, the total of schools in West Papua increased significantly. Data from Department of Education in Papua reported that the total number of primary schools was 2,472, secondary schools 395, high schools 115 and vocational schools 30 (*Dinas Pendidikan dan Pengajaran*, Papua, 2001). In 2003, there were about 2,400 primary schools, 380 secondary schools, 140 high schools and 10 tertiary institutions or universities (BPS, Papua, 2004).

The West Papua enrolment rate remained below the national average. However, the enrolment rate from 1997 to 2003 fluctuated. The economic crisis in 1997-98 affected the enrolment rate in the province and resulted in a five per cent decrease in student numbers. After the province adopted the SAL in 2001, the enrolment rate in both primary school and secondary schools increased to 78 per cent and 50 per cent respectively. Furthermore, by 2001, about 96 per cent of students finished primary school and continued on to secondary school (The World Bank and Papuan Government, 2005).

EDUCATIONAL PROBLEMS FACED BY WEST PAPUA

Shortage of Teachers

A teacher shortage particularly at the primary and secondary levels in West Papua meant that not all school-aged children attended school. The Indonesian government recruited teachers from West Papua and other parts of Indonesia with limited success. It was common in remote areas for army and police personnel who were stationed in the area to give technical assistance by teaching in schools.

Teachers are reluctant to teach in remote areas for the following reasons; the first is the lack of facilities and social services such as adequate housing for teachers and limited health care (*Puskemas*). Teachers often live in houses that belong to local people and it is very hard for teachers if they want to bring their families to the remote area. There are no social services in some highland areas of the province due to a lack of *Puskemas* and medical staff. The second is a lack of transportation. It is common for teachers who work in remote areas to use small engine planes where there are only flights to remote area every three months or more. The third is lack of incentives for teachers to work in remote areas. It should be noted cost of living in remote area is expensive compared to that in urban areas. Therefore, without additional incentives for teachers in remote areas, they cannot survive. The last reason is irregular salary payments to teachers in remote areas. They must go to the regency centre to obtain their salary every three to six months, and improper accounting procedures means there is often a salary shortfall (Rumbiak and Mollet, 2002). In addition, surveys from the International Foundation for Election System (IFES) have shown that 35 per cent of 3,450 respondents mentioned a lack of an adequate of number of teachers (IFES, 2003). A significant example of this issue is noted in Bomamani-Pania, where the Catholic primary school has 180 students with three teachers each teaching six classes (UNDP and Government of Indonesia, 1989).

Curriculum

Like other provinces in Indonesia, the West Papua educational system has adopted the National Education System. This means the educational curriculum has been produced by the Ministry of Education in Jakarta and is a national curriculum. This curriculum is a controversial issue for educational experts in West Papua as the standard of curriculum is not designed for rural conditions. This curriculum is an urban standard curriculum designed for areas such as Jakarta, Yogyakarta or Surabaya. As a result, it is not surprising that West Papuan students have great difficulty adjusting to this curriculum. According to UNDP the national curriculum is difficult to apply in West Papua because of the local customs and the low level of basic competence of the students concerned. The students with different ethnic and regional differences receive the same kind of educational curriculum (UNDP and Government of Indonesia, 1989). Up to now, not much has been done to adapt the curriculum and teaching methods to the local context.

The Shift of Non-Indigenous Students from Public Schools to Private Schools

Under the Special Automy Law (SAL), the local government has an affirmative action policy to protect minority ethnicities in all sectors including in education system. To implement the policy, the education department has a policy for the public schools to allocate 50 per cent of the places for indigenous Papuan and 50 per cent for non-Papuan students. The benefit of this policy is to give more opportunity for indigenous students to study in public schools. In reality, however, the of allocation of places to indigenous students and migrant students is uneven with 80 per cent of the places going to indigenous students and only 20 per cent to non-indigenous students. This policy, therefore, has reduced the opportunities for non-indigenous student to study in public schools. It should be noted that public schools in West Papua are attractive to students because of the low tuition fees.

Prior to 2001, public schools in West Papua were of relatively better quality than private schools and places were occupied principally by non-indigenous students. This happened because entry to a public school was based on grades, therefore, a student needed to have a certain score or grade which was determined by the central government. Thus, if students had high grades in their previous school, they could continue to further schooling, simply because they qualified to study in public school. The process for entering private schools, however, was not as strict as for public schools. Therefore, students did not qualify to enter a public school went to private schools and most of them were indigenous students. In addition, under the SAL, the situation was reversed and public schools were more likely to be of lower quality compared to private schools. This was because many capable non-indigenous students could enrol in the public schools due to the government's affirmative action policy. Therefore, because of this situation, the non-Papuan students preferred to study in private schools.

In the Jayapura municipality, prior to decentralisation, the public senior high school (SMAN I) was the top ranked high school in Jayapura. The average score of grade of National Examination Test was relatively high compared to other high schools. Also graduates from the school could continue their study at famous universities in West Papua or other provinces such Java. Recently, the quality at SMAN I dropped because the average score of National Examination Test went below that of private senior high schools such as SMA Taruna Bhakti (Catholic mission school). Last year, one of the best students from SMA Taruna Bhakti received a scholarship to study at a famous university in Singapore.

Lack of Student Motivation

The majority West Papua population are involved in the traditional agriculture sector. They grow vegetable or staple food for their own consumption with some left over to sell in the traditional market. It is common in rural areas for students to help their parents look for food, grow crops, hunt and fish. In the harvest season, schools in rural areas do not open as no students are able to attend school as they are needed to help their parents. The Central Population Studies Department at Cenderawasih University conducted a survey in Tomu village in Bintuni Bay regency. In 2003 they reported that about 79 per cent of the total population dropped out of school. These students did not attend school as they were needed to help their parents with sago processing and fishing (*Pusat Studi Kependudukan Universitas Cenderawasih*, 2003).

Low Quality Education

In West Papua the number of graduates from tertiary education institutions has increased during the last decade. However, many graduates from university cannot be absorbed by the private sector due to a low demand for their qualifications. As a result, the annual unemployment rate in the province has increased significantly. For Jayapura municipality and Sorong the unemployment rate in 2004 was about 20 per cent and 15 per cent respectively (*Badan Pusat Statistik*, Jakarta, 2005). After completion of university studies, graduates prefer to work in Jayapura municipality. It should be kept in mind that since 2000, the business environment in West Papua has declined due to political instability. Therefore, most of university graduates have looked for opportunities to work as officers for the local government.

Corruption and Collusion

Like other provinces in Indonesia, corruption and collusion have occurred in the process of decentralisation in West Papua. The local government has contributed less than 14 per cent of the total budget and has a greater tendency to spend the money on infrastructure which is easily corrupted by the government, legislators and business people. It is common in West Papua that the local government and members of the legislative body have a mutually beneficial relationship. The local government offers the programs, but members of legislature and businessmen also want to be involved in the programs providing educational infrastructure in West Papua.

In addition, the local government designs projects to improve the human resources of the bureaucrats and members of parliament by using the mutually beneficial relationship and use the education budget to continue their studies and to take Master's degree outside West Papua at universities such as in Gajah Mada University in Yogyakarta and Hasanuddin University in Makassar. Each term funds are allocated for 40 to 50 Master's students. They pursue their study using incentives from the education budget. Ironically, there were no students from education institutions. Furthermore, the bureaucrats need to improve the quality of human resources. However, most of the students who are bureaucrats and are studying for Masters degrees are in top salary level and almost at retirement age. Therefore, it is useless because they cannot apply their new knowledge to improve the performance of the local government.

Local Government Policy Toward Education in West Papua

In terms of the employment market, education can be divided into two aspects, supply and demand. The supply side refers to the quantity of schools at all levels, from primary school to university. In terms of the demand side, Todaro (2000) argues that there are two principles which influence a person's desire to go to school. The first is the student's educational prospects of earning a better income in the future in the modern sector employment. The second are the educational costs that the student or the family must bear. The quality of education demanded is related to the demand for high-wage employment opportunities in the modern sector. Entry to modern sector jobs is, therefore, determined by the level of an individual's education.

In addition, Todaro (2000) also states that there are four variables that affect the amount of schooling required to gain sufficient qualifications for a job in the modern sector. The first is the wage or income differential. It should be noted that there are wide differentials in wages between jobs in the modern sector and those in the traditional sector. In the modern sector a high or low salary depends on the employee's background and the level of education completed. On the other hand, in the traditional sector, they are no educational requirements for entry into the sector. It is argued that the wage differential between modern and traditional sectors has resulted in an increased demand for education. Therefore, there is a positive relationship between the educational demand and wages gained.

The second variable is the probability of success in finding job in the modern sector. A person might get a well-paid urban job as long as he or she has higher educational qualifications than a person who does not. However, if job opportunities in urban areas are limited when there are many people trying to enter the labour market, the result is likely to lead to increasing unemployment. This assumes that there is a negative relationship between the demand for education and the current unemployment rate.

The third variable is the actual cost of education. These costs refer to financial expenses of for children's education and include tuition fees, books, clothing and other associated costs. In less developed countries (LDCs), particularly, the actual costs to poor people can become a major constraint for the education of children in school. Therefore, there is a negative relationship between the demand for education and the direct cost of education. This means the higher the tuition fees associated with the cost of education, the lower the demand for education. For example, in African countries, a family may spend more than 20 per cent of their total income per capita on the education of their children (Todaro, 2000). This is the indirect cost of education. A child's education is an investment that involves more than just the direct cost of education because even when a child becomes productive he or she may still continue to study. At the same time, the child ignores the family expectation in order to get income to fulfil family needs. Like the relationship between the indirect cost and the amount of educational demand, a negative relationship is found to exist between indirect cost of education and the total educational demand.

The local government in West Papua has struggled to design a strategy to develop the province in order to match the supply and demand sides of education. Every governor of West Papua has had

a strategic plan to push the economic development and improve the human resources in the province. However, the strategies offered did not appear to attain their objectives. As a result, the economy and human resources in West Papua have fallen behind the rest of Indonesia. Table 1 lists the governors of West Papua and the development strategies they devised.

Table 1. Development strategies of West Papua governors

Governors	Development Strategies
Busiri Suryowinoto (1980-1982)	Development focused on law and order
Isaak Hindom (1982-1988)	Exploitation of forestry
Barnabas Suebu (1988-1992)	Development based on micro and spatial economy
Yacob Pattipi (1992-1998)	Empowerment of agriculture sector such as intensification.
Fredy Numberi (1999-2000)	Focus on empowerment of apparatus.
J.P. Salossa (2000-2005)	Focus on education, health, empowerments of local economy, & infrastructure
Barnabas Suebu (2006-Present)	Enforcement of local community in villages

(Source: Mollet in *Kompas* on www.kompas.com/kompsd-cetak/0309/07/Fokus/545218.htm and *The Jakarta Post* on www.thejakartapost.com/yesterdaydetail.asp?fileid=20070223.G03)

As indicated in Table 1, Governor Suryowinoto had a development strategy that focused on law and order. This policy led to a massive military built up in West Papua which led to human rights abuses of the local people by the military. Hindom as the next governor of West Papua promoted exploitation of Papua natural resources such as forestry. This strategy attracted private timber companies from Jakarta to West Papua. The companies included PT. Hanurata that belonged to President Suharto. The company enjoyed concessions from local government to exploit the forest resources in West Papua. Most of the companies did not give significant support to the local community as most of the workers were hired from outside West Papua.

Suebu promoted micro and spatial sector strategies. These required synchronisation programs between government departments in West Papua. However, there were barriers in applying the strategies due to lack of cooperation between the sectors. Moreover, each department established very similar programs which led to overlapping. Pattipi emphasised the agricultural sector by using the intensification approach. This approach was adopted from Java and was a controversial program because the local community found it difficult to adopt not only to the new technique but also to its utilisation in agriculture. Numberi was the Papuan governor who promoted the development of human resources in local government. Many bureaucrats from provincial and regency levels studied in universities in West Papua or outside using local government funds. However, the development of human resources in the local government was not balanced. The middle and top level bureaucratic enjoyed their study, meanwhile the bottom level remained poorly educated.

Salossa was governor of West Papua from Sorong. Under Salossa's leadership, West Papua received the Special Autonomy Law (SAL) from the central government in 2001. It was an important event for West Papua as it gave the local government the authority to manage its own resources in the development of the province. In responding to the decentralisation, Salossa introduced four priority programs, (a) education, (b) health, (c) local economic empowerment, and (d) infrastructure which involved the Special Autonomy Law. In earlier attempts to decentralise West Papua, the local government faced complaints from the regency government due to unbalanced budget allocations between the provincial government and the regency. The provincial level received 60 per cent of the total budget and the regency only received 40 per cent (Sumulle, 2003). It should be kept in mind that according to the decentralisation system, the focus of development is at the regency level, not the provincial. Therefore in 2002, Salossa invited all local regency government officials to discuss the new budget allocations and the composition of budget. The meeting produced new budget allocations which gave 60 per cent to regency government and 40 per cent to provincial government and continues into the present.

The implementation of the Special Autonomy Law in West Papua was like 'shock therapy'. The local government found it difficult to spend the money on proper programs. As a result, corruption and collusion occurred not only at the local government level but also in the

legislature. It was common for the local government officers and members of legislature to have a mutually beneficial relationship. The local government offered the programs, but legislative members also wanted to be involved in the programs, just like businessmen.

Governor Suebu was elected in 2006. Suebu established four agendas for the development of West Papua. The first was to promote good governance by adopting a new public budgeting system and improving the quality of local government from provincial and district levels. The second was to improve the welfare of the local community's health and nutrition, education local economies and infrastructure by providing a block grant of 100 million rupiahs for each village and supervisor (*The Jakarta Post*, February 23, 2007). The third was to promote West Papua as peace zone and a human rights area. The last was to improve the infrastructure and transportation systems with the provision of one trillion rupiahs.

As mentioned earlier Special Autonomy Law (SAL) has promoted four program priorities; education, health, economic local empowerment and infrastructure. Thus far, the West Papuan educational policy is still based on the national educational policy. However, in terms of providing a budget for educational facilities, under Chapter 56 of the SAL, the Local Government Act is obliged to allocate 30 per cent the total budget to education programs (*Republik Indonesia*, 2001). The local government budget in education has introduced free basic education, provided incentive courses for indigenous students, provided scholarships, and refurbishment of school buildings.

Education Investment in West Papua

Under the SAL education is a priority program for improving human resources in the province. This is an opportunity for the local government to develop the education section like in other provinces in Indonesia. The proportion of the budget must be 30 per cent of the total budget and should be allocated and properly used for education. Therefore, the local government needs to be very careful in selecting the educational programs for West Papua.

Educational Investment in Primary School and Junior and Senior High School

The implication of SAL particularly in education would seem to be more beneficial to the bureaucrats and parliament members. The vast majority of the education budget is spent on improving the human resources of local government officers and members of parliament. As mentioned earlier the local government and the legislature had planned for bureaucrats and members of parliament to take Master's degrees as sandwich programs at Gajah Mada University and Hasanuddin University between the years 2002-04. It seemed that the local government was wasting the money for the provision of some funds to educate the bureaucrats and legislators. The money could have been used to provide libraries for primary or secondary schools or improving teachers by sending them on short training courses, to undertake exchange study, or to attend national or international conferences.

In order to build a strong foundation in education, local government should provide adequate school facilities such as libraries. At present, many primary schools still do not have libraries. The motivation for students to read is very low partly due to the lack of the libraries. The price of books in West Papua is relatively high; therefore the students are not able to buy books. Libraries play a crucial important role in supporting the teaching and learning processes at school. In addition, education in West Papua is dependent on money from the central government and the amount of money available is not sufficient to maintain school buildings. As a result, many schools in the urban and rural areas of West Papua remain poor. The SAL has insufficient funds to upgrade the conditions in the schools in West Papua.

Investment in Educational Institutions

West Papua has Cenderawasih University which is located in Jayapura. The Faculty of Education at Cenderawasih University has played an important role in providing qualified teachers from primary to high school. So far, the faculty has been dependent on the central government budget. The faculty has struggled to improve the quality of lecturers despite a lack of funds. Therefore, the university has been unable to send lecturers to study for Master's or doctoral degrees. Some of lecturers have only completed study at the undergraduate level. In addition, public schools that have been supported by the local government budget have been able to give some training to teachers to improve their ability to teach. However, private schools, which are managed by Catholic and Christian foundations (YPPK and YPK) in the remote areas of West Papua also have limited budgets to improve the training of primary and secondary teachers. Actually, those teachers have played a crucial role in students' education in remote areas. Therefore, it is essential to provide all teachers with short training course in order to improve their teaching performance in the classroom.

Educational Investment in Teachers

A shortage of teachers in remote areas has been a crucial issue in West Papua. This problem can be solved if the local government focuses on investing in the improvement of resources for primary and secondary school teachers. Therefore, local government should provide scholarships for capable indigenous students to study in school or university for advanced certificates and degrees. Capable indigenous students are disadvantaged because non-indigenous teachers who work in remote areas have problems adjusting to the living in the remote areas. After a capable indigenous student has completed his or her study at university, they should return to their hometown to teach in the local primary or secondary schools. Therefore, in order to attract school teachers to work in remote areas, the local government should provide a house and some monetary incentives. This is the only way to reduce shortage of teachers in West Papua.

Future Curriculum

As mentioned above, the national educational curriculum was not designed for the local context. Therefore the local curriculum should be applied and focus on real things like an orientation program involving linking and matching. The majority of the people in West Papua work in agriculture, therefore the education curriculum should be related to this sector.

It should be noted that during the Dutch colonial era, the educational curriculum matched the job opportunities in the West Papua labour market. This was partly due to the focus of the curriculum on the local context. The Dutch prioritised mathematics, biology, Dutch and English at primary school which were taught three times a week for 45 minutes per class. This model effectively prepared the students to continue their study at vocational secondary schools and high schools. After completing their study, they could go directly into work in the private sector such as in oil exploitation or as Dutch government officers.

In addition, the national curriculum that is not relevant to real life should not be applied in West Papua. Subjects such as history need to be combined with national and local history. To make this a reality, the central and local governments should work together with the central and local educational experts to design a new form of curriculum that fulfils the needs of students in West Papua.

CONCLUSIONS

Under the centralisation system the education situation in West Papua has been poorly developed. The lack of teachers has been the major barrier to the development of the education system in the province due to the limitation of funds from the central government. Despite the implementation

of the Special Autonomy Law, education needs greater consideration. The local government is misdirecting monetary investment in the educational sector. The West Papuan government prefers to give benefits to bureaucrats and members of parliament rather than to educational institutions. Furthermore, the affirmative action policy that applies in the education sector does not encourage competition among students at school due to an imbalance in the proportion of indigenous and non-indigenous students. In addition, educational investment in West Papua should focus on investing funds in educational institutions in projects such as providing and up-grading libraries, providing short term training for teachers and scholarships for the pursuit of higher certificates and degrees, adjusting the curriculum and preparing capable indigenous students to become qualified and well educated teachers.

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Professional socialisation of valuers: Program directors perspective

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An examination of the professional socialisation process is critical in changing the way graduates are trained and how they are supported post graduation. This article summarises key mechanisms to facilitate socialisation from recent socialisation studies undertaken in the fields of medicine, physical therapy nursing, occupational therapy, and certified athletic coaches. The article outlines the design of a survey of undergraduate university property program directors in the Pacific Rim to determine their awareness of professional socialisation and how the development of graduates' professional socialisation is accommodated at orientation and in subsequent years of their program.

Valuers, professional socialisation, property education, appraisers, program directors

INTRODUCTION

Professional socialisation refers to the acquisition of values, attitudes, skills and knowledge pertaining to a professional subculture.

This article summarises key mechanisms to facilitate socialisation over which universities are considered to have an influence. This has been determined from recent socialisation studies undertaken in the fields of medicine, physical therapy (physiotherapy), nursing, occupational therapy and certified athletic coaches. The review concentrates on what the studies offer in the development of the graduate, the role of the university and a graduate's first few years in the workplace. These disciplines have been selected since, like property, they are seen as new professions and graduates require field experience and examination before becoming full members of the profession.

This article outlines the design of a survey of undergraduate university property program directors and provides preliminary findings with regard to research into what universities are doing to socialise valuation students. The survey and analysis were informed by the literature review.

LITERATURE REVIEW

The main socialisation mechanism over which the universities have some influence has been identified in the literature on professional socialisation of the graduate at university and their work as a novice professional include early context, role models, placements, reflection, ceremonies, and curriculum.

It is important to provide students with an early understanding of the end point of their studies and also to provide them with an understanding of why students are learning particular content. If they understand 'why', there is a greater chance that in depth learning will take place. Meyer et al, (2005) found that providing the end point early improved socialisation in the Doctor of Physical Therapy. Carter et al, (2000) and MacKinnon et al, (2001) both reported the benefits of providing a introductory context and course in pharmacy programs. Bozich-Keith & Schmeiser (2003) developed materials to support early socialisation of nursing students and Sellheim (2003) found that students were more likely to deep learn, rather rote learn if they understood the end

point. Pitney (2002) advocated the need also to provide an end point for new staff. This was based on problems faced by certified athletic trainers whose only induction was in how to fill out forms. They did not have clear role statements and it is essential to clarify the roles of the people entering the workplace.

Role models can have both a positive and negative influence. Teschendorf (2001) advocated positive role models in all aspects of student interaction, including program administration as students read the staff behaviour and not what the staff said. Mostrom (2004) also advocated the necessity of providing positive role models in the teaching of physical therapy students. Maben et al, (2006) reported on the sabotage to the Project 2000 in which the nursing curriculum was changed to provide a more holistic and patient centred care. Socialisation into the new care model was destroyed by the hospitals role model and work practices when the graduates entered the hospital. Aperk and Eggly (2004) reported similarly of medical curriculum changes that were destroyed in the medical internships. Pitney (2002) lamented the lack of any role model for certified athletic trainers. Teschendorf (2001) also promoted the importance of expecting professional behaviour from students including taking responsibility for their own learning and gradually increasing this expectation. Coupled with this is the staff practice of frowning upon students' non professional behaviour.

Field and clinical placements provide significant socialisation. Gallimore (1991) noted the development of practice skills in the placements and it was seen as essential that positive role models were provided and people had clear expectations. Dunn et al, (2000) made several recommendations about ensuring the field experiences provided a positive socialisation experience, for example, for university staff to play a proactive role in supporting students' learning in the field experience. Koenig (2003) reported on an instrument developed to predict performance in these placements. Often placement students were provided with little supervision so it was important to identify those who were having or likely to have trouble and support them. Clouder, (2003) also noted the need to help those that did not have the appropriate skills in these placements.

Brown et al, (2001), Pitkala and Mantyranta (2003), and O'Loughlin (2005) all promoted the value of reflection in the socialisation process. The keeping of diaries or use of professional development plans, aided this reflection. It is critical that students have time to reflect and it is important not to overload the curriculum.

Pharmacy and Medical programs had commonly included white coat ceremonies in the early stages of programs. This reinforced to the students that they were becoming professionals. Carter et al, (2000) reported on the anecdotal evidence from the academic staff that this increased the professional attitude of the students to their study. The curriculum should contain content and values that were expected of professionals. Significant efforts had been made to change the professions by changing the curriculum. This had been done in pharmacy, nursing and medicine. However, as indicated earlier, this could all be sabotaged if the right role models and resources were not provided afterwards. The benefits of university socialisation could also be lost if a graduate entered the workplace without induction or clear expectations. Providing mentors what represented the practice wanted in the new organisation was considered important.

The evidence suggested that good early socialisation would provide benefits both at the start of a graduates' working career as well as later on. Page (2004) reported on studies that showed good socialisation provided benefits later in the career as well as first up. Poor socialisation could also be longstanding and Page (2005) also reported on the inference that the Harvard business case study method was responsible for the over reliance of businesses and investment house decisions on short term objectives rather than long term sustainability

PROGRAM DIRECTOR SURVEY

Two surveys were designed to investigate the influence of the university on the socialisation of property and valuation graduates: one survey of the program directors and another to gain graduates' perspective. The design of the graduate survey was reported in Page (2007). The program directors survey questions were focused on short term objectives and were divided into six categories. Guiding questions were designed for each category to elicit information on aspects that influenced the socialisation process. The questions are provided in Appendix 1. The following sections describe the rationale for each category.

Program History and Market

The program content is likely to be influenced by its location within the university organisational structure and whether the program emerges from a business finance background or from a construction background. Page (2005) reviewed the nature of programs and their location within the university structure, which showed that the age of the program was likely to influence current program structure as it would have evolved from a period when certain trends in university education were taking place. The timing of program review was significant in determining if a program had undergone change or whether it would have to change soon as a result of university or government directions. If the program was in a transition phase this would be a pertinent factor as it could influence the findings of this study.

This study is specifically about the socialisation of valuers. However, many university programs have shifted their orientation over the last 20 years from being valuation only to having a broader property context. For example, the University of South Australia had three specialist streams for a decade, in valuation, conveyancing and property management and agency. Students interested in marketing or finance was encouraged to undertake either a second major or a double degree. In many cases property programs in Australia have provided elective streams of courses which allow students to specialise in a number of property fields.

The program mode can also impact on how students are socialised, for example, full-time versus. Part-time mode can influence the opportunity for students to undertake work experience or gain employment. The option of external versus internal can also have an influence over how students interact and the influence of the staff over the students' socialisation.

Program Design

Questions in this category aim at identifying which key aspects of professional socialisation are taken into consideration in developing the program design. The questions also aim at identifying constraints preventing the development of the ideal property program and, specifically, what the difference is if some of these constraints do not exist. The university influence on program design is also important at the macro and micro levels.

The influence of the professional bodies on program design is also of interest, as it is expected that this can have a significant influence. In order to understand this influence further, questions are asked of program directors about differences if the professional guidelines do not exist.

Program Management and Control

The questions in this category aim to identify what quality controls exist both internally and externally over the programs. The questions also target identifying the proportion of the program that is taught by property staff and industry professionals relative to staff from a non-property background. This is likely to influence the socialisation process.

Program Implementation

Implementation questions are included to discover what aspects of socialisation occur at specific stages of the program. The questions also aim at identifying whether students' socialisation

opportunities differ and if different teaching and learning is used to aid other students' socialisation. The questions also examine some elements of potential socialisation that can occur with industry links, such as work experience and mentoring schemes.

Three programs in Australasia were longer than three years, as they had specific industry placements within their programs, and additional questions are included in the questionnaire to discover more about the socialising influence of these placements.

Program Success and Challenges

This section aims at obtaining the program directors perspective on the strengths and weaknesses of their program and to generate information to assess the key socialisation aspects such as knowledge, values and attitudes. There is also a question on when they believe their students become valuers, which allows triangulation with the graduate survey.

Program Directors

The questions in this section are to identify the program directors and leaders property knowledge, field or work experience and teaching experience relative to the program as the program director or leader can be perceived to have a significant influence on students.

PROGRAM DIRECTOR SURVEY RESULTS

All property program directors or program leaders, as listed on university web sites for undergraduate property programs in the Australia and New Zealand, were invited to participate in the discussion. Eight people participated in interviews that took place in November and December 2006. The interview questions listed in Appendix 1 were the basis for the discussions with program directors. The interviews were transcribed and common factors were identified from these interviews. This section reports on the early findings from this survey.

Program History and Markets

The property programs were not designed only to train valuers. Different end points were possible and different classification systems were used with one program identifying 11 different markets for their graduates. Programs were mainly dominated by school leavers (approximately 80%) and generally had a balance of 60% male 40% female. Most program directors provided comments that the trend over the last decade was for more females to be undertaking property programs.

The majority of the programs were designed around a full-time internal mode, though some did have a small amount of web material available to support internal students. Two programs had an external option and a third program had its material delivered at more than one site. The organisational location of property programs varied across the universities represented in the interviews, but the majority of property programs are within either a business or a construction faculty. In New Zealand, programs were offered by two faculties, though the viability of the agricultural programs was questionable. The survey discussions concentrated on the more viable business versions. Irrespective of the program location, most students faced a common first year.

The program length varied between three and four years with the programs in excess of three years having an industry placement component. The programs of three years duration generally had no formal industry placement component. In one case, industry experience could be recognised for one course if the appropriate diaries were kept. Another program was contemplating recognising industry experience and the program structure allowed for credit to be given.

The property programs were now very close to being prescribed programs with students having very little choice over which courses they studied. Program directors indicated that choice of courses had gradually been reduced and in most cases the number of elective options was those mandated by the university.

Program Design

All program directors indicated that they complied with the professional body's education requirements and that these requirements did not have a significant influence on program design. Most program directors indicated that they were likely to keep their programs the same even if there were no educational requirements from professional bodies. There was some variability with regard to how items were presented for the benefit of the professional body and in some cases program directors emphasised the importance of using the right language to show that values or content was incorporated into courses in other ways, for example, materials. The current proposed change in the Australian Property Institute's (API) compulsory academic requirements might influence the amount of rural content presented in the future, as rural studies were likely to be no longer compulsory. One program director indicated that the program was a compromise between what the staff wanted and what industry and professional bodies wanted, and what the staff wanted tended to reflect their expertise. Interestingly the program contemplating removing the rural aspects had recently lost its rural staff member.

Curriculum overload is a recognised issue. When program directors are provided with suggestions for extra content, then they indicate that this results in discussion over what can be dropped to enable the new aspects to be added. There is also the issue of work load for property courses compared to other courses in the faculty. The clear impression is that many property courses contain more assessment and expectations than other business courses and this is a concern.

The accreditation of business programs by other authorities also impact on property programs. The needs for business students to have capstone units, international perspectives or other graduate qualities in some cases reduce the amount of property content. These alternative accreditations have weakened the influence of the professional bodies which was reflected in that it was property content that was deleted to ensure the other authorities accreditation requirements were met.

Many of the property programs had an advisory committee that met at least once a year. These advisory committees provided feedback to program directors on proposed changes. The advisory committees had no formal functions and, in some cases, they were there as a response for money provided by industry or a conduit to industry hopefully to obtain resources or cooperation.

The program directors with short experience were frustrated by the extent of influence of university policy and procedures on program design. The longer term program directors just saw them as factors that had to be worked with. The new research framework was also perceived as a threat by several of program directors. They perceived that it could reduce staff-student interaction, which they believed was important.

Program Management and Control

The property programs all had to undertake annual internal university reporting and annual reporting to the relevant accrediting professional bodies. The programs also had significant reviews every three to five years. These quality control measures were not seen as a threat to the professional socialisation of students. In several situations, the licensing board also participated in an annual review. The licensing authorities that participated probably had a greater influence than the professional bodies and this might have arisen due to these authorities having full time staff. Several universities held focus groups with students on a twice yearly basis and they took notice of the feedback. They believed this was the reason why their programs were rated highly in student evaluations.

The property courses were mainly taught by full time university staff with industry personnel being used as guest lecturers on specialised topics. Industry personnel were not used as tutors or as markers. It was commented that some industry individuals wanted to assist the industry and they frequently offered to give some specialist lectures. In one program 50 percent of the property

courses were taught by industry practitioners with this program only having a few permanent university staff.

Program Implementation

Most of the programs had a common first year, which meant that property teaching was generally only minimal in the first year. In some cases, a property course or part of a property course was incorporated into a core course. In one program, common first year courses were moved to second year to allow property courses to be included as part of first year studies, which allowed the students to be provided with an endpoint and larger context within the first year. Most program directors accepted that a common core was an economic necessity. In most cases, there appeared to be no concern that a property course was not undertaken in the first year of study.

In most programs there was some interaction with the profession in the first year. This often involved a couple of presentations and drinks but few program directors saw these events as being important. In this situation, the students were exposed to recent graduates who discuss what their job entails. Many program directors commented favorable on these interactions between students and industry.

Program directors were keen, however, to provide further student interaction with industry and the professions later in the program during the second and third years of the programs.. This was implemented through mentor schemes or specialist guest lectures. As part of one course, one of the institutions invited past graduates to discuss their work with students over a three to four week period. Two program directors commented that students were encouraged to participate in the young version of the Property Council of Australia Events. Several program directors also discussed their mentor or buddy schemes. Three spoke highly of the value of these schemes and they indicated that they had been evaluated and would continue with some modifications. One program director was extremely keen to restructure their mentor scheme to ensure that it did provide a positive contribution to professional socialisation. The program directors believed that the practicum component within programs had a significant positive effect on the socialisation of students but did create some difficulties. Employers who had invested in the students generally wanted to keep the students in their employment. This meant the students must finish in a part-time mode, which creates some difficulties for the students in finishing study and working. Conflict arose whether the students should be at work or at the university. The directors of programs with a practicum made no formal efforts for this socialisation to be shared with fellow students. One program director noted the experience might have been shared informally and might have influenced tutorial answers.

Program Success and Challenges

The students of most property programs were made aware of the relevant professional body guidelines. A small amount of program time was allocated to developing professional values. There was, however, some skepticism that the desired professional values could be taught and that students either came with them or did not. One program director indicated that the demonstration of professional values by staff and program directors was essential in developing student professional values and he also flagged the importance of not accepting unprofessional behavior and, in particular, cited plagiarism.

Program directors indicated that they made students aware of the professional practice guidelines and also expected students to undertake some valuations within the program. It was acknowledged that the programs only provide limited opportunities for students to undertake valuation, due to constraints on the volume of assessment. It was seen as industry's responsibility to develop these skills after graduation. In some programs a six month (minimum) industry practicum provides an opportunity to gain further professional practice skills. An understanding of professional practice was also picked up by mentoring and buddy schemes, which involve

students shadowing those in industry for a short period of time. This was done with the expectation that students will know more about work tasks and industry practice.

The professional knowledge required to be a valuer was generally taught over several courses in the final two years of the program. Program leaders believed this was done well but there were issues about how much could be provided within the programs. There was clearly no difficulty in finding material and it was easy to overload the curriculum.

Program leaders did not indicate any specific challenges that were common across all their programs, though there was some commonality in that the profession and industry had to be realistic in what could be achieved in a three year undergraduate degree. There was also some lamentation of the amount of students' commitment to their studies with competing interests taking priority.

DISCUSSION

The preliminary review of these results indicates that socialisation of valuers is occurring satisfactorily from the program directors perspective. In considering the socialisation literature and the key components over which the university has some control, the main inconsistency is the provision of a clear end point in the early stages of the students' study and data from the survey indicates that very little about property is taught within the first year of the programs. The linking with industry and profession in the first year appears to be largely superficial.. However this again raises questions about what is the end point when program directors identify up to 11 career end points with most programs clearly producing graduates for several property careers.

Program directors talked enthusiastically about the professional socialisation that occurred for students when they undertook work placements, part-time property work or formal practicum. Program directors did not, however, try to utilise or formalise in any way the sharing of students' experiences with students who had not participated or had participated in different experiences.

The main elements of socialisation in the field of valuation provided through universities are the body of knowledge required and an introduction to valuation practice and values. All these elements are further developed in the workplace. The socialisation of valuers is largely achieved with the universities providing most of the knowledge and an introduction to valuation practice and values that are further developed in the workplace.

CONCLUSIONS

The socialisation of valuers is dependent on many influences including the universities and the first employers. The universities are highly accountable to the profession in undertaking this role. The only significant variation from the professional socialisation literature on the running of property programs is the lack of providing clear end points at an early stage. This is difficult to do when common first years course are dictated in universities and programs contain students heading for multiple end points including valuation practice.

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APPENDIX 1

Guiding questions for discussion with Program Director (course coordinator)

Program history & market

Outline

- 1) name of the property program
- 2) how long has program run and when was program last reviewed
- 3) what are the target markets for the graduates & does this effect choice within the program
- 4) is the program the same for all modes of study, fulltime, part-time, external and online.
- 5) How many students are undertaking this program and what is there general profile with respect to age, experience, study mode and gender.

Program design

Outline

- 1) what are the guiding principles in deciding content of program
- 2) how is the professional values developed within the program
- 3) how is an industry orientation built into the program
- 4) how do you get your students to understand professional practice
- 5) what role does the API , RICS ,SISV, NZPI guidelines have in the design of your program

- 6) if the guidelines did not exist, would your program look differently and what would be different.
- 7) what parts of the program are designed specifically for those graduates going on to become valuers.
- 8) constraints on design of program through university policy
- 9) role of faculty/ division in design of program

Program Management and control

Outline

- 1) what % of program is taught by property staff
- 2) what % of program is taught by industry practitioners
- 3) what involvement do professional bodies play in checking quality of program on annual basis
- 4) what other checks do you have on quality control both annually and periodically

Program implementation

Outline

- 1) what do you do in the program/course in the first few months to orientate the students to the profession
- 2) what do you do in the subsequent periods.
 - a. Year one
 - b. Year 2
 - c. Year 3
 - d. Year 4
- 3) Do you vary this for students with different backgrounds in property
- 4) Do you do anything to share the property work experience of students with fellow students
- 5) Do you involve the industry in orientating students towards industry.
- 6) Do you encourage students to be involved in industry activities-if so how is this encouraged
- 7) If industry placement program-discuss its operation, success and challenges
- 8) What different, needs to be provided to valuers relative to other property graduates

Program success & challenges

Outline

- 1) the success of your program in preparing graduates for work in the property industry with respect to
 - a) Knowledge (or content)
 - b) Professional practice –would they be able to undertake work in line with professional requirements
 - c) Professional values-would they act ethically and not be pressured /seduced to meet clients need
- 2) what are the weaknesses of your graduates
- 3) can you separate your answers for this for valuers vs other property professionals.
- 4) for the valuation graduates, at what point do you believe they become a valuer.

Program director

Outline

- 1) years teaching
- 2) yrs as program director
- 3) property education
- 4) Property experience

Creativity, problem solving and innovative science: Insights from history, cognitive psychology and neuroscience

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This paper examines the intersection between creativity, problem solving, cognitive psychology and neuroscience in a discussion surrounding the genesis of new ideas and innovative science. Three creative activities are considered. These are (a) the interaction between visual-spatial and analytical or verbal reasoning, (b) attending to feeling in listening to the 'self', and (c) the interaction between conscious and non-conscious reasoning. Evidence for the importance of each of these activities to the creative process is drawn from (a) historical and introspective accounts of novel problem solving by noted scientists and mathematicians; (b) cognitive psychology and neuroscience; and (c) a recent empirical study of novel mathematics problem solving. An explanation of these activities is given in terms of cognitive neuroscience. A conceptual framework connecting each of these activities is presented and the implications for learning and teaching considered.

Creativity, problem solving, cognitive psychology, neuroscience

INTRODUCTION

The questions 'From where do new ideas come?', 'How do they arise?', and 'Do feeling and intuition play a role?' continue to fascinate scholars and lay people alike. Over the centuries, answers to such questions have varied. Five hundred years ago, in English and European culture, the answer quite simply, was that new ideas come from God (Pawson, 2003). In the period of rationalism that followed, the prevailing answer was that new ideas arose through reason alone (Lacey, 1996). In the reactionary romantic period that ensued, the answer was to be found in 'a way of feeling', 'an intuition' or 'an imagination' (Horowitz, 2004). In the present day climate of relativism the answer supposedly is to be found in the relative nature of experience and culture (Swoyer, 2003).

While none of these perspectives on its own offers complete and efficacious answers to our questions it seems likely that all have some merit and that the way forward must involve a synthesis of elements from the past and ideas from the present. Identifying some of these elements as well as describing the way in which these elements may interact in a cognitive explanation of the origin of new ideas, underlies the purpose of the research documented in this paper.

In particular, elements relating to different kinds of reasoning (indicative of the rationalist period) together with those of feeling and intuition (indicative of the romantic period) are discussed. Further it is argued that creativity may arise from the interactions occurring between each of these elements both cognitive (thinking and reasoning) and non-cognitive (feeling and intuition). This is done within the context of novel problem solving as it relates to scientific and mathematical experience.

BACKGROUND

On Defining Creativity in the Education Context

The literature is replete with many definitions of creativity. Some definitions focus on the product of creativity, some on the person who is creative and some on the process of creativity. Still other definitions focus on the environment where creativity occurs. The meaning of the term 'creativity' as used in this article is one adopted by the majority of investigators in the field. Put simply it means 'the production of effective novelty' (Cropley, 1999; Lubart, 2001; Mumford, 2003; Sternberg and O'Hara, 1999). Thus for creativity to be manifest, the qualities of both novelty and usefulness must be expressed. Speaking gibberish, for example, may be novel but since it is not meaningful, it is not, by such a definition, an example of creativity because it is not useful. Further, while creativity may be expressed in many different forms such as a theory, a poem, a dance, a chemical, a process, or a symphony to mention but a few, the form of effective novelty under consideration in this study, is that of successful creative problem solving carried out within the fields of science and mathematics.

It must be pointed out that the production of effective novelty is relative to the originator. Consequently, if an individual creates an effective solution to a novel problem that others have solved previously, so long as the problem solved is novel and new to the individual concerned, then creativity is considered to have been expressed. Therefore the definition of creativity applied in an educational context is not restricted to the eminent variety but is inclusive of more modest achievements of the everyday kind.

The Classical Model of Creative Problem Solving

In defining the relationship between creativity and problem solving it is necessary to examine what makes creative problem solving creative. Such an examination necessitates an investigation into the creative process.

One of the earliest models of the creative process was that espoused by Wallas (1926) and Hadamard (1945) early last century. Many current day models of the creative process can be mapped to an adaptation of this early model (Aldous, 2005). Therefore the classical model is worthy of some elaboration here and is referred to in later discussion.

Four distinct phases, mark the classical model. These are **preparation**, **incubation**, **illumination** and **verification**. During the preparation phase, the problem is identified, information is gathered and conscious thoughts stirred. Although a solution may be found during this phase, for more complex and novel problems, the individual may well give up for a time. It is this temporary abandonment that leads to the incubation phase. During incubation ideas are free to associate and restructure without the individual directly working on them. It may last for a few seconds, hours or years depending on the situation. Eventually when a solution manifests itself the illumination phase has arrived often recognized as the so called 'aha' experience. Hadamard (1945) explained illumination as the unconscious mind dropping the solution into the fringe of consciousness whereupon the conscious mind seized the new idea as a moment of insight. Ultimately the identified solution needs to be checked, developed and refined in the verification phase and elaborated on to ensure its capability of being understood. Should the verification phase show a solution to be unworkable then there may be a return to an earlier stage of the creative process. Although the phases of preparation and verification are marked by conscious activity, the phases of incubation and illumination may include non-conscious activity.

Cycles of Feedback and Non-Cognitive Activity

Building on the work of Hadamard(1945) and others, Shaw (1989) undertook a study of creativity in the scientific domain. In particular, he invited a number of scientists and engineers to reflect on their creative activity. Of note was the discovery of a series of emotional poles (both positive and negative) that mapped to different stages of the creative process. This finding, along with the

work of others in the field (see for example Cropley 2001, and Russ 1999)has indicated a role for non-cognitive activity in the creative process.

Overlaid on these poles of emotion Shaw (1989) theorised the presence of a series of five feedback loops. The first feedback loop known as the ‘Arieti loop’ predicts cycling between conscious and unconscious thinking that occurs between the phases of preparation and incubation. The second loop, termed the ‘Vinacke loop’ predicts non-conscious and conscious cycling between the phases of incubation and illumination. The third cycle termed the ‘Lalas loop’ predicts cycling between the stages of illumination and verification or explication, with the idea that further verification leads to further illumination. The fourth cycle, known as the ‘Communication loop’, anticipates feedback arising between the stages of verification and ongoing validation of the creative product or outcome. Finally multiple feedback loops, involving both conscious and non-conscious mental activity are theorized to exist from the verification and validation stages of creativity to all previous stages in the creative process. These multiple feedback loops are collectively referred to as the ‘Rossman loop’.

A diagram summarizing the four stages of the classical model of creative problem solving (Hadamard, 1945; Wallas, 1926) together with the theorized cycles of feedback (Shaw, 1989) is given in Figure 1.

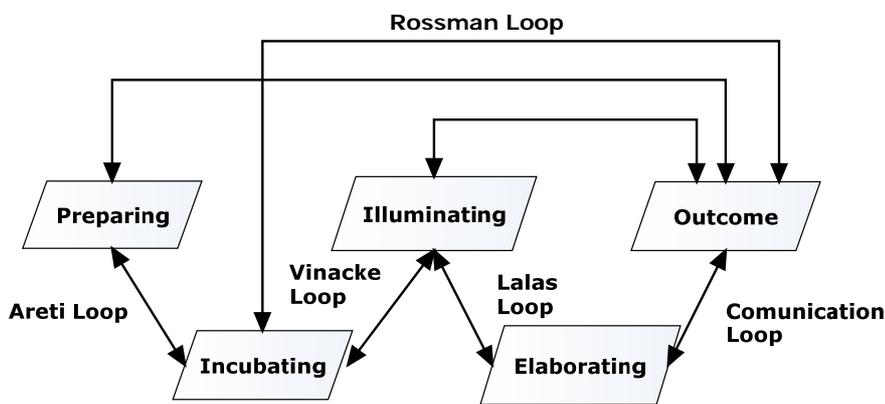


Figure 1: Diagram of the classical model of creative problem solving superimposed with Shaw's feedback loops

One process definition of creativity which takes account of such oscillatory behaviour and the affective dimension described above is that by Koberg and Bagnall (1976). This definition of creativity is described as:

... both the art and the science of thinking and behaving with both subjectivity and objectivity. It is a combination of feeling and knowing: of alternating back and forth between what we sense and what we already know. (Koberg & Bagnall, 1976, p.8)

Therefore a critical question becomes ‘What cognitive and non-cognitive activities can be found that may be used to construct a framework of creative problem solving useful to a cognitive explanation on the origin of new ideas?’ A discussion of three critical activities important to both mathematics and science learning and teaching follows.

PURPOSE OF THE STUDY

A recent study on creativity and problem solving, involving the protocol analysis of five expert problem solvers, followed by a large scale quantitative analysis of 405 individuals, posited that creativity involved the interplay of three activities (Aldous, 2005, 2006). These activities were:-

- the interaction between visual-spatial and analytical/verbal reasoning,
- attending to feeling in listening to the ‘self’, and
- the interaction between conscious and non-conscious reasoning.

This article further examines the validity of these activities drawing evidence from (a) historical and introspective accounts of novel problem solving by noted scientists and mathematicians; (b) cognitive psychology and neuroscience; relating this evidence to (c) the findings of the recent empirical study (Aldous, 2005, 2006) The implications for learning and teaching, are then considered.

THREE CRITICAL ACTIVITIES

The Interaction between Visual-Spatial and Analytical or Verbal Reasoning

A historical introspective account

It has been asserted that introspection supported by historical data is invaluable for exploring scientific creativity (Miller, 1992) and moreover that some generality across case studies can be made (Gruber and Wallace, 1999).

One in-depth study (Miller, 1989, 1992) that utilized historical data from both primary and secondary sources including autobiographical notes and reports of introspection pertain to Albert Einstein's invention of the special theory of relativity. Of relevance to the argument presented here is Einstein's well developed use of visual-spatial thinking and analytical "wondering" (Miller, 1992, p.409). "Wondering" according to Einstein:

seems to occur when an experience comes into conflict with a world of concepts which is already sufficiently fixed within us. (Einstein 1949 p.9 Autobiographical notes, cited in Miller, 1992, p.409)

This "wondering", although often spontaneous, usually depended for its success on "a feeling for what is a fundamental problem" (Miller 1992, p.409). One wondering and thought experiment persisted for 10 years. In this thought experiment:

Einstein imagined what the consequences would be of running alongside of and then catching up with a point on a light wave. (Miller, 1992, p.406)

The wondering around this visual thought experiment eventually gave rise to the "germ of the special theory of relativity" (Einstein 1949 p.53 Autobiographical notes, cited in Miller, 1992, p.406). Later Einstein commented:

During all those years there was a feeling of direction, of going straight toward something concrete. It is, of course very hard to express that feeling in words... But I have it in a kind of survey, in a way visually. (Einstein, 1949, p.53 Autobiographical notes, cited in Keller, 1983, p.150)

In a letter to Hadamard, Einstein (1949, Autobiographical notes, cited in Miller 1992 p.409) further stated that creative thinking occurred in visual thinking and that words followed. The visual images were abstracted from phenomena observed in the world of sense perception and used to intuit solutions to problems concerning theoretical asymmetry not observed in nature. For example, Einstein's purpose in inventing light quanta was to overcome the anomaly concerning the discontinuous particulate source of continuous wave radiation. In Einstein's creation, light quanta represented both particulate sources and particulate radiation (Miller, 1992).

Miller (1992) concluded that Einstein's analytical "wondering" and use of visual thought experiments were critical to the development of new ideas in physics.

Given Einstein's apparent interaction between visual-spatial and analytical reasoning it is perhaps not surprising to find in a more recent study of creative problem solving, expert problem solvers oscillating between visual-spatial and analytical reasoning when successfully solving a novel problem in mathematics (Aldous, 2005, 2006) Like Einstein the visual-spatial "wondering" was associated with a feeling for the nature of the underlying problem and its solution. Some verbal protocols from the reported study evidencing visual-spatial and analytical activity are recorded below.

I'm just trying to visualize patterns in my head ... I definitely feel that the shapes are going to be geometric. (Anne)

So I'm putting markers on the shape just so I can get a visual feel for the shape. (Barbara)

Cognitive psychology and neuroscience

In neurobiology and cognitive psychology, brain-imaging and behavioural data have been used to locate two brain circuits involved in scientific and mathematical thinking (Dehaene, Spelke, Pinel, Stanescu, and Tsivkin, 1999). One circuit has been found to be used for approximate arithmetic (e.g. sense of numerical magnitude) and recruits the bi-lateral areas of the parietal lobes within the brain. It is a region strong in visual-spatial processing. The other circuit has been found to be used for exact arithmetic and recruits the left inferior prefrontal cortex. This region is strong in linguistic processing. The location of these regions is shown diagrammatically in Figure 2.

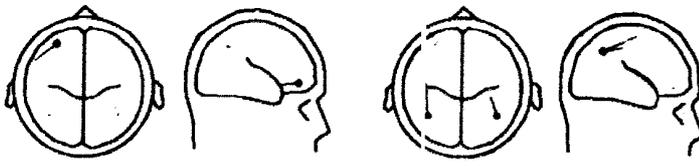


Figure 2: The first two diagrams show the location of the left inferior frontal cortex in both planar and lateral views. The second two diagrams show the location of the bilateral parietal lobes in both planar and lateral views. (Diagram adapted from Dehaene et al 1999, p.973)

The circuit involved in approximate arithmetic is language independent (ie non-verbal) and is involved in analogical mental transformations as well as visual-spatial processing. Non-verbal representations of number magnitude, “akin to a mental ‘number line’” are thought to manipulate quantities in an approximation process (Dehaene et al. 1999, p.971). By contrast the circuit involved in exact arithmetic is language dependent and employs networks involved in word association processes. Exact arithmetic has been found to transfer poorly to a different language. Finally, a more recent study proposes that numerical-spatial interactions arise from common parietal circuits within the brain (Hubbard, Piazza, Pinel and Dehaene, 2005).

Interestingly, discussion in the literature over the nature of intuition, and in particular of mathematical intuition, has debated the relative merits of linguistic competence and visual spatial representation (Das, 2003; Hadamard, 1945; Krutetskii, 1976/1980). Of interest to the argument documented in this paper therefore, is the suggestion by Deheane et al (1999) that mathematical intuition arises from the interaction between these visual spatial and linguistic brain circuits.

Implication for learning and teaching

Thus, from a neurobiological perspective, encouraging students in science or mathematics classrooms to use their visual spatial and imaginative capabilities, followed by analytical and verbal documentation is likely to be helpful in assisting them to be successful in finding creative solutions in a novel problem-solving event.

Attending to Feeling in Listening to the Self

A historical introspective account

It should be noted in the introspective accounts given above, that a feeling of knowing, a feeling of cognition, a feeling of connection or a feeling of direction was being used to guide the reasoning process. Moreover this feeling was frequently associated with visual spatial activity and imagery.

Nobel prize winner and cytogeneticist Barbara McClintock, is credited with using an unusual feeling approach when deriving her theory of jumping genes. This feeling was used to guide thinking, giving greater insight into the nature of things. Indeed the corn kernels with which she worked were the subject not the object of her research (Keller, 1985). Looking for patterns of individual difference on successive generations of corn kernels, McClintock knew the biography of every cob.

The important thing is to develop the capacity to see one kernel that is different, and make that understandable... if (something) doesn't fit, there's a reason, and you find out what it is. (McClintock cited in Keller, 1983, p.xiii)

By her own account, such careful attention gave rise to a feeling of affinity with the corn plants with which she worked that even extended to their chromosomes.

I found that the more I worked with them, the bigger and bigger (the chromosomes) got, and when I was really working with them I wasn't outside, I was down there. I was part of the system. I was right down there with them, and everything got big. I even was able to see the internal parts of the chromosomes ... It surprised me because I actually felt that these were my friends... (McClintock cited in Matthews 1993 p.)

Of relevance to the argument presented in this paper is the fact that McClintock's "feeling for the organism" (Keller, 1983, p. 101) enabled her to observe phenomena about corn genetics that others had missed. Indeed, according to McClintock "Right and left ... they miss what is going on" because of the tendency to call a single difference "... an exception, an aberration, a contaminant" (Keller, 1983, p. xiii.). Thus observation of detail and attention to feeling, is important to the creative process and the development of new ideas in the production of innovative science.

One celebrated mathematician, who by his own introspective report, also used feeling to arrive at a new intellectual order was Henri Poincaré (Miller, 1992).

If I have the feeling, the intuition so to speak of this order, so as to perceive at a glance the reasoning as a whole, I need no longer fear lest I forget one of the elements, for each of them will take its allotted place in the array, and that without any effort of memory on my part. (Poincare, 1924,p. 385, original 1908)

In placing high value on this aesthetic feeling, Poincaré wrote in an essay entitled "Mathematical Definitions and Education", that "it is by logic we prove, it is by intuition we invent" and that "Logic, therefore remains barren unless fertilized by intuition"(cited in Miller, 1992, p.394) .

It is therefore interesting to note Einstein's definition of intuition as one also relying on a feeling for or connection with the phenomena under study

There is no logical path leading to these laws (of nature) but only intuition, supported by sympathetic understanding of experience. (cited in Miller, 1992 p. 408)

and furthermore that "the really valuable factor is intuition"(Beveridge, 1950, p.68).

These historical accounts are not inconsistent with the finding of the recent study of creative problem solving (Aldous, 2005; 2006) that attending to feeling in listening to the self is important for the creative process. Some verbal protocols from this study, indicating an important role for feeling and intuition, are recorded below.

Some numbers **feel** prime to me. Some answers I get don't **feel** good and those ones usually aren't. (David)

It was a case in part of trying to determine why my intuitive **feeling** was my intuitive **feeling**. (Eddie)

I could **feel** it. I could actually **feel** it in my brain. The analysis would take over, and then that would reach a dead end and then I would look for some intuition of where to go. I could **feel** it happening in my head. (Barbara)

I'm thinking the images but **feeling** their correctness. (Anne)

Cognitive psychology and neuroscience

Neuro-scientific evidence indicates that certain processes related to emotion and feeling are indispensable to rational thinking (Damasio, 1994). In his book, *Descartes's error: Emotion, reason, and the human brain*, Damasio (1994) describes cases in which lesions in a small frontal area of the brain impaired the connection between reasoning and feeling. The patient was perfectly rational on all psychological tests and yet was unable to bring reasoning to any practical conclusion. Without feeling, the patient was unable to decide which of two rational alternatives was better.

While the common view holds that under certain circumstances emotion and feelings may be detrimental to reasoning, it is more surprising to read the finding that:

the *absence* of emotion and feeling is no less damaging, no less capable of compromising the rationality that makes us distinctly human and allows us to decide in consonance with a sense of personal future, social convention and moral principle. (Damasio, 1994, p. xii, italics in original)

and that :

feelings point us in the proper direction, take us to the appropriate place in a decision-making space, where we can put the instruments of logic to good use ... Emotion and feeling, along with the covert physiological machinery underlying them, assist us with the daunting task of predicting an uncertain future and planning our actions accordingly. (Damasio, 1994 p. xiii)

In highlighting the role of feelings in the making of rationality Damasio (1994) points out that, in order to strengthen rationality, greater consideration needs to be given to the world within, particularly to the elements of feeling and intuition. Indeed, according to Damasio (1994, p.xv) "feelings are just as cognitive, as other percepts" and that "educational systems might benefit from emphasizing unequivocal connections between current feelings and predicted future outcomes" (Damasio, 1994, p.247).

Hence, according to the weight of evidence presented thus far, it appears that listening to the self through attending to feeling is important in successfully solving a novel problem. Further, in a large scale study of 405 novel problem solvers, no successful solution was reached from a state independent of a feeling approach to reasoning (Aldous 2005).

Implication for learning and teaching

Thus, from a cognitive neuroscience perspective, encouraging students to attend to intuitive feeling is likely to increase their chances of reaching a successful solution in any novel mathematical or science problem-solving event. This has implications for mathematics and science learning and teaching and highlights the importance of the affective domain in developing new ideas and deriving innovative science.

The Interaction between Conscious and Non-Conscious Reasoning

A historical introspective account

Noted chemist Friedrich August von Kekulé is credited with deriving the structure of the benzene carbon ring. However the striking feature about this discovery, is that after having worked on the problem for a long time, he is reported to have done so from a non-conscious dream-like state. In his dream-like state, atoms writhing in snake-like motion folded back on each other to form a ring (Weisberg, 1993). Kekulé reported the dream, in the following words, in a speech at a dinner commemorating the discovery.

I turned my chair to the fire and dozed. Again the atoms were gamboling before my eyes. This time the smaller groups kept modestly to the background. My mental eye

rendered more acute by repeated vision of this kind, could now distinguish larger structures, of manifold conformation; long rows, sometimes more closely fitted together; all twining and twisting in snakelike motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke ... Let us learn to dream, gentlemen. (Weisberg, 1993, p. 149-150)

Cognitive psychology and neuroscience

Interestingly, cognitive psychology has identified two systems of reasoning (Epstein, 1994; Sloman, 1996). One of these, the rule based or rational system, is characterized by conscious activity. The other, an associative or experiential system, is characterized by non-conscious activity. Indeed Epstein (1994) proposes that creativity, among other higher order functions, involves the complex processing of both the experiential and rational systems.

The recent study of novel problem solving documented herein, found expert problem solvers drawing on non-conscious reasoning to solve novel problems. In particular, such experts derived a valid solution to a novel problem using associative patterns of reasoning yet could give no logical explanation as to why this should be the case. Only with further questioning was a conscious explanation derived through the process of conscious rule based reasoning (Aldous 2005). Some examples of protocols evidencing non-conscious activity are given below.

I must admit, when I was drawing it ... I didn't know the solution until I'd finished drawing it. You know what I mean? I must have had a glimmer of it in my head. It was almost like my head wasn't controlling my hand ... my subconscious just fully took over. (Anne)

It's something I've always known about myself mathematically that if I can't see the answer straight away if I just sort of let my head go fuzzy and stare at it (i.e. the problem), it comes. The answer just comes. (Barbara)

I've got to say, it used to worry me ... that I didn't appear to be thinking, like other people think, or ... how I thought other people thought ... For me to actually think about it ... was actually more the emptying of the mind than the filling of it. But I pretty well always got the right answer. (Barbara)

... it was a case of the method that I suggested occurred almost sort of naturally as being the way one would go about the problem in an optimal fashion, and so when I got my initial '8' I was reasonably confident about it on an almost intuitive basis, because it just seemed to me the obvious way to do it (Eddie)

Interestingly, an important role for the psychological states of defocused attention and pre-conscious activity, have been identified in studies involving the biological basis of creativity (Martindale, 1999). According to Martindale (1999, p.149) such states could arise in three ways: "low levels of cortical activation, comparatively more right than left hemisphere activation, and low levels of frontal-lobe activation". Further an important role for non-conscious activity was evidenced in recent experimental research seeking to enhance creativity by switching off the left fronto-temporal lobe using transcranial magnetic stimulation (TMS) (Snyder, Bossomaier and Mitchell, 2004; Snyder, Mulchany, Taylor, Mitchell, Sachdev, Gandevia, 2003; Young, Ridding and Morrell 2004) . Higher order functioning involving mind-sets, it was thought got in the way of seeing information in different ways (Phillips, 2004). By switching off higher order mind sets for short periods of time, it was theorized that, creativity would be enhanced. Although Snyder and Mitchell (1999) advocated that extraordinary skills (including mathematics and drawing) were within us all, Young and co-workers (Young et al, 2004) argued that such skills were likely to be possible for some but not all.

However, the evidence generated from this experimental research, while promising is not yet conclusive (Phillips, 2004). Nevertheless, when taken in concert with data reported in the recent study of creative problem solving (Aldous, 2005, 2006) together with historical accounts of

introspection, such neurological research provides food for thought regarding the significance of the defocused state in realizing a creative idea. It also points to the important role of incubation, carried out at a range of levels of awareness to the creative process.

Implication for learning and teaching

Therefore according to the evidence presented herein, it appears that there is merit in allowing students time to incubate on a novel problem and in encouraging them not to give up because a solution is not immediately apparent. Setting a task aside for a period of time may well permit some non-conscious activity to manifest itself. Having said this however, it is likely to be necessary to apply conscious mental activity in explaining the outcome.

BRINGING IT ALL TOGETHER: CONSTRUCTING A FRAMEWORK

Summarizing the findings to date, evidence has been presented to indicate that creativity: (a) relies on preverbal and non-verbal processes including visual spatial thinking (b) involves pre-conscious activity; and (c) may give rise to a feeling or intuition. Further it appears likely that creativity involves oscillating between thinking and feeling and moving between focused and defocused states of attention. In synthesizing evidence derived from historical introspective accounts of the past, with the cognitive neuroscience and empirical studies of the present, a number of elements emerge:

- visuo-spatial and linguistic circuits of the brain;
- conscious and non-conscious mental activity; and the
- generation of feeling in listening to the 'self' including that of intuition.

If these elements are superimposed onto the classical model of creative problem solving, together with the cycles of feedback identified by Shaw (1989) a clear framework emerges. This framework is presented in Figure 3.

In Figure 3, Self State One is aligned with non-conscious processing and Self State Two with conscious processing. The element connecting these two states of self is the Intuitive function. It is proposed that the Intuitive function acts as an evaluative filter involved in the generation and interpretation of feeling. Further, the Intuitive function mediates the interactions of the visuo-spatial and linguistic circuits.

The Areti loop, aligned with cycles of feedback between the phases of preparation and incubation in the classic model of creative problem solving is associated with cycling between Self State One and Self State Two. This cycling may occur through the visuo-spatial and linguistic circuits. It may also occur through the Intuitive function. The Vinacke loop, aligned with cycles of feedback between the phases of incubation and illumination, is associated with cycling between Self State One and the Intuitive function. The Lallas loop, aligned with cycles of feedback between the phases of illumination and elaboration is associated with cycling between the Intuitive function and Self State Two. The Communication and Rossman loops are associated with cycling between Self State Two, the problem-solving outcome and every other phase of the creative problem solving process. The extent of recycling depends on the validation of the problem-solving outcome. Finally, a complete validation of the outcome may result in the individual exiting the creative problem solving process entirely, while a partial validation may result in the individual revisiting any stage or stages in the creative process, namely preparation, incubation, illumination or elaboration.

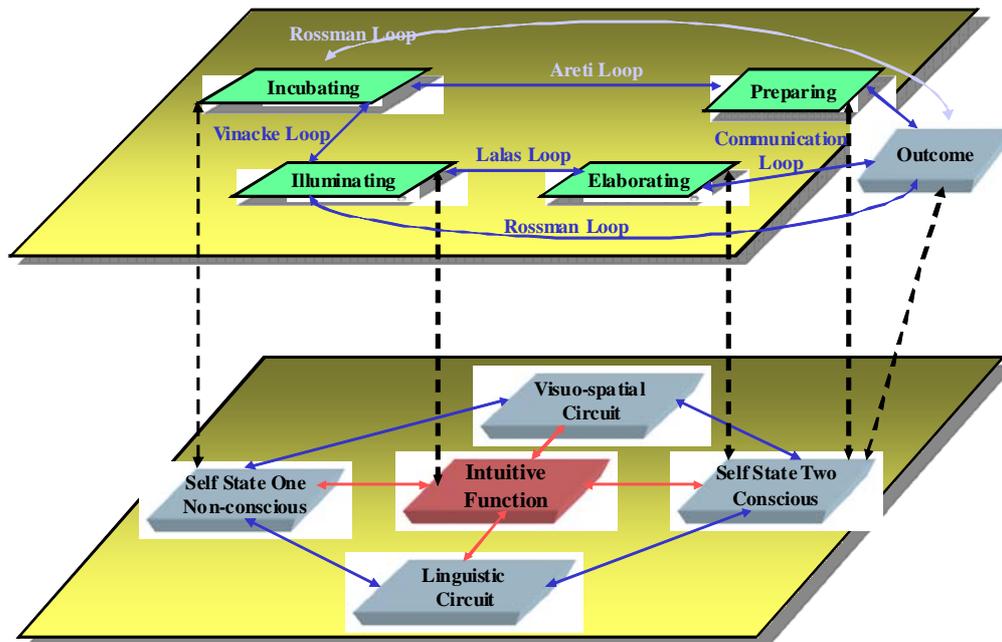


Figure 3: The conceptual framework of creative problem solving and cycles of feedback

CONCLUDING COMMENTS

Based on evidence presented in this paper, the representation of creativity posited in this framework suggests that unless cycling between Self State One and Self State Two gives rise to a feeling, such as that interpreted by the Intuitive function, then a successful solution to a novel problem solving event or the generation of a new ideas is unlikely. Similarly unless cycling between the visuo-spatial and linguistic circuits gives rise to a feeling then the likelihood of finding a successful solution will also be low. Just as Einstein, Poincare and McClintock arrived at new intellectual orders by following a feeling, so too does this framework place high value on attending to feeling in the recognition and evaluation of new ideas. This high value is predicated on the central placement of the Intuitive function within the framework.

Consequently, in characterizing the successful novel problem solver, this framework predicts that such individuals attend to feeling in listening to the self. As such they are likely to take the paths that operate through the Intuitive function. By contrast unsuccessful individuals in a novel problem solving event, this framework predicts, are those that operate through paths external to the Intuitive function. Such individuals are likely to fail to attend to feeling in listening to the self.

Given the evidence presented from historical introspective accounts, from cognitive psychology and neuroscience and from a recent study of creative problem solving educators would do well to attend to the non-cognitive as well as the cognitive elements in science and mathematics learning and teaching. While the gap between what is known about the non-cognitive elements of feeling and intuition and its role in learning and teaching is large

the role of emotion in cognition holds the potential for important innovations in the science of learning and the practice of teaching. (Immordino-Yang and Damasio, 2007, p.10)

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Gender differences in mathematical problem solving patterns: A review of literature

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A large body of literature reports that there are gender differences in mathematical problem solving favouring males. Strategy use, as a reflection of different patterns in mathematical problem solving between genders, is found to be related to cognitive abilities, together with psychological characteristics and mediated by experience and education. Many complex variables including biological, psychological and environmental variables are revealed to contribute to gender differences in mathematical problem solving in some specific areas. This article suggests that the combined influence of all affective variables may account for the gender differences in mathematical problem solving patterns.

gender differences, mathematical problem solving,
mathematical problem solving patterns, school students

In the past few decades, research has repeatedly reported gender differences in mathematics performance on a number of standardised mathematics tests such as the Scholastic Assessment Test-Mathematics (SAT-M) (Gallagher, 1990, 1992; Gallagher and DeLisi, 1994; Hyde, Fennema, and Lamon, 1990; Royer, Tronsky, Chan, Jackson and Marchant, 1999; Willingham and Cole, 1997). The test scores on these standardised tests have been regarded as an important measure of abilities to do mathematics problems (Casey, Nuttall, Pezaris, and Benbow, 1995; Halpern, 2000; Stumpf and Stanley, 1998). But results from these studies are not consistent: some found that males generally outperformed females on mathematical tasks (for example, Maccoby and Jacklin, 1974; Fennema and Carpenter, 1981; Halpern, 2000); some showed different sizes of gender differences with respect to types of mathematical tasks (for example, Voyer, Voyer, and Bryden, 1995). Hyde, et al. (1990) suggested that there was very small or null gender difference in mathematics performance on these tests. Caplan and Caplan (2005) even argued that the link between gender and the mathematics performance was very weak. Can test scores measure the real differences in cognitive abilities and abilities to solve mathematical problems between females and males?

Reviews of research led to the conclusions that there were gender differences in mathematical problem solving that favoured males based on the fact that male samples outperformed female samples in their studies (for example, Benbow and Stanley, 1980, 1983; Benbow, 1988; Casey et al., 1995; Gallagher and DeLisi, 1994; Royer, et al., 1999). However, these conclusions were often limited to an atypical population, normally talented or highly-motivated or college bound students, and relying on the selection of measures and the particular experimental situations (Caplan and Caplan, 2005). These conclusions were even sometimes challenged by the opposite evidence found among these high-ability populations. For example, Pajares (1996) found that gifted girls outperformed gifted boys in mathematical problem solving. Do the conclusions drawn from these highly selected populations reflect the real situation of a more general population? In addition, if gender differences do exist in mathematical problem solving, whatever they are, would there be any different patterns of mathematical problem solving between genders? And what are they if there are any?

Problem solving is the foundation of much mathematical activity (Reys, Lindquist, Lambdin, Smith, and Suydam, 2004). It is so important that the National Council of Teachers of Mathematics (NCTM) has identified it as one of the five fundamental mathematical process standards¹ (NCTM, 2000). Therefore, to find gender differences in mathematical problem solving patterns if any, to investigate these patterns from different perspectives, and thus to link to educational practice, would have significant consequences for educators.

My efforts started with finding factors that contributed to gender differences in mathematical problem solving, and then moved to biological, psychological, environmental perspectives, in order to find gender specific patterns of mathematical problems solving and possible explanations of their existence. However, research related to this issue was numerous but far to be systematic. Evaluating the related works that have been done and then addressing new directions for future research are therefore very difficult. This article has included several relevant studies to try to uncover answers to the questions mentioned before and to identify possible directions for future research.

MATHEMATICAL PROBLEM SOLVING: WHAT IS IT?

Mathematical problem solving is a complex cognitive activity. Some mathematical literature described mathematics problem solving as several separate activities such as doing word problems, creating patterns, interpreting figures, developing geometric constructions and proving theorems (Willson, Fernandez and Hadaway, 1993). While Polya's theory (Polya, in Willson, Fernandez and Hadaway, 1993) defined mathematical problem solving as a process that involved several dynamic activities: understanding the problem, making a plan, carrying out the plan and looking back. The latter definition is applied to the discussion in this review.

Reitman (1965) described a problem solver as someone who received information and a goal without an immediate means to achieve the goal. In order to achieve the goal, the mathematical problem solver must develop a base of mathematics knowledge and organise it, create an algorithm and generalise it to a specific set of applications, and use heuristics (strategies, techniques, shortcuts) and manage them (Willson, Fernandez and Hadaway, 1993). Two types of thoughts: spatial inductive thought and verbal-logical deductive thought are both believed to be important to mathematical problem solving (Battista, 1990; Tartre, 1993). During the process, students might apply a number of general strategies such as a solution rubric, a logical-mathematical reasoning, a trial-and-error approach and an outright guess to derive answers on mathematical problem solving tests (Gallagher, DeLisi, Holst, McGillicuddy-DeLisi, Morely and Cahalan, 2000). Mayer (2003) divided mathematical problem solving into four cognitive phases: translating, integrating, planning and execution. Royer and Garofoli (2005) classified them into two stages: representation of a problem and solving the problem. Similarly, Montague (2006) defined mathematical problem solving as a process involving two stages: problem representation and problem execution. Both of them regarded representing the problem successfully as the basis for understanding the problem and making a plan to solve the problem. Specifically, Rocha, Rocha, Massad and Menezes (2005) indicated that coordination among "different neuron assemblies" (p.369) of related brain areas was essential to the solution to arithmetic problems.

As a conclusion, a mathematical problem solver not only required cognitive abilities to understand and represent a problem situation, to create algorithms to the problem, to process different types of information, and to execute the computation, but also had to be able to identify and manage a set of appropriate strategies (heuristics, techniques, shortcuts etc.) to solve the problem.

STRATEGY USE AS A RELECTION OF GENDER DIFFERENCES IN

¹ The five fundamental mathematical process standards: problem solving, reasoning and proof, communication, connections, and representations (NCTM, 2000).

MATHEMATICAL PROBLEM SOLVING PATTERNS

Hyde et al.'s (1990) meta-analysis of 100 studies suggested that gender differences in mathematics performance were small but gender differences in mathematical problem solving with lower performance of women existed in high school and in college. Many studies also pointed out the existing of gender differences in mathematical problem solving (Linn and Petersen, 1985; Ben-Chaim, Lappen and Houang, 1988; Tartre, 1990, 1993; Royer et al., 1999; Gallagher, et al., 2000). Many factors such as cognitive abilities, speed of processing information; learning styles, socialisation were suggested to have contributions to gender difference in mathematical problem solving (for example, Duff, Gunther, and Walters 1997; Kimball 1989; Linn and Petersen, 1985; Maccoby and Jacklin, 1974; Royer, et al., 1999). Based on these findings, we may assume that females and males have different patterns of mathematical problem solving. Since many mathematical problems on standardised tests are multi-step and require some systematic approach, students could arrive at a correct solution by choosing and combining a set of appropriate strategies. Strategy flexibility is important for successful performance on standardised tests such as the SAT-M (Gallagher et al, 2000). Only focusing on test scores might not reveal gender differences in problem solving patterns, investigating gender differences in strategy use might shed some light on researching gender patterns of mathematical problem solving. In this section I include some relevant studies that posited some hypotheses on students' strategy use from different perspectives, to try to compare different patterns of mathematical problem solving between female and male students.

Some research studies have reported gender differences in strategy use among elementary school students (Carr and Jessup, 1997; Carr, Jessup and Fuller, 1999; Carr and Davis, 2001; Fennema, Carpenter, Jacob, Frank, and Levi, 1998). First-grade girls were more likely to use a manipulative strategy and first-grade boys were more likely to use a retrieval strategy to solve mathematics problems (Carr and Jessup, 1997). Carr and Davis (2001) found that during the free-choice session of their study, girls and boys showed different preferences for strategy use to achieve the solution, which replicated the earlier findings of Carr and Jessup (1997); while during the game condition that constrained the types of strategies children used, boys showed the same ability as girls to use a manipulative strategy to calculate solutions, but girls were not as able as boys in the use of a retrieval strategy. Fennema et al. (1998) suggested girls tended to use more concrete strategies and boys tended to use more abstract strategies and that elementary school boys tended to be more flexible in employing strategies on extension problems than elementary school girls. Their study also found girls chose to use more standard algorithms than boys at the end of Grade 3. However, there were no gender differences in the group whose members had used *invented algorithms*² in the earlier grades.

Gender differences in strategy use were evident among secondary school students (Gallagher and Delisi's, 1994; Gallagher et al, 2000). Tartre's (1993) suggested that high school boys tended use a "complement" (p.52) strategy to solve problems involving three-dimensional figure. High school girls tried to use more writing to solve problems requiring a written strategy. Studies by Gallagher and her collaborators (Gallagher and Delisi, 1994; Gallagher et al, 2000) reported that among high school high-ability students there was no overall gender difference in the numbers of correctly answered items on the SAT, but under different situations, females and males approached mathematical problems by using different strategies.

Gender differences were evident in successful patterns and in strategy use on conventional and unconventional problems...female students were more likely than male students to correctly solve "conventional"³ problems (by) using algorithmic

² *Invented algorithm* is used by Fennema et al (1998) to identify strategies that involved abstract procedures children construct to solve multi-digit problems. It is distinct from those strategies with automatized quality.

³ Gallagher (1990, 1992) classified many of the problems on the SAT-M into two categories: conventional problems are those problems that can be solved by familiar algorithms, which are normally textbook-problems;

strategies; male students were more likely than female students to correctly solve “unconventional” problems (by) using logical estimation and insight. (Gallagher et al., 2000, p.167)

Related to Cognitive Abilities

Researchers have made a point that there is a relationship between the levels of student’s abilities and strategy choice and efficiency (Lohman and Kyllonen; Kyllonen, Lohman and Snow; Kyllonen, Lohman and Woltz; Wendt and Risberg, in Burin et al., 2000). Higher ability students tended to solve problems by using more spatial processes, while the others tried to solve problems in a more analytical way. Tartre (1990, 1993) suggested that females with high spatial orientation (SO) skills were assumed more than high SO males to be able to integrate spatial and analytic or language skills to successful problem solution. Tartre also found that low SO males were found to be able to use the verbal hint effectively to help solving problems; but low SO females needed help more often and did not always use it successfully. It can be concluded from Tartre’s study that the gender differences in strategy use during mathematical problems solving fall into two classes: (a) on one hand, gender difference within groups with high-spatial level skills arose through the ability to integrate many problem-solving strategies, with which females did better than males; (b) on the other hand, gender difference within groups with low-spatial level skill arose from the ability to use other skills to compensate, in which males outperformed females.

The discrepancy between spatial and verbal abilities also affected both females’ and males’ strategy use. Since many mathematical problems could be solved either by a spatial approach or by a verbal approach or by both of them, the discrepancy between spatial and verbal abilities would influence how students approached mathematical solutions (Krutetskii, 1976). For example, a student with high spatial ability and low verbal ability might try to use more spatial strategies to solve mathematical problems, while students high or low in both abilities might be more variable in strategy use (Battista, 1990). Therefore, if male and female students were discrepant in strengths and weaknesses of their spatial and verbal abilities, they would solve mathematical problem differently. A different ratio in the use of spatial to verbal skills (Maccoby and Jacklin, 1974), which in turn would influence students’ problem solving abilities and strategies (Battista,1990), might create different patterns of mathematical problem solving between the two genders.

Fennema and Tartre (1985) conducted a three-year longitudinal study among middle school students (Grade 6 to Grade 8) in order to examine how students with discrepant spatial visualisation (SV) and verbal skill solved mathematical problems. The samples were divided into four groups: high SV/ low verbal males, high SV/ low verbal females, low SV/ high verbal males, and low SV/ high verbal females. Each participant was interviewed during each year and every time they were required to solve mathematics problems by drawing pictures and then to explain why they did so. In this study, no significant difference was found among groups in ability to solve mathematical problems, but differences in patterns of problem solving were detected: high SV/ low verbal groups tried to translate more information into pictures to solve problems, while low SV/high verbal groups tended to respond to problems by providing more relevant verbal-information. A large difference was also found within the female groups in terms of how much help was needed: the low SV/ high verbal females needed the most help to complete a picture to help solving problem, while the high SV/ low verbal females needed the least help. But the difference between the two male groups in this respect was small.

Battista (1990) conducted a study among 145 high school geometry students from middle-class communities. This research examined the role that spatial visualisation and verbal-logical thinking played in gender differences in geometric problem solving in high school. The findings

unconventional problems are those problems that can be solved by using of logical estimation or insight or usual using of familiar algorithms, which are not presented frequently in textbooks.

suggested that males and females differed in the level of discrepancy between spatial and verbal abilities. The discrepancy between spatial and verbal skills was related to geometric problem solving for both genders. In addition, this study indicated that males with greater “discrepancy of spatial visualisation over verbal-logical ability” (Battista, 1990, p.57) were more likely to use visualisation strategies than to use drawing strategies in problem solving. However this conclusion only held for males, in another words, the discrepancy between spatial and verbal abilities do not influence females’ strategy use in geometric problem solving.

Interfered with Psychological Characteristics

However, not every researcher shares the opinion that strategy choice and strategy efficiency is determined by the level of ability. Burin et al. (2000) found that there was no such a relationship at least on visualisation tasks. So why do females and males develop different strategies if there is no such a relationship? There are also some other considerations.

Gallagher et al. (2000) suggested that males tended to be more flexible than females in applying solution strategies. Kessel and Linn (1996) and Gallagher (1998) reported that females were more likely than males to adhere to classroom-learned procedures to solve problems, so they might be less likely to use shortcuts and estimation techniques for solving unfamiliar and complex problems quickly. Meyer, Turner and Spencer (1997) reported that “challenge avoiders”⁴ were more likely than “challenge seekers” to use surface strategies which required minimal processing of information to solve problems. Carr et al. (1999) found that first-grade boys’ strategy use was related to perception of adults’ attitudes toward various strategies and teachers instruction, while this relationship was not applicable to first-grade girls’ strategy use. Quinn and Spencer (2001) suggested that the interference of stereotype threat with females’ ability influenced females’ selection of problem-solving strategies.

This evidence discussed above indicates that strategy use in mathematical problem solving may be influenced by learners’ psychological characteristics.

Mediated by Experience and Education

Many researchers suggested that mathematical problem-solving strategies responded to training (for example, Hyde et al., 1990). A meta-analysis (in Hembree, 1992) of 487 studies on problem solving found a positive impact on students’ problem solving performance resulted from instruction especially being trained in heuristical methods. Ben-Chaim et al. (1988) found that both genders benefited significantly from the training program on spatial visualisation (SV) skills. However, the instruction in their study did not eliminate sex differences in SV skills. I assume that the applied instruction in this study may not be effective in the same way for females and males, although there is no evidence to support my opinion from their article. Would gender specific instruction eliminate or minimise gender differences in mathematical skills and to what extent should gender specific instruction be given with respect to different types of mathematical problems? These issues remain to be investigated in the future.

In my reviews of published studies, I did not find much research concerned with how characteristics of classrooms and teachers contributed to gender differences in strategy use during mathematical problem solving. However, some studies indicated that these variables were related to gender differences in mathematical achievement (Petersen and Fennema, 1985). Another small piece of evidence was that first-grade girls did not benefit as much as did boys from their perceptions of teachers’ beliefs and instruction to develop their strategy use for problem solving from the very beginning of their academic training (Carr et al., 1999). In order to develop effective teaching to facilitate students’ mathematics learning, these issues also need to be

⁴ “Challenge seekers” and “challenge avoiders” were defined by Meyer et al. (1997) in their study as two different students groups based on the level of self-perception and behaviours.

addressed in future research studies.

FACTORS THAT CONTRIBUTE TO GENDER DIFFERENCES IN MATHEMATICAL PROBLEM SOLVING

Many factors were suggested by researchers to make a contribution to gender difference in mathematical problem solving. A main line of research has focused on the gender differences in problem solving abilities. In this area, spatial abilities were of major concern. Another line of research paid attentions to speed of problem solving, in which a Math-Retrieval hypothesis is still in hot argument among some scholars (see, Gallagher & Kaufman, 2005). This section reviews some related studies that have examined gender difference in these factors with relation to mathematical problem solving.

Cognitive Abilities

Since 1974 when three cognitive abilities (verbal, quantitative and visual-spatial abilities) were identified by Maccoby and Jacklin (1974) as the loci of sex differences, numerous studies have been intrigued to confirm and extend their conclusions as a result. One line of research focused on the relationship between these cognitive abilities and gender differences in mathematical problem solving. However, evidence from these studies is inconsistent and sometimes conflicting. Examples of these inconsistencies are shown in the following discussion.

Spatial abilities

“Spatial abilities generally refer to skill in representing, transforming, generating and recalling symbolic, nonlinguistic information” (Linn and Petersen, 1985, p.1482). “Spatial skills involve the ability to think and reason using mental pictures rather than words” (Nuttall, Casey, and Pezaris, 2005, p.122). They are believed as one important component of mathematical thought during mathematical problem solving (Battista, 1990; Casey, 2003; Halpern, 2000).

There are a variety of spatial tasks, for example the Piaget Water-Level Task, Money’s Road Map Test, paper folding, hiding pictures, mental rotation tasks and so on, that are designed to examine spatial abilities. However, not all these tasks are related to mathematical processes. For example, only tasks involving spatial reasoning, which is composed of two types of spatial skills: visualisation (multistep reasoning) and orientation (mental rotation), were identified by Friedman (1995) to “have the most in common with mathematical processes” (p.23). I choose this classification to consider the gender differences in these spatial skills and their relationships with mathematical problem solving.

Spatial visualisation has been defined as “those spatial tasks which involve complicated multi-step manipulations of spatially presented information” (Linn and Petersen, 1985, p. 1484). Although many researchers have found that spatial visualisation and problem-solving were related (for example, Battista, 1990; Fennema and Tartre, 1985; Sherman, 1979), studies investigating gender differences in spatial visualisation have reported inconsistent results. Ben-Chaim et al. (1988) found that there were statistically significant gender differences in spatial visualisation among middle school students; while other researchers concluded that gender differences in spatial visualisation were small or null among middle school students (Armstrong, 1980; Fennema and Sherman, 1977, 1978; Linn and Petersen, 1985; Tartre and Fennema, 1995; Voyer et al, 1995). These inconsistent results may be due to the changes over time affecting the experiential influence on the measures, or due to different size of samples, or due to the instrumentation used (Ben-Chaim et al., 1988), or due to the test *per se* because some spatial tasks do not show gender difference (Halpern, 2000), or due to the influence of other variables such as different strategies used by males and females (Burin, Delgado and Prieto, 2000). Since observed patterns of mathematical problems solving for each gender may depend on the measure used in studies, this factor may need to be carefully examined.

Mental rotation refers to the ability to transform mentally and manipulate images when the object is rotated in three-dimensional space (Nuttall et al., 2005). Many studies suggested that there was a large gender difference in mental rotation ability with males outperforming females (Casey et al., 1995; Halpern, 2000; Linn and Petersen, 1985; Masters and Sanders, 1993; Voyer, et al., 1995). For example, Linn and Petersen's (1985) meta-analysis found large heterogeneous differences in mental rotation. For example, Casey et al. (1995) found a significant relationship between mental rotation skills and the SAT-M scores in their female sample and this relationship remained after verbal tests scores were statistically controlled. They concluded that mental rotation ability was important for girls' performance on the SAT-M. Casey et al. also suggested that for college-bound and high ability students mental rotation ability was a critical factor contributing to gender differences on SAT-M. However, this conclusion, drawn from a highly-selected sample of high ability students, is hard to disentangle the real situation of general student population.

Spatial abilities were reported to have relationship with mathematics test scores (Burnett, Lane, and Dratt, 1979; Casey, Nuttall, Pezaris and Benbow, 1995; Casey, Nuttall and Pezaris, 1997; Geary, Saults, Liu, and Hoard, 2000; Robinson, Abbott, Berninger and Busse, 1996; in Nuttall et al, 2005). This relationship indicates that gender differences in spatial abilities may contribute to gender differences in mathematical problem solving. However, there are many issues involved. Lohman (1979, 1988, 1996) concluded that variation in measures of general intelligence could explain a considerable proportion of performance on spatial tests, especially complex spatial tests. Linn and Hyde (1989) stated that their meta-analysis found no evidence to support the hypothesis that gender differences in spatial abilities contribute to gender differences in mathematics performance. Instead, they suggested that gender differences in spatial abilities were declining and that "gender differences occur on spatial processes are not obviously related to mathematics" (p.18). Chipman (2005) also pointed out that for those studies (for example, Fennema and Sherman, 1977, 1978; Smith, 1964; Stallings, 1985; Werdelin, 1961, in Chipman, 2005) that reported correlations between spatial abilities and mathematics performance, "the evidence for a specific contribution of spatial ability to mathematics performance... is surprisingly weak" (p.8). These disagreements show that gender differences in spatial abilities may not be an explanation for gender differences in mathematical problems solving and conclusions from related studies need to be critically re-examined.

Verbal abilities

The contribution of verbal skills to mathematical problem solving is evident. Many mathematics problems can be solved either by a spatial solution, or using a verbal approach (Fennema and Tartre, 1985; Casey, 2003). Verbal-logical abilities are regarded as being important to geometric problem solving for both genders (Battista, 1990). Evidence from a variety of sources has shown that there were gender differences in verbal skills with females outperforming males on many verbal tasks (Maccoby and Jacklin, 1974; Halpern, 2000). However, Hyde and Linn (1988) concluded that gender differences in verbal abilities had declined and were negligible now.

Quantitative abilities or mathematical abilities

Although there is no widely accepted definition of mathematical abilities (Byrnes and Takahira, 1993), there is common agreement that quantitative abilities are important to mathematical problem solving. Studies that reported gender differences in mathematical abilities favouring males had generally consistent conclusions. Maccoby and Jacklin (1974) suggested that "boys excel in mathematical ability" (p. 352) but few gender differences emerged until about ages 12-13 years, when boys' "mathematical skills increase faster than girls" (p. 352). Linn and Hyde (1989) concluded that "average quantitative gender differences have declined to essentially zero... females are superior at computation at all ages and that differences favoring males on problem-solving emerge in high school."(p.19). Hyde et al. (1990) concluded that there were no gender

differences on computation tasks but differences favouring males emerged on problem-solving tests in high school and college. They also reported that the more complex the task was, the greater the likelihood that better performance would be found in males. But Benbow and Stanley (1980) drew different conclusions. They indicated that gender difference in mathematical reasoning ability in favour of boys was observed before girls and boys started to differ in mathematics courses taking. This gender difference even increased through the high school years. Benbow and Stanley (1983) also suggested that males dominated the highest end on mathematical reasoning ability before they entered adolescence. The different findings of Benbow and Stanley might be due to their highly-selected samples: intellectually gifted junior high school students (primarily Grade 7 students). But there is no evidence to support that their conclusion can be generalised to a general population. In addition, although a large gender difference in quantitative abilities was found among gifted boys and girls (Halpern, 2000), actual gender differences favouring females were found in samples of general population (Hyde et al., 1990).

Speed of Processing Mathematical Information

In some literature, the ability to solve problems quickly in unfamiliar circumstances was regarded as crucial to mathematics performance on standardised tests such as the SAT-M (Gallagher et al., 2000).

Royer et al. (1999) suggested that speed of fact retrieval in the field of mathematics contributed to gender differences in mathematical problem solving on timed tests such as SAT-M. Their studies showed that males were generally faster than females on math-fact retrieval tasks while there were no gender differences on simple retrieval tasks. However, females were slightly faster than males on verbal processing tasks. It was hypothesised that the automatic execution of math-fact retrieval, resulted in additional working memory capacity that could be used for problem representation and solution planning during problem solving; and males were more likely than females to develop the ability to retrieve basic mathematical facts rapidly and automatically. Therefore males had higher mathematics performance on timed tests such as SAT-M (Royer et al., 1999). Similarly, Geary et al. (2000) indicated a stronger relationship between mathematical problem solving and math-fact retrieval than the relationship between mathematical problem solving and cognitive abilities; males tended to outperform females on math-fact retrieval tests and SAT-M. However, the sources of gender differences in math-fact retrieval have not been examined in their studies. In addition, response latency, which Royer et al. (1999) used as one measure of gender differences in math-fact retrieval, was found in their report actually to favour females (Wigfield and Byrnes, 1999).

Another hypothesis supposed that females, on average, had different response styles with males on timed tests on which females might take a slower and more cautious approach to answering problems (Goldstein, Haldane and Mitchell, 1990). Therefore, if females do not have enough time to complete test, they cannot solve as many problem as males do, their test cores may be significantly lower than males', even if there are no real differences in cognitive abilities between genders. Goldstein et al. hypothesised that if females were given more time to finish tests, gender difference would be eliminated. Their finding that there was no gender difference on untimed mental rotation test strongly supported their hypothesis. But several researchers did not agree with the opinion that speed of responding could contribute to gender differences in mathematical problem solving (Delgado and Prieto, 1996; Masters, 1998; Resnick, 1993; in Halpern, 2000). For example, Resnick (1993) found that gender difference did not minimise in modified versions of mental rotation tests that allowed more time. The contribution of gender differences in response styles to mathematical problem solving needs further examination.

More Complex Variables Related with Gender Differences in Mathematical Problem Solving

Although gender differences in factors discussed above can partly account for gender difference

in mathematical problem solving, there are many questions that have not been answered. Are these gender differences more than individual differences? Are these differences correlated with biological, psychological and environmental variables? If both answers are yes, what kind of variables are they? Studies focusing on these questions are unsystematic. Therefore this section collects some possible explanations and classifies them into biological, psychological and environmental perspectives.

Biological Correlations

Sex differences in brain lateralisation function

An explanation in terms of sex differences in brain lateralisation function emphasises the different brain organisations of females and males and considers their relationships with gender differences in spatial and verbal abilities. It is assumed that the left and right hemispheres of females are more symmetrically (bilateral) organised for speech and spatial functions and males' are more asymmetrically (lateralised) organised. It also hypothesises that "greater lateralisation of function may be essential for high spatial performance and less lateralisation more important for verbal performance so males should superior in spatial tasks and females in verbal tasks." (Battista, 1990, p.48).

Springer and Deutsch (1981) reported that "both language abilities and spatial abilities are represented more bilaterally in females than in males" (P. 123). They suggested that "sex differences in verbal and spatial abilities may be related to differences in the way that those functions are distributed between the cerebral hemispheres in males and females" (p.121). Rilea, Roskos-Ewoldsen, and Boles (2004) found that the hemispheric processing varied across different types of spatial tasks. They suggested that spatial ability was not a unitary construct and different hemispheric processing might account for gender differences in these spatial measures. This study did not assess the strategies that people used to complete the spatial tasks, and whether strategies use correlated with hemisphere performance or not.

But Kimura (2002) stated an opposite point that for functions such as basic speech and spatial ability, there were no major gender differences in hemispheric asymmetry. Her laboratory work also found that damage to the right hemisphere had no greater effect on men than on women.

Sex differences in brain structure

This explanation suggests that the larger size of the corpus callosum (CC) in woman was correlated with a possible lower degree of lateralisation for spatial abilities (in Kimura, 2002; Halpern, 2000). This suggestion may be based on an assumption that larger CC, which is a major neural system connecting the two hemispheres, may permit better communication between hemispheres.

Influences of sex hormones

A line of research tended to attribute gender differences in cognitive abilities to the influence of sex hormones. For example, Geschwind's theory of prenatal hormonal effects (in Halpern, 2000; Halpern, Wai and Saw, 2005) assumed that higher levels of prenatal testosterone⁵ in males would result in a greater level of right-brain dominance, with which males would develop cognitive ability patterns that were more closely associated with right hemisphere functioning. Therefore because both mathematical reasoning and spatial abilities were under greater control by the right hemisphere, males outperformed females on mathematical reasoning and spatial tasks. Another example was Nyborg's theory of optimal level of estradiol⁶ (in Halpern, 2000; Halpern, et al., 2005). This theory suggested that sex hormone levels could partly account for gender differences in visual-spatial abilities. They suggested that males with high levels of estradiol (compared to

⁵ Testosterone is a kind of male sex hormone.

⁶ Estradiol is a type of estrogen, which is a kind of female sex hormone.

their male peers) and females with low levels of estradiol (compared to their female peers) would have higher level of spatial abilities. This theory needs strict confirmation from other studies.

Sex differences in brain activities during information processing

Some studies posited their theories on the basis of the sex differences in brain areas that are involved in mathematical information processing. Widely spread brain areas were reported to be involved in arithmetic processing, in which left frontal and parietal areas were described as the most common and important components (Burbaud, Camus, Guel, Boulac, Caillé and Allard, 1999; Cochon, Cohen, Moortele and Dehaene, 1999; Cowel, Egan, Code, Harasty and Watson, 2000; Dehaene, Spelke, Pinel, Stanescu and Tsvkin, 1999; Jahanshahi, Dirnberger, Fuller and Frith, 2000, in Rocha et al., 2004). Females consistently showed larger global field power for arithmetical processing in electroencephalogram (EEG) studies than males, and they also displayed different scalp field topography of enrolled brain areas during mental arithmetic (Skandries, Reik and Kunze, 1999). Rocha et al. (2004) found that the children's cerebral cognitive mappings (CCMs) were very different between boys and girls. Boys and girls exhibited "different neuronal assemblies" (p.369) for all types of arithmetic problem solving. They also suggested that this gender differences emerged at early elementary school stage and varied with age. According to their suggestions, the gender differences on response time might be explained by a better coordination between the sets of left frontal neurons and the sets of bilateral central-parietal cells in the case of male than in the case of females. However, only gender differences in brain activities of processing arithmetic problems were examined. This suggestion could not be applied to geometric or algebra problem solving due to lack of supporting data.

Psychological Contributions

Learning styles

Some researchers suggested that gender differences in mathematics can be explained by that boys and girls approached the learning of mathematics differently. Kimball (1989) offered a so-called "Rote versus Autonomous Learning Hypothesis" in her review of the gender and mathematics literature. It posited that females took a rote approach while males took an autonomous approach to learning mathematics. This gender differences in learning styles left females at a disadvantage when facing unfamiliar problems. Another hypothesis was advanced from Severiens and Ten Dam's (1994) meta-analysis of research after 1980. They concluded that males showed a greater preference than females to the abstract conceptualisation mode of learning.

Research has shown that males and females have different classroom experiences because they have different learning styles (Schwartz and Hanson, 1992). Females preferred to learn mathematics by using a conversational style, which fostered group consensus, encouraged collaboration, and contributed to constructing interrelationships of thoughts. Males, on the contrary, learned through argument and individual activity, which fostered independence and encouraged competition. But most classroom activities were organised to accommodate male learning styles (Ong, 1981); females were therefore more likely to be at a disadvantage than males in developing abilities or strategies for solving mathematical problems.

Learner's attitudes

This explanation accentuates that gender differences in learner's attitudes had an impact on how females and males solved mathematical problems. Many attitudinal differences, such as mathematics anxiety, confidence in mathematical ability, stereotype view of mathematics, perceptions of differential expectations and encouragement (Buchanan, 1987; Caplan and Caplan, 2005; Carr et al. 1999; Duff, Gunther and Walters, 1997; Fennema and Sherman, 1977; Tartre and Fennema, 1995), were found to contribute to gender difference in mathematics learning (Caplan and Caplan, 2005). One piece of evidence for this opinion was that the confidence gap between males and females might dissuade some females from taking shortcuts on tests such as the SAT-

M. Benbow (1988) stated that she was unable to find support for any of these explanations in data of the Study of Mathematically Precocious Youth (SMPY). But her opinion was not supported by much research (Royer et al., 1999).

Stereotype threat in mathematics tests

Stereotype threat⁷, the concern that others will view one stereotypically (Spencer, Steele, and Quinn, 1999), has been identified recently by some researchers to account for the gender differences in mathematical problem solving. Recent research (Keller, 2002; Spencer, Marx, Brown, and Steele, 1999; Shih, Pittinsky, and Ambady, 1999; Smith and White, 2002; Spencer, Steele and Quinn, 1999; Steele, 1999) has documented that stereotype threat interfered with girls' performance on standardised mathematics tests. For example, Walsh, Hickey and Duffy (1999) found that item content did not account for gender differences on the Canadian Test of Basic Skills (CTBS) and SAT, but gender differences were found when the female participants believed that these tests has shown gender differences before. Quinn and Spencer (2001) found that stereotype threat depressed female's performance on standardised mathematics tests. These findings suggested that the gender stereotype threat could be a key factor that accounted for gender differences in mathematical problem solving. Stereotype threat interfered with females' ability influenced their selection of problem-solving strategies. These studies will certainly undergo careful scrutinies and replications in different context with different groups. However, a new line of research may be sketched in the future investigation.

Environmental/Experience Influences

Socioeconomic variables

An explanation underlines socioeconomic variables played an important role in gender difference in children's development of spatial skills. These spatial skills may be acquired through playing with toys and materials that are related to spatial skills, while socioeconomic variables can affect children's opportunities to be engaged in such kinds of activities for promoting their development of spatial skills. However, these activities have been generally considered "more appropriate for boys by our culture" (Serbin, Zelkowitz, Doyle, Gold, and Wheaton, 1990, p.615). Therefore greater access to male sex-typed toys may be a factor in explaining for boys' better visual-spatial skills.

Serbin et al. (1990) concluded that mothers' occupation status had a significant impact on children's development of visual-spatial skills through greatly influencing the availability of playing with male sex-typed toys. Levine, Vasilyeva, Lourenco, Newcombe and Huttenlocher (2005) reported that socioeconomic status (SES) modified the gender differences in spatial skill. Boys in high and middle-SES groups outperformed girls on spatial tasks in these groups, while there was no gender difference in the low-SES group on spatial tasks.

Socialisation

Some researchers highlighted the important contribution of socialisation to gender differences in mathematics. In a longitudinal study to examine gender differences in mathematical problem solving skills among high ability students, Duff et al. (1997) posited an assumption that the interaction of attributes of mathematical problems with children's prior socialisation produced such differences. The 12-year-old participants (83 boys and 76 girls), who came from predominately white families, took part in two types of standardised mathematical problem-

⁷ Steele (1997, 1998, in Halpern, 2000) found that when talented students took an advanced test of mathematics with a negative stereotype that male will outperform female, male students did score higher than female students. When these students took the same test with a positive stereotype that female and male will score equally, there was no overall gender difference was found in test scores. Steele called such a phenomenon as "stereotype threat". Steele (1999) also found that among the talented the fear of being associated with a negative stereotype impaired intellectual functioning and disrupted test performance regardless of preparation, ability, self-confidence, or motivation.

solving tests: the CTBS and the GAUSS⁸. The results showed that although males outnumbered females among high ability students on the CTBS, there was no gender difference on the GAUSS and no overall gender differences at all tests among the same students. They also reported that the less a student saw mathematics as a male domain, the better the student's performance on problem solving. Based on these findings, they argued that gender differences in brain structure could not account for gender difference in problem solving.

Differential in mathematics course taking

Some studies have attributed gender differences in quantitative SAT performance to males and females' differential patterns of course taking. They suggested that increasing female's high-level mathematical course-taking would effectively increase their performance in quantitative SAT.

Students taking higher level mathematics courses would benefit from training in abstract reasoning and problem solving, from computational practice, and from generally being more comfortable in working with numbers. (Pallas and Alexander, 1983, p.170-171)

This explanation was in conflict with the conclusion of Benbow and Stanley (1980), who found that gender difference in mathematical reasoning ability in favour of boys, was observed among gifted youth before they started to differ in mathematics courses taking. The inconsistent conclusion might be due to the different samples they used.

Comprehensive Influences of All Affective Variables

The research discussed above illustrated that the situation of gender differences in mathematical problem solving is indeed complex. Many factors contribute to gender differences in mathematical problem solving, but the contributions of some factors are still being argued and only applicable in some specific areas, and they cannot account for findings from other areas. For example, Benbow (1988) reported that males outnumbered females at the upper end of the distribution in mathematically talented students. Benbow argued that these differences could not be explained by socialisation theories. However, this argument was in conflict with Duff et al.'s (1997) conclusion that socialisation was the main force behind these gender differences among high ability students. As Deff et al. indicated, genetic determinants could not explain why the same samples showed gender differences on one test but not on another test in the same study.

Another example is that the introduction of new neuronal techniques into educational areas, such as functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and biochemical and genetic analysis, does not show much strong evidence for explaining how these factors produce gender differences in mathematics, although they provide more information for various problem-solving activities at a neuronal level. Caplan and Caplan (2005) argued that biological determinists did not present more convincing evidence than before was not because of a lack of advanced methodologies but because "...both many 19th-century researches⁹ and many present-day researchers ...are trying to explain a difference (in mathematics ability) that has not been solidly shown through behavioural measures to exist" (p. 30).

⁸ The CTBS, was "a widely used standardized test of English and mathematical performance for Canadian students. Students were tested on the mathematical problem solving and concepts subscales at the beginning of the school year. The problem-solving scale in the CTBS is entirely composed of mathematical word problems". The GAUSS was "a test of non-routine mathematical problem solving in a multiple-choice format. It included computational problems as well as word problems. Some of the word problems involve geometry." (Duff, Gunther, & Walters, 1997)

⁹ Caplan and Caplan (2005) argued that the 19-century researchers who sought desperately to find a basis in the brain for what they assumed to be men's superior intelligence tried to find some bit throughout the brain on which they could pin this assumption that men were superior in intelligence. For example, they assumed that men's brains were probably bigger than women's. However, it failed to consider the proportional of brain size to overall body size.

Gender differences in mathematics must be understood in a framework that considers a comprehensive influence from the interaction of all biological, psychological and environmental variables. Halpern (2000) developed a psychobiosocial model to understand the comprehensive influence from the interaction of all affective variables. This model emphasised the interaction and interdependent relationships among all variables and did not try to separate effects and their relationships into independent variables. By borrowing this model, we can obtain a general impression of how biological and psychological variables interact with both experience and the environment to contribute to gender differences in mathematical problem solving patterns.

DISCUSSION AND CONCLUSIONS

Gender differences in mathematical problem solving, that is believed to be an important factor that contributes to gender differences in mathematics performance, have been given increased attention by researchers in the last few decades. I have presented here some of the findings from relevant studies that examined this issue. A review of these studies reveals that the situation of gender differences in mathematical problem solving is very complex.

The literature has consistently reported that males perform better on mathematics problem solving than females do among high ability students on standardised mathematics tests. These gender differences are generally obvious in high school and in college and vary across mathematical tasks. However, females and males' different patterns of mathematical problem solving, as reflected by different strategy use in problem solving, can be traced back to the very early stage of elementary schooling. It is found that students' strategy use is related to cognitive abilities, interfered with psychological characteristics and mediated by experience and education. In order to interpret these patterns, factors involved in mathematical problem solving are taken into this discussion, including cognitive abilities, speed of processing information and many complex variables related problem solving such as physiological differences in brains, influences of sex hormones, learning styles, learners' attitudes, stereotype threat in mathematics tests, differences in socialisation, and the impact of socioeconomic variables. All these factors are reported to contribute to mathematical problem solving, but the contributions of some factors are still in doubt and they are only be applicable in some specific areas.

A complex issue is raised from investigating gender differences in factors contributing to mathematical problem solving. How do these biological, psychological and environmental variables interact with each other and form a comprehensive influence on students' development of problem solving abilities and strategies? How do females and males develop different patterns of solving mathematical problems? There is not much related research. I suggest that the comprehensive influence of all affective variables should be understood in a complex and interactive framework. Halpern's (2000) psychobiosocial model may be employed to understand this issue, but our understanding needs to continue to develop and be based on the findings of future investigations.

Meanwhile, the fact that gender differences in mathematical problem solving are not biologically determined while possibly influenced by the combined impact of many different factors that have biological, psychological and environmental origins, give us promise that education can play a great role in eliminating or reducing gender differences in mathematical problem solving. On one hand educators need think about how to help all female and male students develop problem-solving abilities by using appropriate instruction. On the other hand educators need to consider critically the positive and negative impacts of classroom variables and make conscious effort to promote gender equity in mathematics learning.

From the studies reviewed taken together, several issues are worthy of attention:

First, the SAT-M is designed for able students in high school and to be predictors of academic performance in college. The SAT-M scores are not necessarily a measure of cognitive abilities and not the only measure of performance on mathematical problem solving. Studies need to focus

more on what people can do on problem tasks in practical situation and less on how well they can take tests.

Second, many standardised mathematics tests including the SAT-M are multiple choice tests, thus they do not provide diagnostic information about students' strategy use and working procedures during problem solving, the test scores may not reflect the real differences in problem solving between boys and girls on problem tasks in practical situation.

Third, findings from pre-selected samples can not be generalised to a general population. There is no meaning in repeatedly confirming gender differences among these highly selected samples. In order to investigate differences in mathematical problem solving patterns it may be more helpful for researchers to focus on individual differences, rather than to assume that girls are a inferior group while boys are a superior group or *vice versa*.

Forth, there is no single theory that can explain all the findings from different perspectives. Any conclusion that attributes gender differences in mathematical problem solving to a single factor is clearly problematic.

Fifth, little research has specified why gender differences in problem solving change over time and why females and males have different preferences for strategy use with respect to different types of mathematical problems.

Sixth, research on how different factors interact with each other to form the pattern of mathematical problem solving between genders is still very scant.

Consideration of these points can be helpful when designing future investigations.

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Learning content, physics self-efficacy, and female students' physics course-taking

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A review of literature reveals that self-efficacy (SE) has been shown as a successful predictor of students' course-taking. Many factors have been reported to have influences on physics self-efficacy (PSE), but most of them are contextual variables. This article suggests that learning content is also an influencing factor. Physics learning content in high schools is far from being congruent with girls' development of cognitive psychology and social cognition. This incongruence contributes to the lower PSE of girls, and consequentially leads to their less course-taking in physics. The relationship is examined with respect to the author's personal schooling experiences in China. Appropriate interventions to promote female students' physics course-taking need to be emphasised.

Learning content, physics learning, self-efficacy, course-taking, gender issues

Although the number of females has continuously increased in science fields in the past few decades, data (for example, NSF, 2005a, 2005b; DEST, 2005) has shown that a significant gender difference still exists in the number of students who decide to pursue a male-dominated physics major¹ after finishing secondary education. For example, statistics from National Science Foundation (NSF) (2005a, 2005b) showed that in 2004, 26 per cent of female students in the United States intended to major in science and engineering fields, compared to 41 per cent of male students. In the same year, female students were only about 22 per cent of all physics bachelor's degree awarded students in the United States, significantly less than male students.

Studies have shown that self-efficacy (SE), which is defined as the beliefs about ones' capabilities to accomplish a given task (Bandura, 1994), is a major predictor of students' academic achievement, career interest and course-taking (for example, Britner and Pajares, 2001; Hackett, 1985; Schunk, 1985; Zeldin and Pajares, 2000; Zimmerman, Bandura, and Martinez-Pons, 1992). Deficits in physics self-efficacy (PSE) of female students would appear to contribute to their less course-taking in the field of physics.

Many factors have been reported to have an influence on girl's PSE, such as parental emotional support (Scott and Mallinckxodt, 2005); classroom variables such as teaching strategies and classroom climates (Fencl and Scheel, 2005); prior performance (Hackett, 1985; Lent, Lopez and Bieschke, 1991, 1993), and the link between SE and career interests (Philips, 2002). However, SE is not only context but also content dependent (Shaw, 2004). Besides these context factors, physics learning content would also play a role in girl's development of PSE. Physics learning content in high school classrooms would not only be related to the textbooks and materials used in classrooms, but would also be embodied in the knowledge structure, the ways the knowledge was presented, as well as being strongly associated with classroom activities and classroom teaching strategies. Contextual and content factors are likely to interact with each other to have a

¹ The physics-related area where significant gender difference in course-taking was found includes physics science, computer science and engineering.

combined influence on students' learning motivation and career interests, which in turn jointly have an influence on learning experiences, and hence, the development of PSE. However, little research has been conducted at the high-school educational level with respect to considering the relationship between physics learning content and PSE.

The following sections discuss the effects of physics learning content on girls' physics course-taking in the high school context from both psychological and sociological perspectives. The relationships are examined in terms of my personal schooling experiences. On the basis of these discussions, the final section summarises my points of view of the relationship between learning content and female students' physics course taking, and gives suggestions for further investigation.

PHYSICS SELF-EFFICACY AND GIRLS' COURSE-TAKING

According to Bandura's (1994) social cognitive theory, SE is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p.71). Bandura (1994) hypothesised four main factors as the sources of SE: Mastery experience (experience of success), vicarious experience (learning from watching others succeed), social persuasion (feedback from other people), and physiological arousal (feelings involved with pursuing a task). People construct their SE through the interpretation and integration of information from these four sources.

Among the four main factors, mastery experience is regarded as the most effective source fostering people's SE: the experience of success in performing a task is likely to promote SE related to that task (Bandura, 1994; Britner and Pajares, 2006). But some researchers suggest that girls' learning is influenced more by social persuasions and vicarious experiences (Zeldin and Pajares, 2000). No matter what the arguments are with respect to the causes, they all suggest that higher SE is a strong predictor of academic success and course-taking when compared with academic talent (Bandura, 1986; Zeldin and Pajares, 2000). In the case of physics, female students who have higher PSE are more likely to take physics courses.

However, it is generally reported that females have lower physics self-efficacy (PSE) than males. Educators have long been concerned about how to promote girls' PSE and then to increase their physics course-taking. Their concerns have given rise to numerous attempts to improve girls' PSE through collegiate interventions. However, no amount of effort has thus far produced a successful solution. Is it because collegiate interventions have not worked effectively? The answer is "no". The critical damage to girls' participation rates in physics has happened much earlier. A proof here is that "attrition rates in postsecondary education are very similar for men and women" (Leslie, McClure, and Oaxaca, 1998, p.31). Most of the attrition of girls in physics occurs well prior to university entrance. For example, the ACER (in Lyons, 2005) studies showed a consistent gender difference in physics enrolments of Year 12 Australian students in 1993, 1998, 2001, with females only making up between 35 per cent and 38 per cent of all physical science students. Thus, earlier interventions based on examining a wide range of factors that affect girls' PSE and thus course-taking, must be implemented during girls' adolescent years.

COGNITIVE PSYCHOLOGY AND GIRLS' PSE

Learning content in high school physics classrooms can greatly influence girls' PSE through affecting girls' mastery experience and physiological arousals. This can be understood in terms of Piaget's learning theory. This learning theory is generally attributed to Jean Piaget and can be used to explain the importance of learning in promoting PSE of adolescents. According to Piaget (in Huitt & Hummel, 2003), individuals construct new knowledge from their experiences through processes of accommodation and assimilation. Assimilation allows the learner to fit their new experiences into an already existing cognitive framework; while accommodation urges the learner

to change the pre-existent cognitive structure to make sense of the environment. This theory suggests that teachers should engage students in meaningful learning to allow them develop knowledge by matching new information against their prior experiences. Therefore, the learning content in classrooms has strong effects on students' learning: by facilitating students' learning if it is linked with students' experiences or retarding students' learning if it is far beyond students' experiences.

Piaget (in Huitt & Hummel, 2003) identified four stages in cognitive development: sensor-motor stage; pre-operational stage; concrete operational stage, when intellectual development relates to concrete objects; and formal operational stage, when the development of intelligence relates to abstract concepts. He believed that in adolescence (13-18 years old), intellectual abilities develop to a formal operational stage. However, maturation does not mean that students can automatically think formally. For example, Callahan, Clark, and Kellough (1998) reported that most junior and middle high school students have not reached the formal operations stage. Since the formal operational stage is a prerequisite for much physics learning, it is essential to engage students in advancing their level of learning, that can successfully help the students to work through the concrete stage to the abstract stage of mental processing required for learning of physics concepts. Physics learning content must link to students' prior experience to be meaningful and involve students in learning tasks successfully.

However, learning content in junior high school science classrooms was generally regarded as irrelevant, difficult and uninteresting by Australian students (Lyons, 2005). Woolnough and Cameron (1991) found that senior high school students (in ACT) tended to have a very negative approach to physics. Students especially girls, who decided to enrol in physics course at the Year 12 level, normally had some very vague utilitarian reasons but with little interest. Under such situations, many girls who tended to find the content difficult and uninteresting would be more likely to employ rote strategies to learn physics compared to boys (Ridley and Novak, 1983). A typical rote strategy would involve copying formula and duplicating working steps to answer questions instead of making the effort to understand the meanings behind the formula to solve the problems. This kind of learning strategies would promote girls' lack of interest in learning and retard the development of their scientific reasoning abilities which are believed to be very important for understanding physics. For example, Williams and Cavallo's study (1995) found that scientific reasoning ability would best predict students' understanding of Newtonian physics. Since learning interest was essential to engage students in learning tasks and gain successful experience, girls with rote learning strategies would be at a substantial disadvantage in developing their SEP.

One possible explanation for this gender difference is possibly that female students and male students have different learning styles. Males show a greater preference than females for the abstract conceptualisation mode of learning (Severiens and Ten Dam's, 1994). Girls preferred to learn physics in a conversational style and collaborative activity, and work with concrete objects. Boys, on the contrary, liked to learn through argument and individual activity, and tended to use more abstract thinking. However, most classroom activities were organised to accommodate male learning styles (Ong, 1981). Females were therefore more likely to be disinterested in physics learning than their male counterparts.

Physics learning content in high school, as exhibited by the physics section in science curriculum, commonly fails to consider such differences in learning patterns. It promotes competitive learning approaches which put boys at an advantage over girls and which satisfy their respect for the strength of the abstract contents of physics. As the educational level progresses, physics textbooks become increasingly abstract and disconnected from the world that physics attempts to describe. Experiments become rushed by the increasing amounts of material to be presented. Classroom activities become full of practising, testing and lectures. This situation creates an environment

where teachers only have time to present information in an abstract manner, generally devoid of any relationship with the world around them. This situation creates an environment where many girls develop a more negative attitude than boys to learning physics and do not dare to express their frustration due to diffidence with respect to their abilities. Evidence (Simpson and Oliver, 1985, 1990) has shown that students' especially girls' attitudes toward science became less positive throughout each school year from Grades 6 to 10. But unfortunately it is still believed by some old experienced physics teachers, that this kind of formal learning content is the so-called 'essence' of this discipline, the strength of learning physics.

SOCIAL COGNITIVE DEVELOPMENT AND GIRLS' PSE

Learning content also has an impact on girls' PSE by significantly affecting their vicarious experiences and social experiences. Bussey and Bandura (1999) have addressed gender development and differentiation. They proposed that

...gender conceptions are constructed from the complex mix of experiences... (They) operate in concert with motivational and self-regulatory mechanisms to guide gender-linked conduct throughout the life course... Conceptions of gender and (gender) roles are the products of social influences operating interdependently in a variety of social subsystems... People contribute to their self-development and bring about social changes that define and structure gender relationships through their agentic (agential?) actions within the interrelated systems of influence. (p 676)

This theory suggested that the modelling of gender roles could greatly influence conceptions of gender. When applied to analysing physics learning content in high school, it had significant implications.

Learning content in physics classrooms, as a reflection of social activities and human experience, accompanying students from their very young age, had a great potential to foster conceptions of gender, especially nowadays when the availability of role models is greatly multiplied with the rapid development of ICT. Several studies (see Gray, 2005) found that repeated viewing of the symbolic modelling of equal roles for men and women significantly reduced gender role stereotyping in children. However, the available role models for young girls in physics learning, that is involved in the content of traditional textbooks, materials used, and classroom activities, were often stereotypical and offer relatively more male models of perceived confidence, and also, more models of males in physics careers. Lacking successful female role models in physics careers and having many female role models in house-works, physics leaning content subtly communicates the message that physics is a hard subject for girls to learn. This could result in girls' difficulties in seeing physics as a scholarly and professional pursuit.

Another noteworthy fact is that during females' development of gender identity they frequently link their important life goals to the desires of others. An example is that high school girls start thinking about how to balance career and family roles. "Women are socialised to seek intimate relationships and these relationships are more important concerns for female adolescents" (Ginn, 2003). In the case of physics learning, girls like to learn knowledge in a collaborative way, generate their thoughts based on group consensus, and contribute to group's interrelationship. It is not surprising that most girls tend to be interested in careers emphasising human interaction and tend to pursue social science careers after secondary education. However, physics learning content, focusing more on competitive activities and individual exercises, drives girls away from social interaction. Most examples and topics in physics textbooks and materials used in classrooms are regarded by girls as lacking interaction and having quite tenuous links to their daily life. Learning activities rarely encourage social interactions and feedback from peers and teachers. Girls' curiosity, interests and questions are often not taken seriously by teachers when designing the learning activities and assessment tasks. Teachers' attitudes can in turn influence

girls' and boys' attitudes. They also develop their gender roles by imitating the social behaviors of the teachers. If teachers, girls and boys all hold such ambiguous beliefs that girls can not learn physics as well as boys, this kind of belief can be strengthened by social influences in classrooms where teachers hold traditional beliefs of gender roles.

In addition, physics learning content always links to other disciplines such as geography and chemistry. It also needs mathematical methods to solve problems. But traditional physics learning content generally tends to neglect the interactions between physics and other disciplines, and tends to treat mathematics as an isolated tool. It is hard for girls to obtain more social experience to construct their PSE by stretching physics learning content to a more meaningful world.

THE IMPLICATIONS FOR TEACHERS

It is generally reported that female students have lower PSE than male students. Kahle and Meece (1994) have found that this difference is not evident until late adolescence. Adolescence is the critical period, a time when SE forms, thus the primary foci must be on early and appropriate interventions aiming at improving females' PSE. An unsatisfying example might be such a story referred to by Riesz, McNabb & Stephen (1997), who reported that one intervention program, that was designed to enhance girls' science SE among high school students by inviting women scientists and engineers to make presentations in high school science classes, failed to promote more interest of the high school girls, who still showed significantly less interest in science learning than did the high school boys.

As I have mentioned before, besides those contextual factors, lower PSE in girls also result from the impact of learning content in high school physics classrooms. From this angle, I suggest that there are many things educators can do to improve girls' PSE. First, treating girls and boys without difference is not enough to allow girls to make sense of the learning content of physics. Also, treating girls as the weaker sex is no favour to them. Teachers should interact with female students and create conditions such as collaborative activities to motivate them to interact with male peers, challenge them seriously, engage them in learning content rigorously and actively, and expect a high performance of them as they do their male students. Educators should also manage learning content such as restructuring knowledge and presentation and changing materials used in classroom activities to meet the needs of psychological and social cognitive development of female students. However, how to make interventions appropriately and effectively is very complex and requires the combined efforts from the educators and the educational administration department. The impact of the content of physics learning together with influences of other factors in high school should be considered deliberately and thoroughly at the system level.

Analysing My Schooling Experiences in China

My physics learning experience in a Chinese high school in 1986 to 1991

Physics is a compulsory subject for Year 8 to Year 11 students in China. The students need to spend four school years on learning physics. Due to the long learning period, learning content covers a very broad range of physics concepts, which become more abstract in the senior high-school years.

I did not learn physics very well in junior high school. It is not because I did not have the ability to learn physics; on the contrary, I did very good work in mathematics and other science subjects like biology and geography. Moreover I also wanted to achieve a higher academic level in physics. The only reason was that I did not make sense of physics. Many of my female classmates also had the same problem.

The textbooks were very boring. Few pictures and diagrams, they were filled with great quantities of texts and a lot of abstract concepts, formula and calculation. Examples focused more on applying formula to calculating rather than explaining the rationale. Schoolwork emphasised format rather than logical thinking. At the same time, there were almost no female role models related to the content of learning and role models of females in physics careers. Except from Madame Curie, I could not find any other female scientists in the textbooks.

Teachers used to teach physics through lectures and seldom used concrete materials like videos, stories and pictures to help students to understand the content to be learnt. Although sometimes there were some teacher demonstrations and student hand-on activities in classroom, it was not really helpful to me because the data recorded by experiments rarely linked to concepts I learned in the textbooks and rarely linked to my daily-life experiences. We used the recorded data to fill in the formula (not to derive the formula) in order to examine its accuracy, and if we found that the data did not match the formula, the teacher would tell us that it was due to measurement error. In such a situation, I found that physics was a very boring subject.

On the other hand, every time when I reviewed the textbook, I always found that I did too many exercises. But every time when I took a test, I always found that I got a low mark. I began to lose interests in learning physics and doubted whether I could learn it well.

However, when I stepped into the senior high school, the situation changed, even the content became more abstract. There were several factors contributing to this change. First, my intellectual levels increased due to maturation and academic training. I tried to understand abstract concepts by linking to the prior knowledge and I found that kind of approach worked effectively. The second reason was that the new physics teacher used more concrete materials and designed more meaningful activities to help students to understand physics concepts. He encouraged girls to participate in learning activities and challenged girls seriously. For example, he often required girls as well boys to demonstrate their understanding about one phenomenon or to illustrate their working steps on the blackboard. He also tended to use less competitive and more collaborative activities in the classroom and promoted collaborative relationships between boys and girls.

My increasing academic performance and confidence showed that these strategies, that considered the psychological and sociological characteristics of female students, did work for me. Ultimately I chose physics as my university major. However, there are very few female students among my classmates who selected physics as their university major.

My physics teaching experience in Chinese high schools in 1995 to 2003

When I worked as a physics teacher in Chinese high schools, I found that content of learning have changed a great deal when compared to my time at school.

The knowledge involved was always in changing. It changed several times during the ten years period, moving to a clearer and more understandable structure. Textbooks tended to be more colourful, employing more diagrams and pictures, more examples and less abstract descriptions. Some abstract concepts were deleted, some content became elective, and some content was made more concrete (equipped with examples or diagrams or pictures). Especially, with the development of ICT, the textbooks began to be accompanied by videos and CDs. In Shanghai, some traditional experiments were even accompanied by complementary ICT experiments in the new textbooks. Although female role models in physics careers in these textbooks were more than before, I still found that there were very few. They were rarely linked to females' social experiences and still showed respect for the strength of this discipline especially in senior high schools textbook. They were abstract and disconnected from the real world.

As a physics teacher with professional ICT background, I always tried to make learning content more concrete by using ICT and I tended to use more concrete materials to help students understand abstract physics concepts. The concrete materials and animations I used in my classroom sometimes made the physics learning funny and relaxing. Students liked to use computer software to simulate the movement of objects. They also liked to use instruments to design their own experimental systems. But these materials and information that I presented in physics classrooms, though concrete, still were far away from girls' daily life and the real world. Another strategy that I used was inviting a student to be a temporary teacher. Student must take the responsibility to communicate effectively with me and other students, to let us make sense of content that she or he talked about. This was the favourite activity of students.

Generally, students in my classrooms showed a higher level of academic achievement than those in other classrooms. However, I could not change the physics curriculum that prescribed what students must learn in China. I could not treat girls differently either due to the heavy academic pressure in China. I gave them the same academic treatment as I did to boys. I did not look after their psychological needs very much. Sometimes I did not give enough feedback to the girls' questions because of lack of time or other consideration. Sometimes I had to carry out competitive activities to fit in to the heavy academic pressure. All of these reinforced the male-dominated nature of physics learning. The content thus failed to arouse more girls' interests in learning physics and therefore in their course-taking in Year 12 level and beyond.

CONCLUSIONS

The forgoing sections discuss the relationship between the content of physics learning and female students' course-taking by referring Piagetian learning theory and Bandura's social cognitive theory and the findings from the relevant literature. The content of physics learning in high schools is far from being congruent with girls' development in cognitive psychology and social cognition. This incongruence contributes to lower PSE of girls, and as consequence leads to their less physics course-taking. This relationship is confirmed by my schooling experiences in China. I advance the suggestions that, on one hand interactions among learning content, students and teachers in physics classrooms can play a significant role in girls' development of PSE, on the other hand leaders in school should think critically about the foundations of the content to be learnt, such as the stereotypical gender models in textbooks and materials used in classroom, the knowledge structure, and the organisation and presentation of that knowledge to identify the gender biases that exclude female students from learning physics effectively. Since very few empirical studies were found to support these suggestions, future investigation need to focus on examining the relationships between the content of leaning, girls' PSE and their physics course-taking by employing more vigorous methods of investigation.

Educators must develop more appropriate interventions for the adolescent years. Strategies must include examining the influences of a wide range of factors including the content of learning through different perspectives. These solutions should be considered at a systematical level in order to promote female students' taking course in science and physics before university entrance. Special efforts to expose female students to elective science courses in their senior high school years are important in order to enhance both their skills and the physics self-efficacy necessary to making physics a meaningful choice for a college major.

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Teachers' perceptions of their professional learning activities

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Teacher renewal and improvements in teaching quality through teacher professional development (PD) have been high on the agenda of many countries for some time. Several principles of effective PD for teachers, based on a synthesis of research evidence, have been espoused by the Centre for Educational Research and Innovation (CERI, 1998). A survey based on these principles was developed and administered to 395 primary and secondary teachers at the conclusion of a variety of curriculum, topic or Information Communication Technology (ICT) based professional learning activities which ranged from seminars and workshops to longer courses. While teacher age, gender and school level were not significant, teachers' ratings indicated ICT activities and longer courses contributed significantly to their professional renewal. Teachers also perceived longer courses were more applicable to their work. These findings affirm the CERI principles of effective PD and endorse the need for long term activities that have specific focus.

Teacher perceptions, teacher professional development, teacher renewal

Renewal of the teaching profession and improvements in the quality of teaching and learning through the provision of high quality professional development (PD) for teachers have been at the forefront of the educational agenda of many countries including members of the Organisation for Economic Co-operation and Development (OECD) for quite some time. Teachers are faced increasingly with the need to enact reforms, keep pace with rapidly developing fields of knowledge and technologies, and at the same time cater for an ever widening range of students in their classrooms with diverse interests, aptitudes and abilities (OECD, 2004). Furthermore, many countries including Australia have high proportions of older teachers in the workforce (McKenzie & Santiago, 2004; Ministerial Council for Education, Employment, Training and Youth Affairs, 2003) and while older teachers may be highly experienced and confident, there is a need for their renewal through professional learning to update their curriculum knowledge and pedagogical procedures and to rethink the structure of their teaching careers (Skilbeck & Connell, 2003). However, although considerable funding has been directed to the provision of professional learning for teachers in many countries (Borko, 2004; OECD, 2004), the notion of what constitutes "high quality" PD remains elusive as little is known about how and what teachers learn from the myriad of formal and informal, structured and unstructured, planned and serendipitous PD opportunities with which they are presented over the course of their teaching careers (Borko, 2004). Furthermore, teachers' perspectives of the PD activities in which they engage have received scant attention. There is a pressing need for empirical evidence about the PD activities that teachers participate in and the relationships between these activities and teacher renewal and enhancement of professional knowledge and skills. The present study is designed to address this need by investigating primary and secondary teachers' perceptions of a range of professional learning activities which varied in duration.

In 1998 the Centre for Educational Research and Innovation (CERI), under the auspices of the OECD, identified several critical features characteristic of effective PD for teachers, based on a synthesis of the research evidence. Similar principles have been espoused by the United States

National Partnership for Excellence and Accountability in Teaching. These essential characteristics can be grouped to form the seven major principles presented in Table 1. While there is a very real necessity for a variety of approaches to professional learning to address differences in people, contexts and working relationships (Fullan, 1999) and to take into account individual as well as organisational concerns (Guskey, 1995), Putnam & Borko, (1997) claim that these principles amount to little more than mantras or truisms as overall very little is known about what and how teachers learn from PD activities (Borko, 2004; Wilson & Berne, 1999) beyond the oft reported inadequacies of traditional one-off workshops (Sykes, 1996; Wilson & Berne, 1999). Although the research base on PD is reasonably extensive, most studies have focussed on failures and inadequacies in teacher professional learning processes (Guskey, 1995). Similarly, although characteristics of good professional learning activities for teachers are recognised widely (Lovett & Gilmore, 2003), they have been largely derived from educators' experiences (Cradler, Freeman, Cradler, & McNabb, 2002). Evidence from teachers' perspectives are essential if PD policy and practice is to be better informed (Borko, 2004).

Table 1. Principles of effective teacher professional development (CERI, 1998)

Principle	Characteristics of effective professional development
1	Experiential, engaging teachers in concrete tasks that elucidate learning & development
2	Participant driven. Grounded in inquiry, reflection & experimentation
3	Collaborative, interactional, involving sharing knowledge
4	Connected to and derived from teachers' work with students
5	Supported by modelling, coaching & collective problem solving around specific problems of practice
6	Connected to & integrated with comprehensive school change
7	Sustained, ongoing and intensive

The need for professional development for all teachers is indisputable (Ingvarson, Meiers & Beavis, 2005) with the vitality of the teaching profession dependent upon continuous professional learning which should be *planned, systematic, regular and relevant* (Committee for the Review of Teaching and Teacher Education, 2003). However, teacher professional learning is very fragmented and diverse, with outcomes dependent on the particular circumstances in which it is undertaken (OECD, 2004). Teacher PD takes place in formal, structured settings such as seminars, workshops and longer term programmes but other PD opportunities occur informally during the course of the teachers' working day (Wilson & Berne, 1999). Further, some teachers pursue individual learning opportunities to upgrade their qualifications, increase their knowledge and skills or provide them with a fillip to their career or pedagogy, others pursue a range of interests through one-off PD activities, while still others participate in school-based collaborative PD. However, teacher change through participation in PD is variable (Fennema, Carpenter, Franke, Levi, Jacobs & Empson, 1996; Franke, Carpenter, Levi & Fennema, 2001; Knapp & Peterson, 1995), with some elements of teacher knowledge and practice more amenable to change than others (Franke et al., 2001; Franke & Kazemi, 2001). Furthermore, teacher change is a somewhat slow process, with teachers requiring time to assimilate the changes into their pedagogical repertoire (Snow-Renner & Lauer, 2006) and to become confident in their delivery (Meiers & Ingvarson, 2005).

In the recent Programme for International Student Assessment (PISA) study, Australian teachers were ranked third in the world alongside the United Kingdom, United States of America & Sweden in their rate of participation in PD activities (McKenzie & Santiago, 2004). This ranking was based on reports from school principals who indicated 64 per cent of Australian teachers had participated in some form of PD of at least one day's duration in the previous three months. While other studies confirm the overwhelming majority of Australian teachers do participate in some professional learning and development activities in any year (Skilbeck & Connell, 2003), participation has been found to be very uneven, with several gaps or discontinuities evident (McRae, Ainsworth, Groves, Rowland & Zbar, 2001). Participation rates vary from school to school and even among teachers within the same school, with no organised professional development evident for some schools and teachers (McRae et al., 2001). Furthermore, teacher PD is very largely a matter of choice by schools or individual teachers (Skilbeck & Connell,

2003), with the success of professional learning activities dependant on teacher motivation, enthusiasm and commitment (White, Mitchelmore, Branca & Maxon, 2004). Teacher age and experience are also significant factors, with teachers with more than 20 years of experience participating more often in PD activities than those with less experience (McRae et al., 2001). Clear cut patterns of professional learning activity are difficult to discern (Wilson & Berne, 1999), with most teachers engaging in what has been variously described as an episodic, kaleidoscopic (Skilbeck & Connell, 2003), patchwork quilt of topics (McRae et al., 2001) that are rarely sequential (Ingvarson, 2002). What emerges from this fragmented approach to PD is thus difficult to discern.

Professional learning activities across Australia utilise a range of delivery modes (Ingvarson, Meiers & Beavis, 2004) and tend to focus on pedagogy and curriculum although other roles and responsibilities of teachers are included (Skilbeck & Connell, 2003). An evaluation of 80 individual PD activities undertaken through the Australian Government Quality Teacher Programme in 2002 and 2003 found gaps were often evident between the optimal conditions indicated by research evidence and actual conditions provided for professional learning (Ingvarson et al., 2004). Furthermore, designers and providers of teacher professional learning programs often struggled to articulate clearly the strategies that characterised their activities and the outcomes expected from them. Although Ingvarson et al., (2004) examined the efficacy of the PD activities in relation to teacher practices and student learning outcomes, teacher perceptions of the professional learning activities were not investigated in relation to any of the effectiveness principles identified by CERI (1998).

THE PRESENT STUDY

The present study investigated primary and secondary teachers' perceptions of professional learning activities they had undertaken through the administration of a common survey instrument that was based on five of the seven CERI (1998) principles. The CERI principles were adopted as the basis of the survey as although there is the consensus of expert opinion that the conditions for teacher learning embodied by these principles lead to more effective teacher professional development (Wilson & Berne, 1999), there is little empirical evidence in support of this agreement (Meiers & Ingvarson, 2005), particularly from teachers' perspectives. The need for the PD to be participant driven identified in CERI Principle 2 was not addressed in the survey as all teachers participated in a range of formal, structured PD programs that differed in their duration. Thus, by their very nature, it may not have been feasible or possible for some of the PD activities to be teacher driven. CERI Principles 5 and 6 were also not included in the survey as the teachers came from a variety of schools across primary and secondary levels and had participated in a wide variety of activities that were not necessarily school based. CERI Principle 7 was measured indirectly as the PD activities differed in their design and duration. The professional learning activities teachers engaged in focussed on major curriculum areas such as Literacy, Numeracy and Science, specific topics such as *Bullying in Schools* and the *Education of Boys* and the use of *Information Communication Technologies (ICT)* and ranged from individual seminars, workshops and conferences to longer term professional learning courses. While some workshops were offered on more than one occasion with a total duration of up to 10 hours, longer term courses were offered over multiple occasions totalling a considerable number of hours.

Participants

Three hundred and ninety-five teachers, who had completed a professional learning activity between July, 2003 and April, 2004 participated in the survey. They ranged in age from 22 years to 63 years, with a median age of 46 years. One hundred and ninety two teachers taught at the primary school level, 200 were secondary teachers, three teachers did not indicate the level at which they taught, 142 teachers were male and 227 were female (26 teachers did not indicate their gender). Ninety-two teaches had participated in a curriculum based activity, 243 a topic

based activity and 60 teachers an ICT based PD activity. Overall, 232 teachers attended a seminar, 79 a workshop or conference and 84 attended a course.

The Survey

A *Teacher Perceptions of Professional Learning* (TPLP) (Yates & Harris, 2003) survey was developed for the study and consisted of 21 statements (items) about professional learning which were generated from the research literature to reflect the behavioural characteristics of five of the seven CERI principles. The first two principles of experiential, inquiry and reflection based professional learning were combined and measured by 11 items, the third principle reflecting the collaborative nature of the PD activity was measured with three items and the fourth principle of relatedness to teachers' work with seven items. Table 2 presents the four CERI principles, and their corresponding item numbers in the survey, with 19 of the 21 items presented in Table 3. Items 10, 14 and 17 marked with an (R) were reversed. The initials PD used in all items except item 16 were defined in the survey as Professional Development. Teachers rated each item in relation to the professional activity that they had just completed on a four point scale ranging from 1 (strongly disagree), 2 (disagree), 3 (agree), to 4 (strongly agree).

Table 2. Principles of effective professional learning (CERI, 1998)

Principle No.	Professional Learning Principle	Item numbers
Principles 1-2	Experiential, inquiry and reflection based professional learning	1, 2, 3, 4, 6, 7, 12, 13, 16, 19, 21
Principle 3	Collaborative sharing of knowledge among educators.	8, 15, 18
Principle 4	Related to teachers' work with students.	5, 9, 10(R), 11, 14(R), 17(R), 20

Method

All teachers were administered the common pencil and paper survey instrument between September, 2003 and April, 2004 immediately after the completion of programme of professional learning activity in which they had participated.

RESULTS

Teacher ratings were analysed with SPSS. Reversed Items 10, 14 and 17 were recoded and the 21 items analysed with Principal Components. Three factors were formed, with the factor loadings of the 19 items shown in Table 3 based on an Oblimin resolution. Items 9 and 12 did not load into any of the factors and were not considered further. The 12 items that loaded into Factor 1 reflected teachers' Professional Renewal, and with the exception of Item 20 mirrored the behavioural characteristics designated as measuring CERI (1998) Principles 1 and 2. The two items that loaded into Factor 2 reflected school level Collegiality and mirrored CERI (1998) Principle 3, with the exception of Item 15 measuring teacher sharing with colleagues which loaded into the Professional Renewal factor. The five items that loaded into Factor 3 reflected the Applicability of the PD to teachers' work and were indicative of CERI (1998) Principle 4, except for Item 20 measuring teachers' intention to use the PD knowledge in their classrooms which loaded into Factor 1. Professional Renewal which accounted for 38 per cent of the variance had a reliability alpha (Cronbach) of 0.90, Collegiality a reliability alpha of 0.65 and Applicability a reliability alpha of 0.74. The Collegiality and Applicability factors accounted for 8 per cent and 7 per cent of the variance respectively. The factor scores correlation between Professional Renewal and Applicability was $r = 0.37$. Mean scores in Table 3 are expressed on a 4 point scale from 1 (strongly disagree) to 4 (strongly agree).

Distribution of teachers' ratings for the first factor of teacher professional renewal is presented in Figure 1, with ratings for collaborative sharing at the school level illustrative of Factor 2 in Figure 2 and the third factor of applicability of the professional learning activity to teachers' work with students in Figure 3. The mean values for Professional Renewal in Figure 1 is 3.15, for Collegiality in Figure 2 is 3.00 and Applicability 3.44 respectively. In each figure the frequency

of teachers' responses is shown on the vertical axis, while the ratings from 1 strongly disagree to 4 strongly agree are presented in the horizontal axis.

Table 3. Factor analysis of teacher perceptions of professional learning activity

No.	Item	Loading	Mean
<i>Factor 1: Teacher professional renewal (Eigen 7.2, 38% of variance)</i>			
16	I learned new and different ideas from the PD	0.80	3.07
13	Knowledge gained from the PD will improve my teaching skills	0.73	3.10
19	I look forward to trying out new things in my teaching	0.72	3.23
4	The PD increased my knowledge of what can be done in the classroom	0.71	3.11
2	The PD will improve student learning opportunities in the classroom	0.68	3.13
21	The PD provided me with an opportunity to focus on improving student learning outcomes	0.67	3.19
6	The PD renewed my enthusiasm for teaching	0.66	2.92
15	The PD encouraged teachers to share what they had learned with their colleagues	0.63	2.94
3	The PD encouraged me to reflect on aspects of my teaching	0.60	3.37
20	I plan to use the knowledge gained from the PD in my work with students	0.59	3.26
7	The PD gave me some useful ideas of how to improve student outcomes	0.57	3.14
1	The PD updated my professional knowledge	0.51	3.30
<i>Factor 2 School level collegiality (Eigen 1.5, 8% of variance)</i>			
18	Adequate support is available to teachers at my school to share information gained from PD	0.82	3.09
8	Teachers in my school share ideas, knowledge and skills gained from attendance at PD	0.82	2.90
<i>Factor 3 Applicability of the PD (Eigen 1.3, 7% of variance)</i>			
17	I think the ideas presented in the PD will be too difficult to put into practice (R)	0.62	3.14
10	The PD was a waste of teacher time (R)	0.60	3.58
14	I did not find the PD useful (R)	0.54	3.66
5	Information presented in the PD was directly relevant to teaching and learning in my school	0.52	3.31
11	Information presented in the PD was directly applicable to teachers' work in schools	0.51	3.31

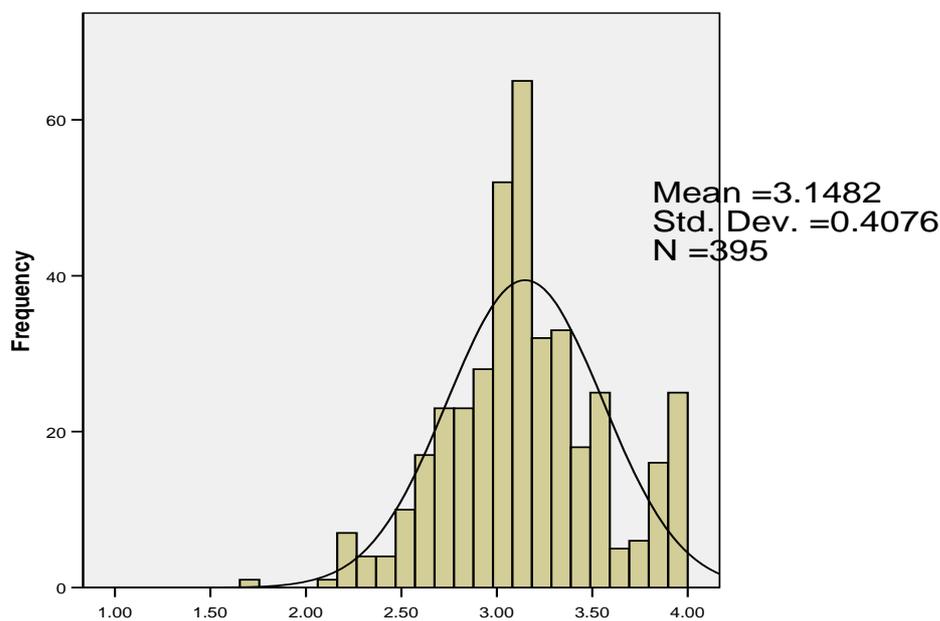


Figure 1. Factor 1: Teacher professional renewal

These three factors were then used to explore relationships between teacher age, gender, school type (primary or secondary school), type (curriculum, topic or ICT based activity) and duration (seminar, workshop or course) of the professional learning activity that the teachers had undertaken through one way analysis of variance (ANOVA). Teacher age and teacher gender did not relate significantly to any of the three target measures. Similarly, no significant differences were found between primary and secondary teachers. However, it was found that ratings on the Professional Renewal factor were significantly higher in the case of teachers who had experienced the longer courses, $F_{(2,393)} = 32.21, p < 0.01$, and also in the case of teachers who had

undertaken PD in the area of ICT, $F_{(2,393)} = 19.94$, $p < 0.01$. Applicability ratings were also significantly higher when teachers had experienced the longer term courses, $F_{(2,392)} = 4.69$, $p = 0.01$. In essence, teachers rated their experiences as providing professional renewal more highly if they undertook an ICT professional learning activity (60 people, mean of 3.41 out of 4), or if they undertook an experience of longer duration (84 people, mean of 3.44). It should be noted that all the ICT experiences took place within longer courses. However, the 24 teachers who had undertaken longer courses within the curriculum domain also clearly rated their experience as professionally renewing (mean of 3.52).

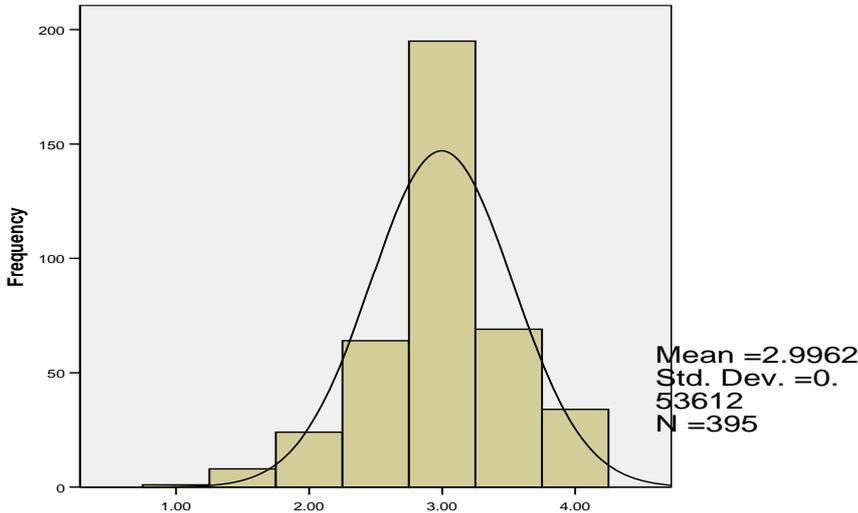


Figure 2. Factor 2: School level collegiality

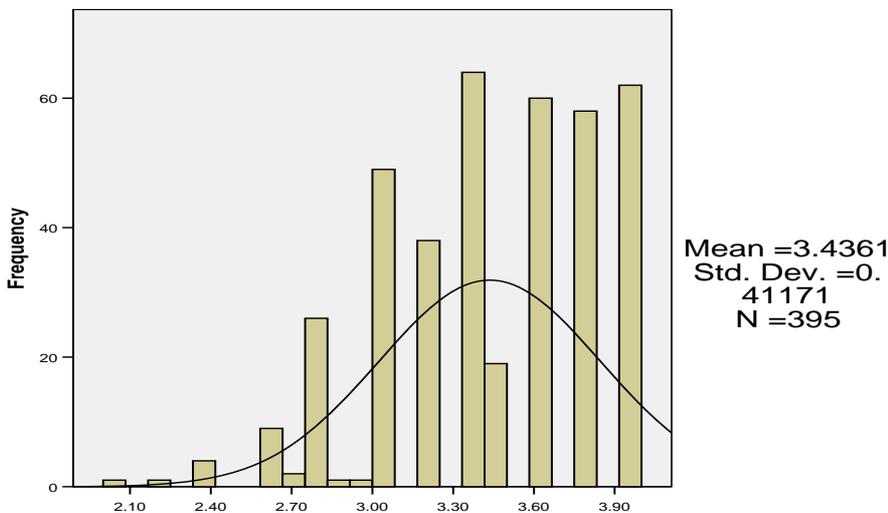


Figure 3. Factor 3: Applicability of the professional learning

DISCUSSION

Improvements in teacher quality and student learning have been linked in several studies (Meiers & Ingvarson, 2005), with teacher PD identified as the single most important means by which the quality of teaching and thence learning outcomes for students can be enhanced (Masters, 2003). The need for substantial PD for teachers is recognised widely and valued (OECD, 2004), but previous studies have indicated that there are often considerable gaps between optimal conditions for professional learning indicated by research evidence and those that are actually provided (Ingvarson et al., 2005). The present study lends supportive evidence to the commonly and widely agreed characteristics of effective PD for teachers (CERI, 1998; Wilson & Berne, 1999). The TPLP (Yates & Harris, 2003) survey administered to teachers in this study was based on the five of the seven PD effectiveness principles espoused by CERI (1998). Factor analyses of the TPLP

Items indicated that the majority of the items loaded into three separate factors of teacher renewal, school based collegiality and applicability to teachers' work, with the three factors related to the combination of Principles 1 and 2, Principle 3 and Principle 4 respectively. CERI Principle 7 was also affirmed as the results from this survey show that the longer duration of the PD programs undertaken by teachers was a significant factor in their perception of their renewal and applicability of the PD activities to their work with students. Extended PD programs are considered not only to offer teachers increased opportunities to acquire new knowledge and skills but also to give them time to actively reflect on their practices (Meiers & Ingvarson, 2005). A recent synthesis of PD research relating to standards based reform in the United States has specified extended time as the crucial element in determining positive relationships between teacher PD and pedagogy (Snow-Renner & Lauer, 2006). While the current study focussed on teacher professional learning which is just the first link in the chain for the enactment of changes in teachers' pedagogical knowledge and practice and subsequent improvement in student learning outcomes (Ingvarson et al., 2005), the need for the content of the PD to have a specific focus rather than more general PD activities also identified by Snow-Renner & Lauer (2006) is affirmed in the survey results, with teachers rating their experiences of ICT and curriculum based activities as contributing significantly to their professional renewal.

In order to be effective, the professional learning activities must not only encourage teachers to be reflective but also require them to communicate openly with one another about pedagogical issues (Grodsky & Gamoran, 2003). CERI Principle 2 highlights the importance of teachers sharing what they have learned from their professional learning activity with one another (Grodsky & Gamoran, 2003). While school level collegiality did emerge as a factor in this study, it was not significantly related to either the type or duration of the PD activity that teachers undertook. However, it must be borne in mind that opportunities for sharing with colleagues at the school level may not have been feasible as most of the PD activities available to teachers were not school based. Furthermore, in many situations teachers undertook the professional learning in their own time or at their own expense.

The present study focussed on teacher self-report data collected immediately after professional learning activities had concluded. Mayer (1999) has asserted that a certain level of confidence can be placed in surveys that rely on teachers' reports about their practice, a finding verified with Australian teachers by Ingvarson et al., (2005) who consider that most teachers are remarkably frank and unbiased in their assessment of professional learning programmes. As the survey was administered immediately following the PD activities it was not possible to ascertain the extent to which the professional learning activities undertaken would have an effect on student learning outcomes, although previous studies do indicate that this is the case (McRae et al., 2000; Skilbeck & Connell, 2003; Ingvarson et al., 2005). Guskey (1995) suggests that changes in teaching practices must precede changes in teacher attitudes, so although the teachers reported their intention to put the new ideas into practice whether they did so remains unknown. Furthermore, the question of the cumulative effects of professional learning on teacher renewal and quality has not been addressed in this study or in other studies to date. This is an important consideration as it is not known how long the effects of professional learning endure or indeed what motivates some teachers rather than others to undertake professional learning. Certainly the reasons why teachers chose to participate in the PD activities were not addressed in this study. The necessity of a continuum of lifelong learning for teacher renewal advocated by governments around the world (OECD, 2004) is as yet untested.

Teacher renewal through high quality PD activities is clearly an issue that is central to Australia's future as a knowledge nation (Department of Education, Training and Youth Affairs, 2000) as it is many other countries (Borko, 2004; OECD, 2004). While research reviewed by CERI (1998) has indicated a coherent set of principles which are associated with effective professional learning for teachers, the current episodic and disjointed nature of professional learning offered to Australia's teachers means that much more research is needed, particularly from the viewpoint of the teachers

who often undertake professional learning on their own initiative, out of school hours and at their own expense.

Acknowledgment

The work of John Harris and Dianne Harris in this study is gratefully acknowledged.

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Undergraduate nurse variables that predict academic achievement and clinical competence in nursing

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A hypothetical model was formulated to explore factors that influenced academic and clinical achievement for undergraduate nursing students. Sixteen latent variables were considered including the students' background, gender, type of first language, age, their previous successes with their undergraduate nursing studies and status given for previous studies. The academic and clinical achievement of 179 undergraduate nursing students were estimated by measuring their performance using two separate assessment parameters, their completing grade point average scores and outcomes of their final clinical assessment. Models identifying pathways leading to academic and clinical achievement were tested using Partial Least Square Path Analysis (PLSPATH). The study's results suggest that undergraduate nursing student achievement can be predicted by four variables, which account for 72 per cent of the variance of scores that assess academic and clinical performance at the completion of the third year level of nursing studies. The most significant predictors and those that had direct influence on undergraduate nursing student achievement were: (a) grades achieved in topics undertaken at the beginning of their last year of study and (b) those achieved just prior to course completion (c) where the undergraduate nursing students had undertaken their final allocation for clinical experience, and (d) students' self rated need for clinical supervision at course completion. Measures of performance according the grade point average scores, student gender, age and type of first language used were not directly related to the performance outcomes.

Partial least squares path analysis, undergraduate nurses, predictor variables, achievement

BACKGROUND TO THE STUDY

Currently in Australia (and worldwide) there is a shortage of qualified nurses in the health care workforce. As a consequence of this, there had been several significant government enquiries into issues associated with the recruitment and retention of nurses. These enquiries have also sought to understand the relationship between educational processes and preparation of student nurses for their eventual role in the nursing workforce. It could be reasonably argued that the effort and resources, that are employed to recruit nursing students, has little value when the educative resources and curricula may not be preparing graduates for academic success. What is required is a mechanism to predict academic success for nursing students during the course of their studies (Hass, Nugent and Rule, 2004). In this way, educational resources can be honed to meet best the needs of the students and the profession/workforce.

In a bid to attract more nurses into the profession there are multiple pathways into the undergraduate nursing degree, including recognition for prior learning, mature entry pathways, and recruiting graduates from other disciplines.

Not all pathways have a consistent entrance requirement and this confounds any attempt to predict academic and clinical achievement (Campbell and Dickson, 1996) particularly when nursing students arise from quite diverse backgrounds. It was perceived by the authors that not enough was known about how these different pathways would impact on nurse academic and clinical achievement.

A search of the literature revealed that this concern of predicting Australian student achievement was not confined just to nursing and much literature had examined the predictors for medical achievement and this information has served to inform this article.

Studies suggested that different psychological tests had been used to predict academic and clinical achievement. Blackman and Darmawan (2004) in their study that examined criteria used to predict achievement for medical students, explored the use of psychological assessment as a factor associated with of student success in graduating from medical schools, but these had proved to be unreliable particularly when such variables as the student's personality, interest and attitudes (Aldrich, 1987) were considered. Other studies cited by Blackman et al. (2004) suggested that useful predictors for medical student success in the academic aspects of their studies included their achievement at high school and their past grade point average scores (Green, Peters and Webster, 1993; Hoschl and Kozeny, 1997; Shen and Comrey, 1997).

A large proportion of mature-aged students are entering the undergraduate nursing degree in response to the shortage of nurses and the career pathway that is offered for advancement for enrolled nurses and non-licensed personal carers. Previous studies provide conflicting evidence as to how age impacts on nurse achievement. Byrd et al. (1999) found that in baccalaureate and diploma courses, older students were doing better in those courses than younger students. This stance is disputed, with other literature suggesting that older students often take longer to adapt and learn new nursing skills. This parallels the findings of the variable of age and its impact on medical student achievement (Aldous, Leeder, Price, Sefton and Tuebner, 1999; Huff and Fang, 1999; Kay, Pearson and Rolfe, 2002).

Historically, nursing has been a female dominated profession with only about 12 percent of the nursing profession being composed of men. Conversely, medicine has historically been a male dominated profession with women making a minority, and it has been argued that student gender influences achievement. According to Blackman et al. (2004) achievement in the clinical assessments in medicine and in particular using the OSCE assessment format, female students achieve at a level significantly higher than males in certain specific medical skills assessments. It is argued that male and female students do in fact learn differently from each other and this can therefore also influences achievement outcomes (Chaput de Saintonge and Dunn, 2001). Conversely, according to Harden, Towers, Berkeley and Dunn (1998), female nursing students did significantly better than male nursing students irrespective of which nursing subjects were taken. This position is also confirmed by studies by Hass et al. (2004) who suggest that higher female student achievement could in fact be due to non-academic factors, such as the level of students' self esteem, and economic factors that impact on the student.

Since nursing students came to the undergraduate nursing degree from multiple pathways, it would appear from the studies by Wall, Miller and Widerquest (1993), Waterhouse, Carroll and Beeman (1993) and Byrd, Garaz and Niesweamody (1998) that undergraduate grade point average scores (GPA) were the most significant predictors of achievement in nursing. Where these authors differed with respect to GPA scores being a predictor for achievement was with respect to the timing of when GPA scores were able to predict best a final measure of achievement. Waterhouse et al. (1993) reported that all year GPA scores were useful predictors for final achievement, while many other authors did not support this finding, Glick, Mc Clelland, and Yang, (1986), Jenks, Selekman, Bross, and Paquet (1989), Arathuzik, and Aber, (1998), Enders, (1997), Gallagher, Bomba, Crane, (2001), and Stark, Feikema, and Wyngarden, (2002).

Similarly, GPA scores were not reliable predictors of success in the early years of undergraduate medical studies (Blue, Gilbert, Elam and Basco, 2000) either, and when used on their own, GPA scores were poor predictors for medical course achievement especially for students who came from cultural minority groups (Lynch and Woode, 1990), or for students who used English as a second language (Chan-Ob and Boonyanaruthee, 1999), or predicting students' ability to interact with patients, or in estimating their efficacy with clinically related skills (Hall and Stocks, 1995; Poussaint, 1999; Reede, 1999).

The Australian Nursing Council Inc (ANCI) has as its charter, to ensure that nurses have initial and continuing competence to practice as a nurse (Australian Nursing Council, 2002). It does this by advising educational providers to nursing, of the national competences that are expected and consistent with safe practice. There are many core competencies that are attributed to safe nursing practice that student nurses must meet by the end of their academic studies. To achieve this goal, the ANC recommend that (a) number of diverse assessments methodologies are employed to measure candidate competence, including student self-assessment; and (b) assessment of performance by a registered nurse.

METHODS OF INVESTIGATION AND ANALYSIS

Figure 1 gives in diagrammatic form a hypothesised path model for predicting nursing student achievement and clinical competence. The outer model is composed of the topics undertaken by nursing students, for each semester (eg: NURS1404) of their three-year degree program and the elements of competency assessment' that nurses are required to undertake (eg: ANC 14) to be deemed as proficient. These manifest variables are displayed in Figure 1 as small rectangular boxes. The latent variables are shown (in oval-shaped figures in Figure1) with the directions of hypothesised causal influence impacting on undergraduate nurse achievement, being shown by the path arrows. A full explanation of all topics undertaken and areas of nursing competence (ANC) is displayed in the two tables that follow.

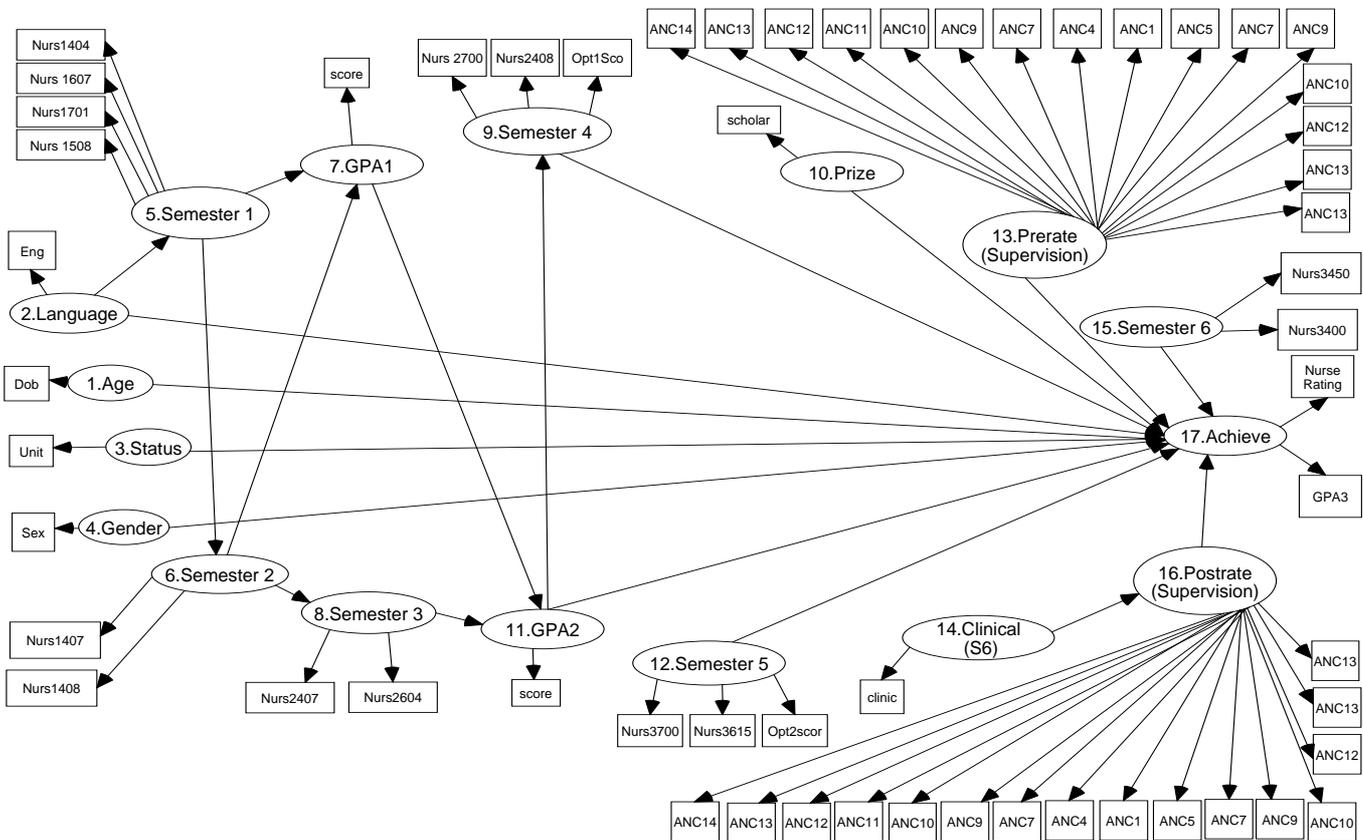


Figure 1: Predicted relationships between manifest and latent variables to undergraduate academic achievement and clinical competence in nursing

Table 1 introduces variables that are not defined by other variables and that can therefore be measured directly. It can be noted that the first four variables are essentially student demographic variables (eg: student age).

Table 1: Descriptors of Variables

Variables	Description of the latent variables
1. Age	Age of the student in years
2. Language	The first language type used by the student
3. Status	Recognition of prior learning translated to number of units credited towards the nursing degree (4.5-72 units)
4. Gender	Sex of the student
7. GPA 1	Grade point average for all nursing studies completed in Year 1
10. Awards	The number of university prizes or awards achieved for academic and clinical performance
11. GPA 2	Grade point average for nursing studies completed in Year 2

Several of the variables were not directly observable, are hence are termed latent variables, necessitate the use of manifest variables to observe and measure the latent variables that lead on to student nurse achievement. These are listed on Table 2.

Table 2: Descriptors of the manifest variables that define latent variables

Latent variable	Descriptions of manifest variables
5. Student scores for Semester 1 topics	Topic nurs 1508: Research topic Topic nurs 1701: Communication skills Topic nurs 1607: Applied physical science Topic nurs 1404: Introduction to nursing
6. Student scores for Semester 2 topics	Topic nurs 1407: Anatomy, physiology and health assessment Topic nurs 1408: Activities of daily living and introduction to social sciences
8. Student scores for Semester 3 topics	Topic nurs 2407: Nursing theory and practice Topic nurs 2604: Pathophysiology
9. Student scores for Semester 4 topics	Topic nurs 2700: Psychological responses to illness Topic nurs 2408: Nursing theory and practice Option 1 topic: Nursing practice focused elective
12. Student scores for Semester 5 topics	Topic nurs 3700: Sociopolitical aspects of health Topic nurs 3615: Nursing theory and practice Option 2 topic: Nursing practice focused elective
13. Self-rated student scores for level of clinical supervision needed for them to demonstrate competence prior to last clinical placement and	ANC 14: Competence with collaboration skills ANC 13a: Competence with delegation skills ANC 12a: Competence with documentation skills ANC 11: Competence to ensure patient safety ANC 10: Competence with care evaluation skills ANC 9: Competence in providing comprehensive care
16. Self rated scores produced at the completion of the students' final clinical placement	ANC 7a: Competence to assess needs methodically ANC 4: Competence to show accountability for care ANC 1: Competence to practice as informed by law ANC 5: Competence to engage with professional development ANC 7b: Competence for individual's health assessment ANC 9: Competence to educate about health promotion ANC 10: Competence to determine patient progress ANC 12b: Competence in communication effectiveness ANC 13b: Competence to organise workload ANC 13c: Competence to respond to rapid clinical changes
14. Type of last clinical placement	Public or private clinical venue
15. Student scores for Semester 6 topics	Topic nurs 3450: Professional development topic Topic nurs 3400: Final clinical topic
17. Final achievement variable	GPA scores for the third year of undergraduate study and numerical rating given for student clinical competence ability by an assessing registered nurse.

With reference to Figure 1, it is hypothesised that clinical and academic achievement in the students' third year of nursing study (latent variable 17) is directly influenced by the student's age (latent variable 1), whether the student uses English as a first language (latent variable 2), if the student has been given status or credit for previous studies successfully undertaken (latent variable 3) and the student's gender (latent variable 4). GPA scores, especially those derived from

the student's second year of study (latent variable 11) are hypothesised to influence directly the final achievement variable. Scores obtained for studies in the semesters' immediately preceding their course completion (latent variables 12 and 13) in addition to the number of awards held by the student (latent variable 10), impact directly on the students' final achievement. It is also hypothesised that achievement is directly influenced by how the students' self-rate their level of competence, before and after their last clinical secondment (latent variables 13 and 16 respectively). Lastly, achievement is also directly defined by academic achievement in academic topics undertaken in their last semester of study (latent variable 15).

Not all possible causal paths are shown in Figure 1 however, only those that are hypothesised to be of sufficient magnitude and expected to have recognisable influences are shown. It should be further noted that in testing the model, all possible causal pathways were examined.

METHOD

Participants

Subject to and satisfying ethical requirements for the study, a retrospective sample of 179 undergraduate nursing students enrolled in their final year of study in one School of Nursing, was chosen for this longitudinal research study. The sample consisted of 86 per cent female students, predominantly using English as their first language (72 per cent). The age range was 20 to 53 years with a mean age of 26 years. Just over a quarter (28 per cent) of the students had been given status for previous studies, which typically included 4.5 units of study usually undertaken in the first semester (one topic) and 4.5 units of study within each of the 9 unit topics in the second semester.

Data Collection

With full recognition of confidentiality issues, information about student admission variables was obtained from past student records. Grades for all topics (manifest variables) for each semester were derived by compiling all test scores that the students had undertaken throughout their studies. It should be noted that while the methods of student assessment varies according to the topics taken, all scores used in this study were converted to standard university grades. In terms of student self-assessment (latent variables 13 and 16), each student was asked in a survey, to rank how much supervision they believed they needed in order to demonstrate clinical competence in 16 different domains, related to clinical nursing practice. The survey was administered twice to the students, initially as they were about to embark on their last clinical placement and upon its completion, 15 weeks later. A Likert scale was employed using response categories reflecting student need for supervision, ranging from supervision being 'hardly needed', 'needed', 'highly needed' to 'essential'. This scale was seen as a continuum of student nurse ability and one measure of their capacity to demonstrate safe practice independently. Reliability rating for the use of this rating scale was acceptable (Cronbach alpha = 0.93).

Scaling was used also to define the final achievement variable (latent variable 17). Registered nurses, who had been working with the student, completed their final clinical assessment. This tool used a four-point Likert scale to measure if students could practice safely and independently and to what extent they required supervision. The response categories ranged from 'unsatisfactory performance', 'satisfactory performance', 'good', to 'excellent performance'. Written criteria were provided to assist clinicians to differentiate between the student ability levels. Cronbach alpha for scale reliability was also estimated to be 0.93.

Data Analysis

The Partial Least Squares Path Analysis (PLS-PATH 3.01) program (Sellin, 1989) was used to test the model of variables that were hypothesised to influence academic and clinical performance in nursing. It estimated the strength of the relationships between the predictor variables and

achievement or outcome measures (Noonan and Wold, 1985). The main aim of this procedure was to examine the causal relationships between the constructs of the model and to estimate the magnitude of influence of the hypothesised relationships had between the variables.

This procedure is highly appropriate for analysing and predicting relationships between educational data that are not normally distributed (Sellin, 1989) and it can also deal with relatively small numbers of cases, yet remain very robust (Falk and Miller, 1992). PLS path analysis can additionally account for influences hypothesised to act through causal models that traditionally confound experimental approaches, because it is clearly impossible to administer randomised controlled conditions to assess causality, in most educational settings (Keeves, 1988).

The presentation of the findings of the data collected in this study together with the estimated path models are shown in diagrammatic form in Figure 2.

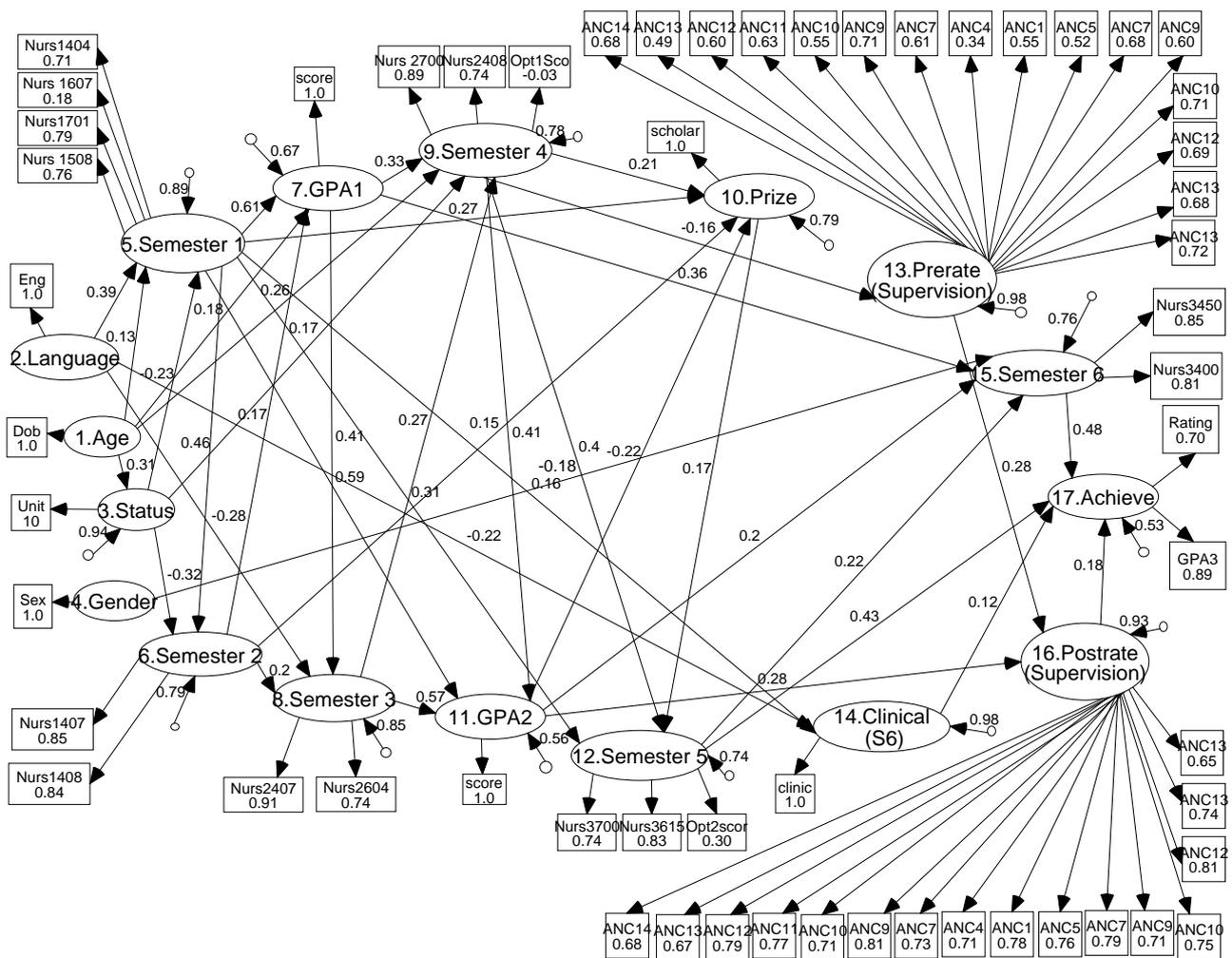


Figure 2: The final path model predicting nurse academic achievement and clinical competence

RESULTS

Figure 2 shows the final path model for the prediction and explanation of the variances that influence achievement in academic and clinical nursing for undergraduate students. A discussion, of which variables have a direct influence on nurse achievement, are discussed first and then an examination of how achievement is indirectly effected by other variables is introduced.

Direct Effects on Final Achievement and Nursing Competence

Semester 5 topics outcomes and effects on final achievement

The variable that describes student nurse outcomes at the completion of their fifth semester of study (latent variable 12) at university, has a positive co-efficient (0.50) leading from it to final achievement variable (latent variable 17). This indicates that students who did well in their penultimate semester of study, also performed well in their final units of study at completion of the university course.

The effects of clinical placement on final achievement

Where the nursing student was seconded to (either a private or a public hospital) for their final clinical placement is represented as latent variable 14. A positive co-efficient (0.10) operates from this variable to the achievement variable. This indicates that the type of clinical placement has a significant and direct influence on student nurse achievement. Registered nurses employed in private health care venues tend to rate student nurses more positively than registered nurses assessing student nurses in public health care venues.

The effects of semester 6 topics on final achievement

Nursing students who performed well academically in the final semester of study also did well in the final clinical assessments. From Figure 2, this is confirmed by a positive co-efficient (0.50), which operates from latent variable 15 to the final achievement variable.

The effects of the nursing student's self-rated need for clinical supervision on final achievement

At the conclusion of the undergraduate nursing program, completing students who self-rated themselves as needing minimal clinical supervision, performed significantly better in their final achievement overall. With reference to Figure 2, it can be seen that a positive co-efficient exists (0.20) between latent variable 16 (post rate for supervision) and the outcome variable.

Indirect Effects on Final Achievement and Nursing Competence

The indirect effects of nursing student language type on final achievement

There is a significant negative pathway arising from the student's language variable (latent variable 2) that extends to the clinical variable (latent variable 14) with a co-efficient of -0.2. This indicates that students who use English as a second language are more likely to be placed in a public clinical setting for their final clinical practice compared to native English speaking students. It is not possible to generalise this finding across all clinical placements for the students, as the study confined itself to the one period of time used for clinical placement.

The indirect effects of nursing student outcomes of semester 1 on final achievement

From Figure 2, it can be seen that two pathways operate from the semester 1 variable (latent variable 5) with one path leading to latent variable 12 (semester 5) and the other to latent variable 14 (clinical placement). This suggests that student success in semester 1 has an indirect influence on student nurse final achievement and it in turn mediates the effects of latent variables 12 and 14 on final achievement.

The indirect effects of nursing student's first year grade point average scores (GPA 1) on final achievement

The indirect effects of GPA 1 scores (latent variable 7) on final achievement are exerted through semester 6 scores (latent variable 15). This suggests that the influence of semester 6 scores on final achievement is in turn mediated by the GPA 1 scores. In this way GPA scores have a limited effect, and are not a strong predictor of final achievement in nursing.

The indirect effects of nursing student outcomes of semester 4 on final achievement

From Figure 2, it can be seen that one pathway operates from the semester 4 variable (latent variable 9) to latent variable 12 (semester 5). This suggests that student achievement with semester 4 topics, has an indirect influence of final achievement and it also mediates the effects of latent variable 12 on final achievement.

The indirect effects of nursing student outcomes of awards on final achievement

From Figure 2, it can also be seen that one pathway operates from the award variable (latent variable 10) to latent variable 12 (semester 5). This demonstrates that the variable associated with students who receive awards and prizes, exerts only a weak indirect influence of final achievement and it also mediates the effects of latent variable 12 on final achievement.

The indirect effects of nursing student outcome of GPA2 scores on final achievement

GPA 2 (latent variable 11) operates positively through two indirect paths. The first path leads through the semester 6 variable (latent variable 15) to the achievement variable, while the other path mediates achievement indirectly, through the self-rated student scores for level of clinical supervision needed on completion of last clinical placement (latent variable 16). This suggests that GPA scores achieved by student nurses in their second year of study only exert an indirect influence on final achievement.

DISCUSSION

Awarding Status including Recognition for Prior Learning (RPL) and Academic Achievement and Nursing Competence

The relationship between status given and final achievement needs to be considered carefully. Two negative co-efficients exist between the latent variable 3 (status) to the semester 1 (-0.2) and semester 2 achievement variables (-0.3) latent variables numbered 5 and 6 respectively. This indicates that a relationship exists between the amounts of status given or exemption granted to students upon nursing course admission, and their later performance in semester 1 and 2 topics. Students given status did not perform as well in semester 1 and 2 topics as those students who were not given any status at all. In this study, students who had been recognised as having prior learning were predominantly given status for two semester 1 topics. In the second semester, they were given exemption for certain components of the topics but not the entire topic. It was believed that students in this situation had some recognisable prior learning but full exemption was not granted. Students with status had less classroom contact than traditional students. The integrated nature of these topics (nursing practice skills with applied science and social science theory combined) meant however, that these students were potentially disadvantaged when it came to the assessments they were expected to undertake. For example, for one semester 2 topic the major assessment took the form of an examination that tested all components of the topic. This examination meant that students with exemption were tested on the assumption of possessing prior knowledge but in reality, they did not perform as well as students who had not been given

exemption. In the second topic for which students were granted exemption, they were required to complete only one aspect of the assessment (100% weighting) and consequently did not have the same opportunities as other students who might have performed poorly in this assessment, to improve their overall grade by performing better in the other assessment tasks. The model for awarding status needs to be reviewed as current practice impacts on student achievement.

In this study, students were awarded blanket status on the basis of holding registration as enrolled nurses (EN). However, these students were not a homogeneous group, as among them would be enrolled nurses who had minimal or no clinical experience outside their original course. There were others who had used enrolled nursing qualifications essentially as an entry point to the undergraduate nursing degree because they did not possess the appropriate Tertiary Entrance Rank (TER) for direct entry into the undergraduate nursing degree. Conversely among this group, there would be other enrolled nurses who would have a long history of clinical work, but did not possess recent academic exposure. Within this group there would be wide variations with respect to the area(s) in which clinical experience had been gained. Hylton, (2005) and Dearnley (2006) cautions EN's embarking on a degree course, by reminding them that their traditional education methods used in their past courses coupled with a so called 'apprenticeship type' culture where tradition and rituals continued to be commonplace, led to a situation where the student initially experienced low self confidence at the commencement of the undergraduate course. Hembrough and Sheehan (1989) also highlighted in their study, that the transition from EN to RN, required the development of a new self identity and that early in their studies, such students reported confusion and a decline in their self confidence.

The relevant literature is mixed with respect to awarding status and predicting achievement. Kilstoff and Rochester, (2004) have suggested that academic status given to students had no effect on academic or clinical expertise. Youssef and Goodrich (1996) and Duke (2001) reported similar findings. Although the participants in their study did not have a nursing background, they found that students who had been given status for prior learning, had lower GPA scores initially while on course, but this difference was not evident at the course conclusion.

If the awarding of status impacted negatively on student performance on semester 2 as argued in this study, the GPA for first year would be subsequently lower for those students compared to others who were not given any status in the first place. Consequently, given that there was a relationship between GPA 1 scores and student performance in semester 6 in this model, it could be realistically argued that students, who obtain status in first year, are not as likely to achieve as well as the other students in their performances in semester 6. This situation has implications for curriculum development, program design and clearly warrants further study.

This model does not show the same findings as Wall et al. (1993), Waterhouse (1993) and Byrd (1999) who reported that GPA scores were significant predictors of final achievement. Instead this model identifies GPA as having an indirect influence only on achievement through the academic scores in the students' last unit of study and through the students self-rating for competence of the ANC. However, this difference may be explained by the fact that in this model, GPA 3 was incorporated into the achievement variable and not measured independently.

Wheelahen et al. (2000) identified a philosophical debate around recognition of prior learning (RPL) and the perceived differences in the culture of the Vocation Education Training (VET) and the higher education sectors. The latter focuses on the relationship between the student's self-development and its context to clinical experience. With this approach it can be argued that awarding so called 'blanket' status for past studies does not best indicate or is not always sensitive enough to indicate how a student will cope with undergraduate study. Conversely, the former approach to awarding status to students is essentially and foremost an administrative process. Therefore while there is a high probability of a mismatch between the amount of status awarded and recognition of the student's past experience, it is strongly advocated that student access to accelerated programs need to be set on an individual basis. Rapley, Nathan and Davidson (2006) report from a review of Bachelor of Nursing programs, that there is considerable

variation in the amount of status given for prior learning and that a main consideration is whether the EN program undertaken by the student, was hospital based or VET sector based.

Northedge (2003, p171) explained that learning is “a process of acquiring the capacity to participate in the specialist discourse of a knowledge community”. Therefore it can be argued that the students who have been granted less status have less exposure initially, to the academic discourse and therefore take more time to become literate in that discourse. This assertion is supported by Hylton (2005) who in her study, found that ENs engaged in a degree program, had not been adequately prepared for study at degree level. Their initial reliance on old ways of learning hindered their academic development as independent learners, even though they brought their life skills and work experience to the new situation. Draper and Watson (2002) went further and stated, that traditional ENs struggled with academic requirements of the degree course initially, the evidence being a higher level of resubmission of academic work compared to other students.

Measuring Students for Clinical Competence

Clinical assessment undertaken in semesters 5 and 6 aimed to reflect the ANC (Australian Nursing Council) competencies and in this study, student’s self-assessment was used as one way of determining what degree of independence the student possessed, in order to meet individual competency statements and standards. Heslop, McIntyre and Ives (2001) linked student self-confidence and their perception of their own clinical competence as being entwined with the “nature and extent of the workload, knowledge of ward routine, and the manner of feedback on performance”. The students in this study by the end of semester 5 (mid way through their third year of study) would have predominantly had 12 weeks contact with the clinical area. At this point in time, the students would possess a reasonable understanding of the ward routine and a better understanding of their performance, in relation to the ANC competencies. Additionally, they would have not only have completed their self-assessment for nursing competence prior to the next clinical exposure, but students were also applying for graduate nurse positions (work positions at hospital upon graduation). It would be a reasonable assumption that students would be very focused on demonstrating to others, positive aspects of their performance. It was noted that students differed in how they self-rated their performance at this point of time, particularly in light of their level achievement with semester 4 topics. There was an invariant relationship here. Students who did well academically in that semester of study (semester 4) tended to rate themselves as needing more supervision in order to show clinical competence. While students who did not perform as well in semester 4, rated themselves as needing less supervision clinically. This negative pathway was derived partly by reference to two specific competency areas, namely communication competence and competence in the application of law to clinical practice which arose in topics offered in semester 4 studies. It could be argued that the students, who scored highly on the legal aspects in semester 4, had a heightened vulnerability to legal issues and the complexity of communication in relation to nursing practice, and hence perceived themselves as needing more supervision.

The ANC competencies were an accepted measure of achievement and students were expected to meet these performance standards for registration as a nurse with the Nurses Board of SA (NBSA). However this was also a limitation of the study, in that the overall reliability of assessment methodology used to measure national competency statements for nurses had its critics. One concern was the perception of student competence in the “eyes of the assessors” (Registered Nurses). Green (in Pitman, Bill and Fyfe, 1999) identified a subjective relationship between the assessors’ understanding of competency and the validity of competency-based assessment. The ANC concurred that the understanding of the assessor was a critical element in order to achieve reliability especially with respect to accuracy of outcome of the assessment process. A search of the literature revealed multiple understandings of the term, ‘competence’, (See Ling, 1999; Manly Garbett, 2000; Masters et al., 1990; Rethans et al., 2002; Watson et al.,

2002). It is reasonable to assume that within the clinical sector, there are also multiple understandings of just what constitutes 'student competence' and 'student performance'.

It is assumed that assessment methods are objective; however, it is difficult to specify many professional skills in a precise and unambiguous way (Ashworth, Gerrish, Hargraeves and Mc Manus, 1999; Masters et al., 1990). For example, in the cues provided by ANC, which define competency elements, words such as 'appropriate', 'as necessary', 'regular' are used as descriptors for the assessor. What is 'appropriate' and how is 'appropriate' measured? Leung (2002) contends that the meaning of 'competence' is shaped by the assessor and is therefore not value free. Watson et al. (2002), cite several authors who conclude that the relationship between the assessor and the student is problematic with respect to assessment validity and reliability. Finucane et al. (2002) argue that assessors require "initial and ongoing training and their performance will need to be monitored". However the RNs who were the assessors for this cohort of students, did not undergo formal training in assessment, nor was the assessment of the competencies moderated and there was no mechanism established for providing feedback to the RNs on their judgement about the students they assessed.

The clinical environment can also impact on reliability and validity. Cusack (2001, pp. 243) reported from her study of the competency based model in nursing that:

Clinical skills and knowledge were valued over the holistic approach to nursing care which includes broader attributes such as communication skills, attitudes and flexibility to think laterally when needed.

Furthermore, this has created an environment where assessment of competence is more narrowly focused on managing equipment or undertaking a particular task (Cusack, 2001). Similarly, Finucane et al. (2002) propose that professionally-oriented performance assessment is actually very demanding in terms of time and resources. These constraints similarly apply to the capacity of registered nurses to assess students for competence because apart from working in this difficult role, they execute it while also carrying a full clinical workload. This congestion of roles has implications for students in their bid to have accurate progressive feedback on their performance, beyond the narrow focus identified by Cusack (2001).

Student nurse language use and academic achievement and clinical competence

Unlike the findings of Chacko and Huba (1991) and Salamonson and Andrew (2006) who suggested there was a direct influence between achievement in nursing and student language use, this study demonstrated mixed outcomes.

It is noted that non-English speaking background (NESB) nursing students were performing well in their initial studies (at least as well as other native English speaking nursing students) but their achievement diminished later in their studies. A significant number of NESB students involved in this study originated from Norway, and completed their first year of study in their own country and joined Australian students in their second year, in Australia. This arrangement explained the overall trend of performance seen in this path model. Norwegian students who studied their beginning nursing topics did so in their own first language, with learning packages and teachers teaching in their first language in Norway. This explains why these NESB students were achieving so well, given that NESB students typically, are not usually as successful as their English native speaker counterparts. Indeed, when Norwegian students attempted clinical academic topics in semester 3, their performance diminished. It was at this point of time of their program that these NESB students were physically in Australia, receiving their instruction and learning packages in English (their second language). Therefore, it can be recommended that they require English language support at this time or ideally, even earlier in their course, when they are in their own country. Another factor for diminished NESB student performance in semester 3, could be due to the fact that that NESB (Norwegian) students were only just at this point of time, gaining their first exposure to the Australian health care system, which would not only be new to

them but would render assignments about their host country's health care system more difficult compared to their native English-speaking student counterparts.

Student self-rating for clinical competence

This study has shown that the students' capacity for self-rating their own levels of clinical competence had a significant impact on their overall achievement. At a time when students are about to complete their undergraduate studies and enter the workforce as qualified nurses, historically, there had been a reluctance on the part of the profession to view this form of assessment as credible, reliable and realistic, preferring instead to rely on traditional assessment methods. Data from this study indicates that it is the completing nurses themselves who tend to be quite critical of their clinical competence and do not see this form of assessment as frivolous. Self-assessment complements traditional clinical assessment methods and can quickly highlight to clinical or teaching staff, which aspects of clinical practice, the students themselves believe they need more assistance to become clinically competent. Self-assessment for clinical competence serves to inform potential new employers of areas of nursing competence, which they themselves believe require further development as beginning graduate nurses. This information is valuable for staff development purposes for hospital employers who seek to help the completing student with their transition of the new graduate nurse.

Final clinical experience and type of clinical venues attended

It has been shown in this article that variance in the clinical competence ratings given about completing students by their assessors (Registered Nurses), differ according to the type of venue in which the student is seconded to for the last clinical experience. While such variance can be minimised with the strategies provided above, clinical assessor preparation needs to be reviewed. Clinical nursing staff who are involved with student assessment irrespective of whether they are employed by the private or public sector hospitals, continue to need assistance and staff development when it comes to assessing students for clinical competence. While beyond the scope of this paper, it can be argued that the amount of preparation given to clinical staff who comprise dedicated education units (DEUs) can become the benchmark against which all venues that receive students for work experience need to be prepared for.

Final academic topics and achievement

Academic topics offered in both semesters of the students' last year of study, all have a positive and direct impact on eventual achievement. There are no inverse relationships between topic successes at this point of time and overall achievement at course completion. It is noted however, that the co-efficient value that exists between the Option topics offered in semester 5 are very low compared to other topics offered at that time. This suggests that unlike the other topics offered in semester 5, there is greater variance in student performance for the option topics offered at this time. While this has no major influence on the student's eventual achievement or outcome, it is likely to have a negative impact on the students' (depending on which option topic they chose to study) overall grade point average score (GPA), which employers do note when considering employing graduates. While it is common practice to offer option topics to students nearing the completion of their undergraduate programs, this study suggests that there is considerable variation of scores obtained by students across the different Option topics that were offered to students in their penultimate semester of study.

CONCLUSIONS

Significant variance (72%) related to achievement and clinical competence for beginning entry nursing students during their third year assessment can be explained by four variables, none of which are related to student demographics such as age or gender, but exclusively confined to variables associated with the students' progression through their undergraduate course. The students' grade point average scores attained during their earlier years of study have only limited

value in predicting final achievement. However, success in penultimate study areas prior to actual course completion provides the most reliable estimates for academic success. Identifying consistent measures for identifying for student clinical competence remain problematic. However, the incorporation of student self-assessment for clinical competence nearing course completion, is seen as one predictor for identifying competence overall. What level of competence is required to ascertain whether a graduating nurse can perform well, and how this can be measured requires ongoing professional debate and research.

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Is the Aggression Questionnaire bias free? A Rasch analysis

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Buss and Perry (1992) developed the Aggression Questionnaire (AQ) to assess aggressiveness as a personality trait in high school and college samples. The AQ has been used by researchers in United States, Italy, Germany, Netherland, Japan, Canada, and Greece. The present study is reported on an Arabic adapted version of the AQ among a sample of 510 Egyptian high school students. An exploratory factor analysis technique defined four factors: physical aggression (9 items), verbal aggression (5 items), anger (7 items), and hostility (8 items). The correlation among the four factors ranged from 0.38 to 0.49. A confirmatory factor analysis revealed that the AQ could be described by four first levels factors that were linked by a higher order factor of general aggression. Rasch analysis showed that the AQ was bias free. Relevance of these findings to the assessment of the trait aggressiveness is discussed.

Aggression questionnaire, Egyptian adolescents, bias, Rasch analysis

INTRODUCTION

Aggression describes an overt behaviour intended to harm another person (Bushman, Cooper, & Lemke, 1991). Buss and Perry (1992) published a self-report measure of trait aggressiveness; the Aggression Questionnaire (AQ). The AQ consisted of 29 items. An exploratory factor analysis of responses from 406 college students yielded four correlated factors: (a) physical aggression, (b) verbal aggression (c) anger, and (d) hostility. The hostility factor represented a combination of resentment and suspicion items. The correlation coefficients among the four factors of the AQ ranged from 0.25 to 0.48. Subjects rated their response to each item of the AQ on a 5-point scale ranging from 1 (Extremely uncharacteristic of me) to 5 (Extremely characteristic of me). Thus scores from the four factors of the AQ could be summed to obtain a total score, which represents a respondent's overall level of aggressiveness.

The AQ showed acceptable psychometric properties as indicated by the test-retest reliability over a period of nine weeks being 0.80 for physical aggression, 0.76 for verbal aggression, 0.72 for anger, 0.72 for hostility, and 0.80 for overall AQ. A confirmatory factor analysis (CFA) showed that the AQ could be described by four first-level factors (i.e., physical aggression, verbal aggression, anger, and hostility) that were linked by a higher order factor (i.e., general aggression). Buss and Perry reported that the factorial structure of the AQ was invariant when compared with the factor loadings emerged from an exploratory factor analysis across two samples of college students and across gender.

The invariance of the four-factor structure of the AQ has been validated in a number of studies in several countries. For example, Fossati, Maffei, Acquarini, and Di Ceglie (2003) reported that the four-factor structure of the AQ was invariant in a sample of Italian university students. Bernstein and Gesn (1997) found that the four-factor structure of the AQ was invariant in a sample of

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American university students and that the factorial structure was not an artefact of differences in items distributions. Similar results were reported by von Collani and Werner (2005) in a sample of German university students, and Tsorbatzoudis (2006) in a sample of Greek high school students.

Other studies, however, have reported adequate fit of the AQ only after some items were discarded and reviews could be found in Williams, Boyd, Cascardi, and Poythress, (1996). For example, Harris (1995) validated the four-factor structure of the AQ in a sample of Canadian university students after removing two items from the hostility scale. Similarly, Meesters, Muris, Bosma, Schouten, and Beuving (1996) suggested discarding three items from the hostility scale when working with a sample of Dutch university students. Furthermore, Nakano (2001) conducted a validation study on a Japanese adapted version of the AQ. Although Nakano found the Japanese version of the AQ to be psychometrically adequate, his results indicated a better fit of the four-factor structure when two items were removed from the physical aggression scale.

Furthermore, Vigil-Colet, Lorenzo-Seva, Codorniu-Raga, and Morales (2005) argued that some items of the AQ may be culturally or linguistically biased. The reanalysis of the data collected in different cultures and languages indicated that some items should be discarded. Vigil-Colet et al. developed a new short version of the AQ by removing Items 4 and 7 of the physical aggression scale; Item 3 of the verbal aggression scale; Items 4, 5, and 7 of the anger scale; and Items 2, 3, and 6 of the hostility scale. The resulting scale showed an adequate fit to the four-factor structure and an internal consistency similar to that of the full version of the AQ.

AIM OF THE STUDY

Considering previous research findings, it is possible to suggest that the factorial structure of the AQ needs to be further investigated in different contexts. The present study is reported from an Arabic adapted version of the AQ among a sample of Egyptian high school students. One goal of the present study is to investigate the factorial structure of the AQ within an Egyptian context. A second goal is to test for gender bias of the AQ across Egyptian males and females groups using the Rasch analysis procedure.

METHODS

Participants

Subjects of the present study included 510 (265 males and 245 females) second year students enrolled in two high schools in El-Minia, Egypt during 2006. The median age of students was 16.3 years with a range from 16 to 18 years. Students were recruited to participate during their normal classes at their schools. Participation was voluntary and 32 students from the approached sample declined to participate in data collection. Because only two schools were involved in the data collection, no allowance has been made for the slight cluster sample design of the study, although the use of two schools can be used to provide replication in the analysis.

Measurements

The Aggression Questionnaire (AQ)

Buss and Perry (1992) developed the AQ as an updated version of an earlier scale, the Hostility Inventory (Buss & Durkee, 1957). The version of the AQ employed was a self-reported measure that consisted of 29 items and four subscales: physical aggression (9 items), verbal aggression (5 items), anger (7 items), and hostility (8 items). Subjects rated their response to each item of the AQ on a 5-point scale that ranged from 1 (Extremely uncharacteristic of me) to 5 (Extremely characteristic of me).

Procedures

The author translated the 29 items of the AQ from English to Arabic. Applying a blind-back-translation strategy, two qualified translators, working without referencing to the English version of the AQ, independently translated the Arabic version back to English. All the translators were accredited with the British-Egyptian Centre in El-Minia, Egypt. Other three qualified translators independently compared the original English version of the AQ to the new English version that was translated back from Arabic, and rated the match between the two versions on a scale from 1 to 10. A score of 1 represented poor match, whereas a score of 10 represented perfect match. The average percentage of match between the two versions of the AQ was 96 per cent which could be considered acceptable (see, Brislin, Lonner, & Thorndike, 1973). The AQ was administered to the sample of the study in the eleventh week of the 2006 school year.

RESULTS

Exploratory Factor Analysis

An exploratory factor analysis with oblique rotation of the AQ identified four correlated factors: physical aggression (9 items, Cronbach $\alpha = 0.82$), verbal aggression (5 items, Cronbach $\alpha = 0.81$), anger (7 items, Cronbach $\alpha = 0.83$), and hostility (8 items, Cronbach $\alpha = 0.80$). The percentage of variance explained by a specific factor was 19 per cent for physical aggression, 14 per cent for verbal aggression, 12 per cent for anger, and 11 per cent for hostility. The correlation coefficients, presented in Table 1, among the four extracted factors range from 0.38 to 0.49. The factor loadings for the four factors of the AQ are recorded in Table 2.

Table 1: Correlation among the four factors of the Aggression Questionnaire (N=510)

Factors	1	2	3	4
1. Physical	–			
2. Verbal	0.49*	–		
3. Anger	0.45*	0.48*	–	
4. Hostility	0.41*	0.38*	0.40*	–

Note. $p < 0.05$

Unidimensionality

In order to employ the Rasch model to test for gender bias of the AQ, it was necessary to examine whether or not the items of the AQ were unidimensional since the unidimensionality of items was agreed to be one of the requirements for the use of the Rasch model (Hambleton & Cook, 1977; Anderson, 1994).

Consequently, a confirmatory factor analysis procedure is employed to test the unidimensionality of AQ items. Confirmatory factor analysis is a statistical procedure that is employed for investigating relations between a set of observed variables and the underlying latent variables (Byrne, 2001; Kim & Mueller, 1978). Thus, confirmatory factor analysis assumes that the observed variables are derived from some underlying source variables (Kim & Mueller, 1978). Factor analysis may also be used as an appropriate method for identifying the minimum number of hypothetical variables that account for the observed covariation, and thus as a means of exploring the data for possible data reduction (Kim & Mueller, 1978). However, one of the main purposes of confirmatory factor analysis is to examine the common underlying dimensions associated with a number of observed variables.

The Mplus 4.0 program (Muthen & Muthen, 2006) was used to run a confirmatory factor analysis of the AQ using the full information maximum likelihood estimation procedure (Bollen, 1989). The analysis showed that a nested model (see Figure 1) in which the AQ items were assigned to four specific correlated first-order factors of Physical Aggression, Anger, Verbal Aggression, and Hostility, as well as a general higher order factor, which was labelled as *Aggression*. This provided the best fitting model, $\chi^2(371, N = 510) = 385.6, p = 0.29$, Root-Mean-Square Error of

Approximation (RMSEA) = 0.01, Standardized Root-Mean-Square Residual (SRMR) = 0.02, Adjusted Goodness of Fit Index (AGFI) = 0.99, Parsimonious Goodness of Fit Index (PGFI) = 0.29, Tucker-Lewis Index (TLI) = 0.99, Parsimony Ratio (PRATIO) = 0.85, and Parsimony Normed Fit Index (PNFI) = 0.83.

Table 2: Exploratory factor analysis of the Aggression Questionnaire (N=510)

Factor/Statement	Factor loadings
Physical Aggression	
1. Once in a while I can't control the urge to strike another person.	0.72
2. Given enough provocation, I may hit another person.	0.68
3. If somebody hits me, I hit back.	0.66
4. I get into fights a little more than the average person.	0.63
5. If I have to resort to violence to protect my rights, I will.	0.59
6. There are people who pushed me so far that we came to blows.	0.55
7. I can think of no good reason for ever hitting a person.*	0.51
8. I have threatened people I know.	0.48
9. I have become so mad that I have broken things.	0.46
Eigenvalue	5.3
Verbal Aggression	
1. I tell my friends openly when I disagree with them.	0.61
2. I often find myself disagreeing with people.	0.58
3. When people annoy me, I may tell them what I think of them.	0.53
4. I can't help getting into arguments when people disagree with me.	0.48
5. My friends say that I'm somewhat argumentative.	0.44
Eigenvalue	2.6
Anger	
1. I flare up quickly but get over it quickly.	0.64
2. When frustrated, I let my irritation show.	0.61
3. I sometimes feel like a powder keg ready to explode.	0.59
4. I am an even-tempered person.*	0.58
5. Some of my friends think I'm a hothead.	0.55
6. Sometimes I fly off the handle for no good reason.	0.53
7. I have trouble controlling my temper.	0.49
Eigenvalue	4.0
Hostility	
1. I am sometimes eaten up with jealousy.	0.62
2. At times I feel I have gotten a raw deal out of life.	0.60
3. Other people always seem to get the breaks.	0.57
4. I wonder why sometimes I feel so bitter about things.	0.54
5. I know that "friends" talk about me behind my back.	0.50
6. I am suspicious of overly friendly strangers.	0.48
7. I sometimes feel that people are laughing at me behind my back.	0.47
8. When people are especially nice, I wonder what they want.	0.45
Eigenvalue	4.2

Note * The scoring of these items was reversed.

All the hypothesized regression path coefficients of the AQ model, presented in Table 3, were statistically significant because the critical ratio (CR) for a specific regression path coefficient was $> \pm 1.96$ (Byrne, 2001). The correlation between the error terms associated with two observed variables of the physical aggression scale (i.e., Items 1 and 2, $r = 0.29$) could be justifiable on the basis that correlated error terms often indicated some type of meaning redundancy between the measured variables (see, Abd-El-Fattah 2006; Abd-El-Fattah & Barnes, 2007; Abd-El-Fattah & Yates, 2007; Byrne, 2001).

Rasch Analysis

It is common within classical test theory to sum individual item response values to obtain a total score. However, this approach has been criticised and reviews have been made by Andrich (1978), Masters (1988), and Wright and Masters (1982). For example, Bond and Fox (2001) highlighted that the summing of individual item response values had two underlying assumptions.

First, each item was measured on an equal interval scale. Thus, each item was contributing equally to the underlying trait. Second, the distances or the steps among the response categories were equal for an item and through all items of a scale, that is, the level of the underlying trait required to move from one response category to another was the same for an item and was equal across all items of a scale. Bond and Fox concluded that those two assumptions were counterintuitive and mathematically inappropriate.

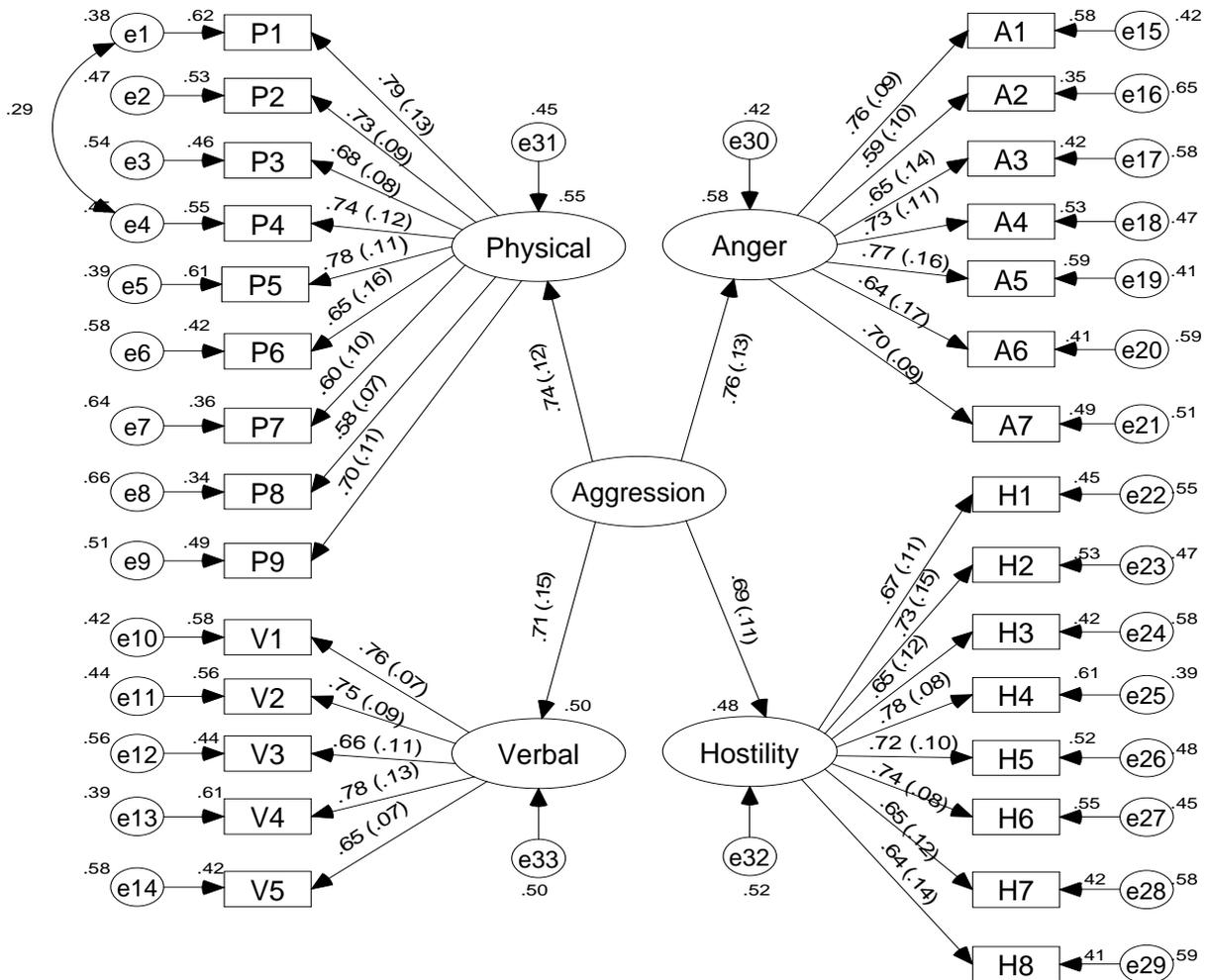


Figure 1: A second-order confirmatory factor analysis of Aggression Questionnaire

The basic Rasch model is a dichotomous response model (Rasch, 1960; Wright & Stone, 1979) that represents the conditional probability of a binary outcome as a function of a person’s trait level (B) and an item’s difficulty (D). The Rasch dichotomous response model is given by:

$$P_{ni} = \frac{\exp(\beta_n - \delta_i)}{1 + \exp(\beta_n - \delta_i)}$$

where P_{ni} is the probability of an endorsed response (a ‘yes’ response to an item), β_n is the trait (or ability) parameter of person n , and δ_i is the difficulty of endorsing item i . When $\beta_n > \delta_i$, $\beta_n = \delta_i$, and $\beta_n < \delta_i$, the chances of a ‘yes’ response is greater than 50 per cent, equal to 50 per cent, and less than 50 per cent, respectively.

Andrich (1978, 1988) is credited for extending Rasch dichotomous response model to the rating scale. The rating scale model is an additive linear model that describes the probability that a specific person (n) will respond to a specific Likert-type item (i) with a specific rating scale step

(x). It is important to note that the Likert scale can be modelled with either the rating scale or the partial credit model (Masters, 1988; Wright & Masters, 1982). The partial credit model allows the item format and the number of categories to vary from item to item (e.g., some items are scored with a 5-point scale and others with a 6-point scale). When the item format is inconsistent from item to item, the partial credit model is useful in providing estimates of the psychological distance between each set of the ordinal categories (Masters, 1988). However, the rating scale model restricts the step structure to be the same for all items (Wright & Masters, 1982). In essence, the rating scale models are a subset of the partial credit models (Andrich, 1978).

Table 3: Standardized path coefficients, standard error, critical ratio, error variance, and R^2 of the second-order confirmatory factor analysis of the Aggression Questionnaire ($N = 510$)

Paths		Path coefficient	Standard error	Critical ratio	Error variance	R^2
Physical Aggression	1	0.79	0.13	6.1	0.38	0.62
	2	0.73	0.09	8.1	0.47	0.53
	3	0.68	0.08	8.5	0.54	0.46
	4	0.74	0.12	6.2	0.45	0.55
	5	0.78	0.11	7.1	0.39	0.61
	6	0.65	0.16	4.1	0.58	0.42
	7	0.60	0.10	6.0	0.64	0.36
	8	0.58	0.07	8.3	0.66	0.34
	9	0.70	0.11	6.4	0.51	0.49
Verbal Aggression	1	0.76	0.07	10.9	0.42	0.58
	2	0.75	0.09	8.3	0.44	0.56
	3	0.66	0.11	6.0	0.56	0.44
	4	0.78	0.13	6.0	0.39	0.61
	5	0.65	0.07	9.3	0.58	0.42
Anger	1	0.76	0.09	8.4	0.42	0.58
	2	0.59	0.10	5.9	0.65	0.35
	3	0.65	0.14	4.6	0.58	0.42
	4	0.73	0.11	6.6	0.47	0.53
	5	0.77	0.16	4.8	0.41	0.59
	6	0.64	0.17	3.8	0.59	0.41
	7	0.70	0.09	7.8	0.51	0.49
Hostility	1	0.67	0.11	6.1	0.55	0.45
	2	0.73	0.15	4.9	0.47	0.53
	3	0.65	0.12	5.4	0.58	0.42
	4	0.78	0.08	9.8	0.39	0.61
	5	0.72	0.10	7.2	0.48	0.52
	6	0.74	0.08	9.3	0.45	0.55
	7	0.65	0.12	5.4	0.58	0.42
	8	0.64	0.14	4.6	0.59	0.41
Aggression						
Physical		0.74	0.12	6.2	0.45	0.55
Verbal		0.71	0.15	4.7	0.50	0.50
Anger		0.76	0.13	5.8	0.42	0.58
Hostility		0.69	0.11	6.3	0.52	0.48

The simple dichotomous response model can be extended to provide an appropriate model for use with polytomous response categories by the addition of an additional difficulty parameter; either a second δ parameter or a τ parameter. The Rasch rating scale model is given by:

$$P_{nij} = fn \left(\frac{\exp(\beta_n - \delta_i - \tau_j)}{1 + \exp(\beta_n - \delta_i - \tau_j)} \right)$$

Or

$$P_{nij} = \frac{\sum_{k=1}^{m_i} \exp \sum_{j=1}^k (\beta_n - \delta_{ij})}{1 + \sum_{k=1}^{m_i} \exp \sum_{j=1}^k (\beta_n - \delta_{ij})}$$

where n = subscript for persons, i = subscript for items, and j = response categories (0, 1, 2). In the present analysis, the QUEST program (Adam & Khoo, 1993) was used to run the Rasch analysis for the AQ. All the reported results were obtained from the QUEST program. The RUMM program (Andrich et al., 2000), however, was used to plot the Item Characteristic Curve and Category Probability Curve with thresholds for an example item of the AQ.

Item fit statistics

One important item fit statistics was the infit mean square (INFIT MNSQ). The infit mean square measured the consistency of fit of the cases to the Item Characteristic Curve (ICC) for each item with weighted consideration given to those cases close to the 0.5 probability level. The acceptable range of the infit mean square statistic for each item of the AQ was taken to be from 0.77 to 1.30 (Adams & Khoo, 1993). Items that had infit mean square above 1.30 indicated that the relevant items did not discriminate well, and below 0.77 indicated that the relevant items provide redundant information. Items that had INFIT MNSQ outside the acceptable range must be deleted from the analysis (Wright & Stone, 1979). Figure 2 shows that, in the present analysis, no items of the AQ had been deleted because all items had an INFIT MNSQ value within the acceptable range of 0.77 to 1.30. Specifically, the range of the INFIT MNSQ for all items ranged from 0.83 to 1.18.

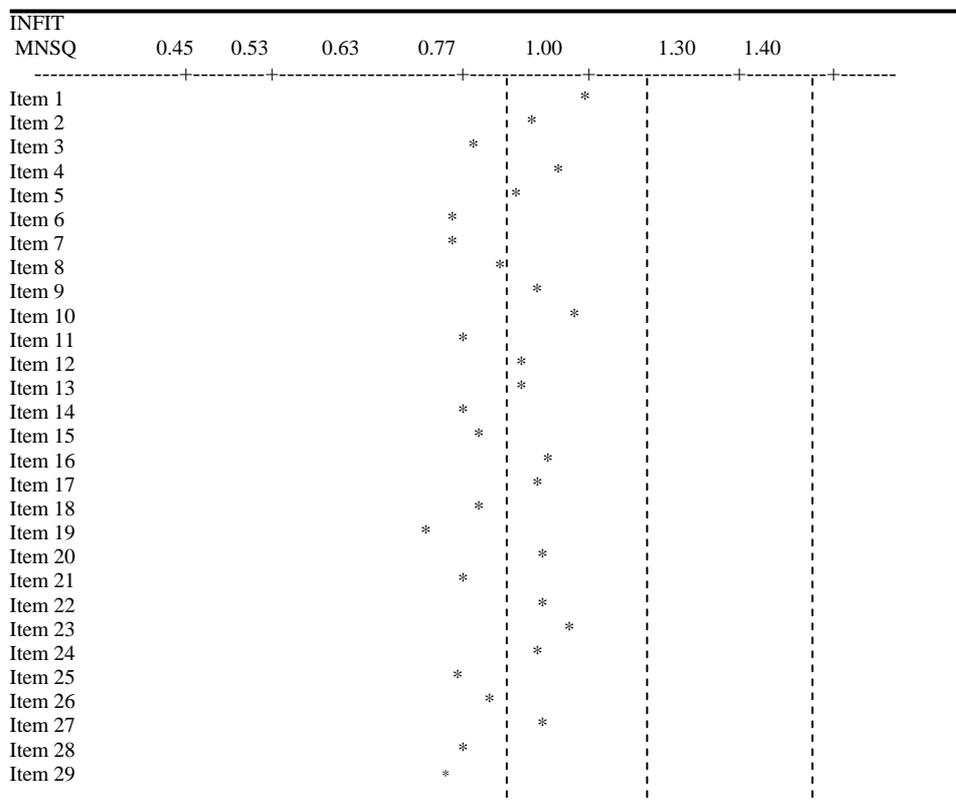


Figure 2: Plot of all Infit Mean Squares for all items of the AQ

The RUMM program could divide the examined sample into a specified number of groups or Class Intervals (CIs) for each item. The average ability of individuals within each CI was calculated and represented by a dot on the ICC for each item. If an item fit the Rasch model, the dots should fall on or as close as possible to the ICC. Any deviations of any of these dots from the ICC represented a difference between the observed mean ability of the CI that these dots represent and the expected mean ability of the CI as predicted by the Rasch model. In the present analysis, the RUMM program divided the sample of the study (N = 510) into six CIs that were plotted along the ICC for each item. Figure 3 shows the ICC for Item 3 of the AQ.

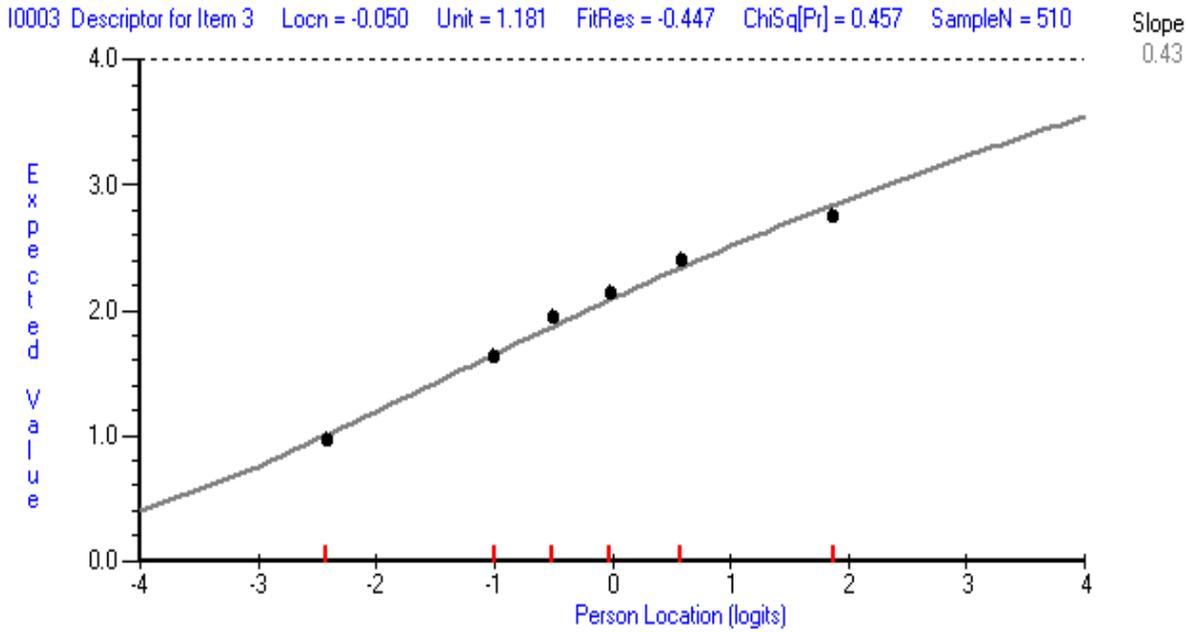


Figure 3: Item Characterise Curve for Item 3 of the AQ

Figure 4 shows the Category Probability Curve and thresholds for Item 3 of the AQ. The thresholds reflect the item difficulty for each item. According to Bond and Fox (2001), a threshold is “the level at which the likelihood of failure to endorse a given response category (below the threshold) turns to the likelihood of endorsing the category (above the threshold)” (p. 234). For example, in the case of four response categories, there are three thresholds that mark the boundaries between the four response categories: SD (*Strongly Disagree*)-D (*Disagree*)-A (*Agree*)-SA (*Strongly Agree*) and all are ordered. That is, the data are regarded as ordinal and the Rasch model transform the counts of the endorsement of these ordered Likert categories into interval scales (Bond & Fox, 2001).

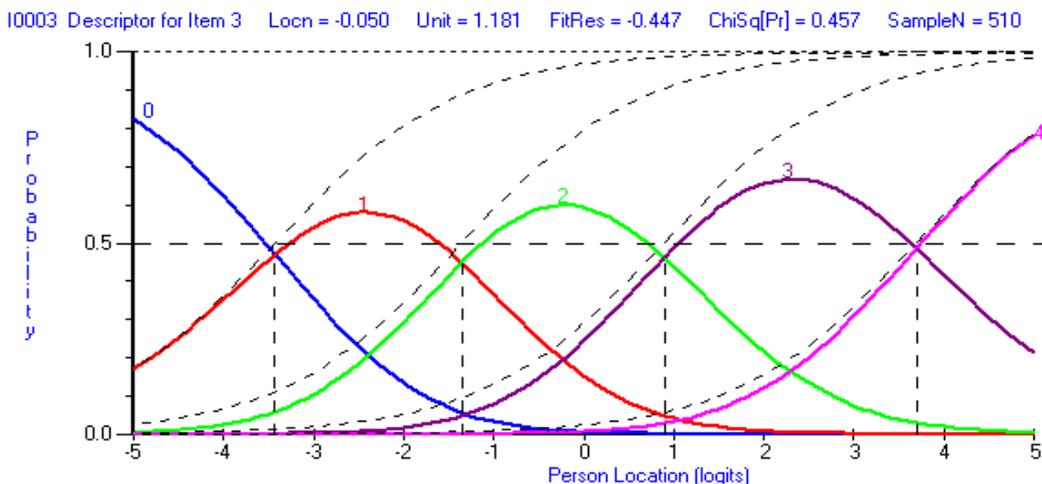


Figure 4: Category Probability Curve and thresholds for item 3 of the AQ

Case Estimates

It is also important when investigating the fit of the Rasch scale to data to examine the estimates for each case. The case estimates give the performance level of each student on the total scale. In order to identify whether the cases fit the Rasch scale or not, it is important to examine the case OUTFIT mean square statistic (OUTFIT MNSQ) which measures the consistency of the fit of the persons to the student characteristic curve for each student, with special consideration given to extreme items. In the present analysis, the general guideline used for interpreting t as a sign of misfit is if $t > \pm 5$ (Wright & Stone, 1979). Thus, if the OUTFIT MNSQ value for a person had a t -value greater than ± 5 , that person did not fit the scale and was consequently deleted from the analysis. In the present analysis, no person was deleted because the t -value for all cases fell within the acceptable range of ± 5 . Specifically, in the present analysis, the OUTFIT MNSQ for all cases had t -values between -2.8 to +3.7, and since the normal t -value tests were not being employed, as is stated above, no cases were deleted.

Gender Bias

Differential item functioning (DIF) might result in an unfair advantage to members of one group over the members of another group (Lord, 1980). Therefore, it was necessary to ensure that every item was functioning identically across all groups of interest. Item response theory (IRT) was a preferred method for detecting DIF (Lord, 1980). Detecting DIF was based on comparing the ICCs of a specific item, which were estimated separately in each group. If a given item was unbiased, then the ICCs for that item should be the same. When the estimated ICCs of the relevant item differed between the groups of interest by more than sampling error, then DIF was suspect (Lord, 1980).

The QUEST program produced a plot of standardized differences between the performances of the groups of interest for each item. An item that had a t -value $> \pm 2$ indicated significant differences in performance between the groups of interest and the relevant item needed to be further investigated in order to identify the cause of the bias (Wright & Stone, 1979). Figure 5 shows that, in the present analysis, no gender bias was detected for any item of the AQ because all items had standardized differences between males and females groups within the acceptable range of ± 2 . Specifically, in the present analysis, the standardized difference between males and females groups ranged from -1.84 to +1.78.

DISCUSSION

One goal of the present study was to investigate the factorial structure of the AQ within an Egyptian context. A second goal was to test whether the AQ was free of gender bias using the Rasch analysis procedure. The findings of the study showed that the AQ could be described by four first-level factors (i.e., physical aggression, verbal aggression, anger, and hostility) that were linked by a higher order factor (i.e., general aggression). These results seem to be consistent with the original four-factor structure of the AQ as described by Buss and Perry (1992). In addition, these results were in line with findings from other research studies that had replicated the four-factor structure of the AQ and found it to be invariant in different cultures and contexts such as United States (Bernstein & Gesn, 1997), Greece (Tsorbatzoudis, 2006), Italy (Fossati, Maffei, Acquarini, & Di Ceglie, 2003), and Germany (von Collani & Werner, 2005). In a manner different from other studies that suggested removing some items of the AQ to achieve a better goodness-of-fitness of the four-factor structure (see, Harris, 1995; Meesters, Muris, Bosma, Schouten, & Beuving, 1996; Nakano, 2001), the findings of the present study did not suggest that any item of the AQ should be discarded.

A second finding of the present study showed that the AQ was free of gender bias. This implied that all items of the AQ seemed to function in a highly similar way across males and females groups. This finding seemed to be inconsistent with other research findings that had employed

factorial invariance procedures and recommended developing a shorter version of the AQ because some items seemed to be culturally or linguistically biased (see, Vigil-Colet, Lorenzo-Seva, Codorniu-Raga, & Morales, 2005).

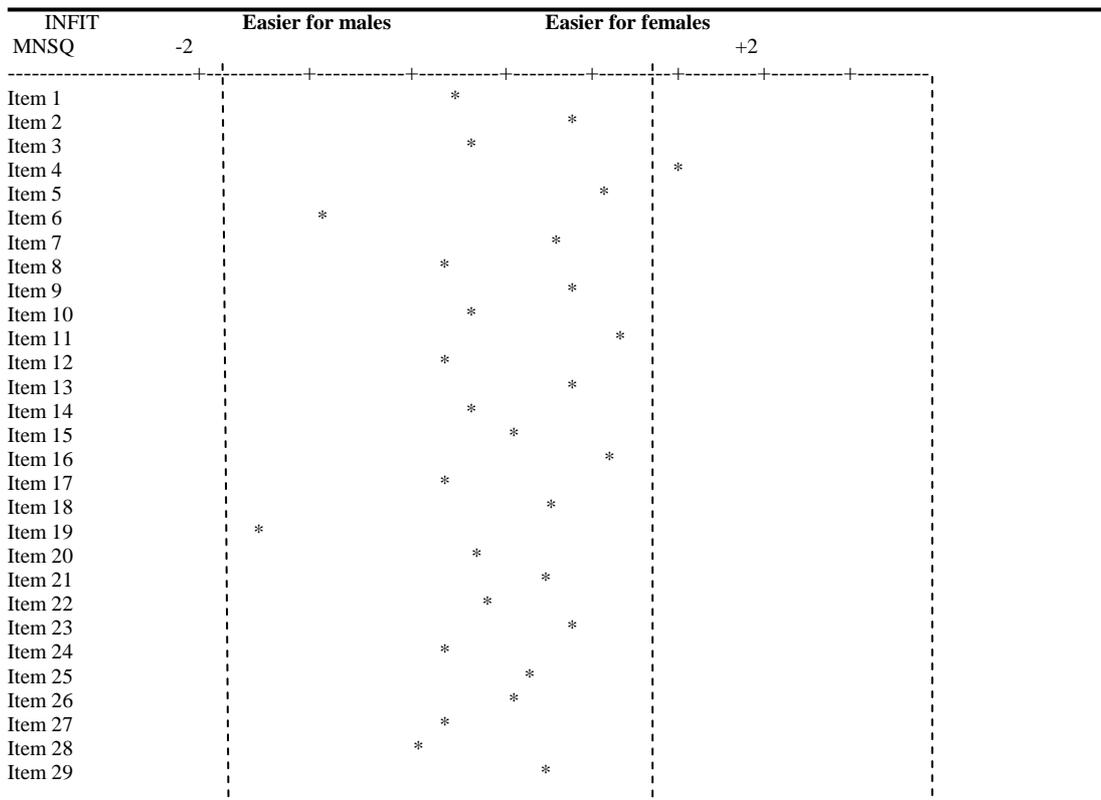


Figure 5: Plot of the standardized differences for males and females groups for all items of the AQ

In summary, the AQ seemed to represent a promising measure of the trait aggressiveness. The AQ showed satisfactory psychometric properties and could be described by four first-level factors that were linked by a higher order factor of general aggression. In addition, the AQ seemed to be free of gender bias.

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X-ray your data with Rasch

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By using the Rasch model, much detailed diagnostic information is available to developers of survey and assessment instruments and to the researchers who use them. We outline an approach to the analysis of data obtained from the administration of survey instruments that can enable researchers to recognise and diagnose difficulties with those instruments and then to suggest remedial actions that can improve the measurement properties of the scales included in questionnaires. We illustrate the approach using examples drawn from recent research and demonstrate how the approach can be used to generate figures that make the results of Rasch analyses accessible to non-specialists.

Rasch, partial credit model, reliability, threshold analysis, differential item function

We have used the physical science/medical analogy of the x-ray deliberately to indicate that the application of the Rasch model can reveal otherwise hidden aspects of data. We show that it is advantageous to view data at macro-, meso- and micro-levels in order to generate a complete understanding of how well an instrument is working and to identify modifications that might improve the measurement properties of the instrument. These levels respectively refer to the scale as a whole, to items within scales, and to thresholds within items. Other facets of measurement scales must also be considered and we refer to person fit and to systematic bias, for example gender bias, in instruments.

Our analyses are not restricted to the Rasch model. Compliance with the three pillars of sound data analysis, namely the structural, distributional and measurement assumptions (Rowe, 2002) implicit in any analysis, must be confirmed. The primary concern of ensuring appropriate structural properties of the data is with the design of the sample of respondents. Where samples are clustered, design effects may require multilevel analytic techniques. A review of the distributions of responses will indicate if responses are skewed excessively and if responses adequately reflect the range of views of respondents. The three levels of analysis that we describe contribute to a demonstration that the scale does indeed conform to the requirements of measurement (Michell, 1997).

Application of the Rasch model through software such as Quest (Adams & Khoo, 1999) provides estimates of person and threshold locations on the latent variable scale. The software also yields indices of item and person fit to show that the requirement of uni-dimensionality is met. Other approaches, notably confirmatory factor analysis, can also be used to provide alternative indicators of the coherence of items and of their conformity to the requirement of uni-dimensionality. Bringing multiple perspectives to bear on a data analysis problem can give greater confidence in interpretations arising from the analyses. Our main focus is on revealing the threshold structure of items, so we report summary results of confirmatory factor analyses but do not discuss them in detail.

MEASUREMENT AND THE RASCH MODEL

The data sets that we analyse come from surveys comprising polytomous items. The raw data derived from these instruments are ordinal and do not directly yield **measures** of the constructs

that the instruments are designed to assess (Harwell & Gatti, 2001; Wright, 1993). However, provided items in the scale comply with certain axioms of measurement, there is sufficient information in the ordered responses to enable item thresholds and person locations to be mapped stochastically onto a latent interval variable. Several requirements must be satisfied about individuals' responses to items in tests and survey instruments. Weiss and Yoes (1991) stated four requirements of measurement which may be paraphrased as (i) individuals respond honestly to item prompts; (ii) items are indicators of a uni-dimensional latent trait; (iii) items are locally independent; and (iv) item responses can be modelled using a monotonic function. Threats to each of these requirements are known.

In the assessment of attitudes, respondents may exhibit a range of behaviours such as acquiescence to perceived assessor expectations (Anderson, 1997). Departures from uni-dimensionality can be checked using item fit indices from Rasch software and by testing alternative structures (uni- and multidimensional ones) using confirmatory factor modelling. The confirmation of a uni-dimensional structure provides evidence of internal consistency. A departure from local independence is observed, for example, when common stems are used for several items. Linacre (1997) has shown that this can be detected by examining item covariances, but he described this as a "third order" problem. The fourth requirement articulated by Weiss and Yoes (1991) is a key subject of Michell's (1997) challenge to measurement in the social sciences. Michell asserted "constructs that are thought to be quantitative must be shown to be so empirically" (p. 355). The literal implementation of (part of) Stevens' (1951, paraphrasing Campbell) dictum that "measurement is the assignment of numerals to objects or events according to rules" has been adopted in much psychological research without establishing the required correspondence between the numbers assigned to responses and the trait that is being measured (Michell, 2002). Testing this hypothesised quantitative relationship is what the Rasch method does, and poor fit at the macro-level or poor precision of item and threshold parameters at the meso- or micro-levels indicate a failure of measurement in Michell's terms.

The application of Rasch models has led to some rethinking of the construction of tests and survey instruments. One of the "new rules" of measurement proposed by Embretson (1999), following the application of item response theories rather than classical test theory, suggests "shorter tests can be more reliable than longer tests". We argue in this paper that this new rule needs to be qualified. Short tests can be reliable, provided their items and specifically their item thresholds do cover adequately the trait range of the sample of respondents. We set out to show how item thresholds can provide information that adds to item- and scale-level information and how those thresholds can be mapped to provide a visual representation that communicates item structures to non-specialists.

Rasch modelling provides information (a) about scales through, for example, item and scale reliability indices – the macro-level, (b) about individual items through location parameters and item fit indices – the meso-level, and (c) about individual item thresholds through their locations and standard errors – the micro-level. Using information at each of the three levels can assist in diagnosing the sources of scale deficiencies.

We demonstrate a systematic approach to the analysis of survey data using three analytic levels, namely the macro (scale) level, the meso (item) level and the micro (response category or threshold) level. In addition, we undertake preliminary analyses to check the data before commencing the Rasch analyses, and we report confirmatory factor modelling as a means of checking the results of the Rasch findings.¹

¹ Bentler (1996) observed that confirmatory factor modelling was equivalent to the two-parameter IRT model. This differs from the Rasch approach which assumes consistency of discrimination across items and models a single, difficulty, parameter for each item.

METHODS AND DATA

The data sets used in this study are drawn from research conducted into students' anger (Boman, 2002; Boman *et al.*, 2006; Boman *et al.*, 2003) and from some scales included in the Longitudinal Surveys of Australian Youth (LSAY) program.² Scales were selected because they illustrated some of the features that were made apparent by using Rasch based approaches to analysis and not because the scales were either particularly good or deficient. Almost any data set arising from the administration of survey instruments could be used.

The analyses reported in this paper were conducted using the program Quest (Adams & Khoo, 1999). Quest provided various indicators of the adequacy of scales and items and had very flexible output. The graphs were generated by exporting the Quest output to a standard spreadsheet program. Other programs would provide comparable scale and item statistics and most of the analyses shown below could be generated from many other Rasch-based programs. Preliminary screening of data was conducted using SPSS (SPSS Inc., 2003) and the confirmatory factor modelling was undertaken using M-plus (Muthen & Muthen, 2006).

A RASCH BASED APPROACH TO SCALE ANALYSIS

Preliminary Analysis

The main purpose of the preliminary analysis was to check the distributional properties of responses to items. The scales used in this investigation had relatively few response categories, and it was feasible to examine the responses using the item analysis (*itanal*) command in Quest. Where scales have many response categories, perhaps as many as 11, it would be feasible to regard the responses as coming from a pseudo-continuous variable and to examine the variance, skewness and kurtosis statistics produced by SPSS. That is, the distributional properties of the responses to items could and should be examined. The preliminary analysis was also a phase in which data can be screened and cleaned. Generating frequency tables for item responses would reveal any data entry or coding errors. This is a necessary process in very large data sets or secondary data analysis, especially where the analyst has not been involved in data collection and entry. We do not report these results here, as the focus is on the Rasch analysis, but no problems were encountered in this phase of our analysis of the scales.

The Macro Level: The Scale

Under classical item analysis, Cronbach's alpha is used as an indicator of the internal consistency of a set of items. An extensive body of literature has criticised the use of Cronbach's alpha as an index of scale reliability (see Rowe, 2002 for a summary of this literature).

Rasch analyses produce several indicators of the adequacy of scale measurement. The responses of individuals to item prompts provide information about both the items and the persons. The difficulties of items and the abilities of persons are placed on a common measurement scale for the construct being assessed. The consistency with which individuals provide information about the difficulties of items that form the scale is reflected in the item separation index. The consistency with which individuals are placed on the scale by the items in the instrument is reflected in the person separation index.

Andrich (1982) showed that the person separation reliability is almost identical to the KR-20 (for dichotomous items, which is a special case of Cronbach's alpha which applies to polytomous responses), although under some circumstances the person separation index deviates from Cronbach alpha. Under the Rasch model, responses to items are assumed to be stochastic and there is an expectation that there will be some variation from a deterministic pattern of responses. However, if there is too much departure from complete consistency in observed responses, the placement of items and persons on the scale will be imprecise, and the two reliability indices will

² See the LSAY web site at <http://www.acer.edu.au/research/projects/lsay/overview.html>

be low. The magnitude of the measurement error limits the number of discriminable performance levels on the attribute being assessed. The calculation of the number of performance levels is shown in Wright and Masters (1982, pp. 91-92), and these and other summary data for the illustrative scales are shown in **Table 1**. The sample indices of item and person reliability, which are generated in Quest output, are shown in the table. For the three scales used as examples, the reliability of item separation is quite high. With the very large numbers of cases, the standard errors of item estimates are quite small and so the reliability of item separations are inflated compared with analyses based on smaller numbers of cases. Whether or not these reliability indices are thought to be inflated by having larger than necessary numbers of items or persons, it is desirable to examine the person and threshold errors of measurement to ensure that the instrument provides the desired precision given the purposes to which the data will be put. The issue of threshold precision is discussed below. In the analyses of some scales very low values for item separation reliability indices have been found (Curtis, 2003), even when the reliability of person separation is acceptable. Very low values of the item separation index indicate that the scale reflects a very broad construct or perhaps several conflated constructs.

The sample reliability of person separation is of particular interest. Values of this statistic vary from 0.69 to 0.81 for these scales. This statistic is related to the number of performance levels or bands that can be distinguished in the respondent sample using the set of items that comprise the scales. It is important to know the number of discriminable performance bands when interpreting individual achievement scores. Considerable attention is paid to this issue in large-scale testing programs, where achievement bands are associated with performance descriptors. The PISA reading and mathematical literacy scales have well described bands that can be used in describing the achievements of population groups and sub-groups and individuals (Thomson *et al.*, 2004, pp. 42-44, 92-95). Although the number of discriminable performance bands can be estimated from the separation indices, the cut points between these bands are not identified from these statistics and must be based on substantive performance criteria defined when the underlying construct is described and the items generated.

Table 1: Scale summary statistics for three example scales

Scales	Anger Intensity	Life Satisfaction	Vocational Interest (Realistic)
Number of items (L)	13	12	4
Number of respondents (N)	1400	8660	9378
Response options	4	4	4
Cronbach alpha	0.80	0.85	0.80
Item separation index	0.98	0.95	0.99
Person separation index	0.80	0.81	0.69
Number of performance levels	2.4	3.9	2.5
Mean person score	0.45	2.68	0.32

The targeting of an instrument for a sample of respondents is indicated by the distance between the mean score for items and the mean score for persons. Since the item mean is set to zero by default, the mean person score indicates the degree of mistargeting of the instrument. In a series of simulations of various factors that influence the precision of measurement, it was shown that scales for which the person mean is within 0.5 logits of the origin provide good measurement (Curtis, 2003). When the person mean was more than 1.0 logits from the origin, measurement was compromised (Curtis & Boman, 2004). In the scales analysed in this study, the Anger Intensity and Vocational Interests scales were well targeted (person means of 0.45 and 0.32) but the Life Satisfaction scale was very poorly targeted, having a person mean score of 2.68 logits. It is common to find that the around 90 per cent of case scores for well-targeted instruments lie in a range from -3 to +3 logits. For the Life Satisfaction scale, the mean score is close to the effective upper limit of this common distribution pattern. It suggests that the set of response options requires revision and that the lowest two response categories might be combined and an additional upper option be generated. This matter is addressed further in examining the micro-level features (thresholds) of items.

The Meso Level: Items

The meso- or item-level of analysis tends to be the one that receives most attention through an examination of fit statistics. Many analysts appear to pay considerable attention to item fit statistics, but few attend to person fit statistics. (See the review in Curtis & Boman, 2004).

The issue of item fit has been canvassed thoroughly in many texts and articles (see, for example, Bond & Fox, 2001; Linacre, 1995; Linacre *et al.*, 1994; Wright & Masters, 1982) and it will be covered only briefly in this paper.

Item Fit

Many indices of item misfit have been tested (Li & Olejnik, 1997; Linacre, 1998; R. M. Smith, 1996), but most common Rasch analysis software programs use the information weighted index (Infit Mean Square or IMS) and the unweighted index (the Outfit Mean Square or OMS). There has been some debate in the literature on whether to use the statistics themselves or their t -transformed variants. In most statistical procedures, a t (or similar) statistic is computed and its corresponding probability of being observed under normal sampling variation is used to decide whether the observation is likely (or not) to have arisen by chance. It is tempting, therefore, to apply the same logic to evaluating the fit statistics produced for items (and persons) in Rasch analysis. The consensus appears to favour the use of the fit statistics rather than their t -transformations (Bond & Fox, 2001; Linacre *et al.*, 1994). Bond and Fox (2001, p. 179) provide advice on acceptable ranges of item fit using IMS values, depending upon the purpose of the measurement exercise. There is some value in using both IMS and OMS values. The OMS statistics are more sensitive to outliers, and if an item shows acceptable fit on one index, but marginal or poor fit on the other, the item should be investigated more closely. This might include a search for outlying cases, perhaps using person fit statistics, or could involve a detailed analysis of thresholds (micro-level analysis, see below) or differential item function. A decision to accept, modify (and if so, in what way) or to reject items should be made after an examination of all relevant evidence. Item fit statistics provide part of this evidence, but additional evidence may be found from an examination of person fit statistics and inspection of the micro-level (threshold) structure of items.

In the three scales used as examples in this paper, item fit statistics lie within the acceptable range from 0.7 to 1.4. Item fit statistics for the Life Satisfaction scale are shown in **Table 2**. The item asking about money earned fits the scale much less well than the others. Using the fit criteria suggested by Bond and Fox (2001, p. 179) this item could be retained. However, it could be argued that wages reflect a unique dimension of satisfaction with an individual's life situation, but a decision to remove or retain this item should be based on the substantive intent and meaning of the scale and not on the arbitrary application of a particular criterion value for a fit index (Linacre *et al.*, 1994). 'Your life as a whole' summarises the views individuals had expressed through other items in the scale. It can be expected to be highly correlated with other items and to add little information that is not already conveyed by responses to other items. This redundancy is reflected in the low IMS value (0.75) for this item.

It is instructive to examine the t transformed fit statistics for these items. The first item (satisfaction with work) has an IMS value of 1.06, a figure that would be acceptable for even the most rigorous assessment purposes. However, its t statistic is 3.05, suggesting significant misfit. The LSAY Y03 2004 sample included 8690 cases and this large sample leads to low standard errors of estimates and to high t statistics for a given level of misfit.

Person Fit

Fit statistics are determined by the response vector of persons to a set of items or of items for a sample of persons. However, each response is stochastic in that a person with a certain trait may choose a particular response option on one occasion and alternative option on another occasion.

When there are few items with few response categories, selecting a different response category can lead to a substantial change in the person fit statistic. Thus, the power of fit statistics to detect aberrant response patterns depends on the number of items and the number of effective response choices for those items (Curtis & Boman, 2004). Typically, there are many more respondents to a survey instrument than there are items within it, so much more latitude has to be allowed in deciding whether to accept or reject a person as fitting. For an attitude scale, an upper limit on the IMS range for an item might be 1.4 (Bond & Fox, 2001, p. 179), but for a person this figure might be set at around 1.6. For scales with few items and few response choices, even greater latitude must be permitted. In simulations in which some responses that were entirely random, IMS values in excess of 4 were found. If respondents with these high values are found, it may be desirable to remove these cases for instrument calibration because their inclusion would lead to increased estimated standard errors of item estimates. A decision on whether to re-admit these individuals to the sample for other purposes, such as scoring, might be made separately. This decision would depend on what interpretation can be made of their scores. This situation is illustrated in **Table 3**, which shows parameters for selected cases on the Realistic Vocational Interest scale. Note that two individuals had the same trait estimate (1.24), but one had an IMS value of 1.02 indicating good fit to the model while the other has a misfit of 2.99, suggesting very poor fit. A question for the analyst is ‘What substantive meaning can be imputed to these two cases?’ In this instance, it seems that one individual has expressed preferences that accord with the order of preferences of most other respondents, but the other may have a unique pattern of interests or may simply have responded thoughtlessly or randomly to the items.

Table 2: Item parameters for the Life Satisfaction scale from the LSAY Y03 2004 questionnaire

Items	IMS	OMS	Infit t	Outfit t
Firstly, how happy are you with...				
The work you do, at school, at home or in a job	1.06	1.08	3.05	3.29
What you do in your spare time	0.99	0.97	-0.37	-1.32
How you get on with people in general	0.96	0.94	-2.35	-2.36
The money you get each week	1.39	1.46	21.74	20.27
Your social life	0.99	0.98	-0.70	-0.73
Your independence - being able to do what you want	1.09	1.11	5.14	4.78
Your career prospects	1.06	1.06	3.46	2.90
Your future	0.92	0.88	-4.95	-5.57
Your life at home	0.86	0.81	-8.44	-8.63
Your standard of living	0.84	0.80	-10.29	-8.39
Where you live	0.98	0.97	-1.48	-1.38
Your life as a whole	0.75	0.67	-18.02	-14.82

Notes: IMS = Infit Mean Square; OMS = Outfit Mean Square.

Precision of Person Estimates

In educational psychology, there has been considerable focus on scale properties – for example reliability as indicated by Cronbach alpha – with much less attention being paid to the precision of the estimated trait levels of individuals (Adams, 2005, p. 164 citing Weiss and Davison (1981)). In classical test theory, it is assumed that measurement error is constant across the trait range. In Rasch analysis, this is not so, and nor should it be expected. In the range where the instrument is targeted and where most thresholds are located, the precision of measurement will be greatest, but at the margins of the measured range where there are few fixed points on the measurement scale (threshold locations), estimates of individuals will be less precise. The precision of individual estimates is illustrated (**Table 3**) by some selected cases, reflecting the range of ability estimates on the Realistic Vocational Interests scale. Estimates near zero logits have the lowest standard errors (at 0.6 logits) while those at the margins of the scale have standard errors of more than one logit. Two questions arise. First, is the precision of the measurement in the most effective region of the scale adequate for the purposes to which they are to be put? Second, at what point do the errors become too great for the estimates to be useful for their intended purposes?

Table 3: Person estimates, standard errors and Infit Mean Square for selected cases from the Realistic Vocational Interest scale

ID	Raw score	Estimate	se	IMS
4366	11	2.75	1.10	1.34
1543	11	2.75	1.10	0.49
3453	10	1.85	0.84	0.57
5356	9	1.24	0.73	2.99
833	9	1.24	0.73	1.02
9918	8	0.75	0.67	0.15
1324	7	0.33	0.63	0.81
8977	7	0.33	0.63	0.05
9109	6	-0.06	0.62	5.73
4753	5	-0.44	0.62	1.77
6162	5	-0.44	0.62	0.59
10346	4	-0.83	0.64	1.37
2692	3	-1.27	0.69	0.57
6086	2	-1.81	0.79	0.30
6914	1	-2.62	1.05	0.93

The Micro Level: Thresholds

In this paper, delta, or Masters, thresholds are used. A delta threshold is the point on a scale at which a respondent has an equal probability of endorsing either of two adjacent response categories. The delta threshold estimates are reported relative to the scale origin. Thurstone thresholds are reported by default in some software packages. They are the points at which a person has an equal probability of selecting a response category or any of those above that level. Thurstone thresholds are necessarily ordered, whereas the delta thresholds may not be. Disordered thresholds may indicate a failure of correspondence between the latent trait and the assignment of scores to supposedly ordered response categories, but it is more likely that threshold reversals arise because of low response frequencies to one or more options. If reversed thresholds are detected, the cause should be investigated.

In this paper, the partial credit model, in which the steps or distances between thresholds are permitted to vary across items, has been used. By comparison, in the rating scale model (Andrich, 1997), steps between particular thresholds pairs are held constant across items. The penalty of the partial credit, compared with the rating scale, model is that additional parameters must be estimated, but the advantage is that if the thresholds of a particular item are either not discrete or, worse, disordered, the partial credit model will reveal that problem. Conquest (Wu *et al.*, 1998) provides a method of comparing the relative fit of these two models. The rating scale and partial credit models can be tested for a particular data set, and a deviance statistic is calculated for each. Invariably, the deviance statistic will be greater for the rating scale model, but if the difference between the two is not significant, the rating scale model can be used without loss of relevant information. However, in order to investigate the threshold structure of items, it is necessary to use the partial credit model and to allow the threshold steps to vary across items.

Thresholds for the Anger Intensity scale from the Multidimensional School Anger Inventory (D. C. Smith *et al.*, 1998) are shown in **Figure 1**. The mean score of persons on this scale was 0.45 and the standard deviation 0.86 logits. The target measurement range, that is the region of the scale where most respondents lie, is approximately from -1.0 to +2.0 logits, and it can be seen from **Figure 1** that this range is evenly and well populated with thresholds. Thus, the measurement of individuals in this range is based on many calibrated points on the scale. There are, however, thresholds outside this range. Most of the first series of thresholds (Delta 1 in **Figure 1**), those that separate the lowest two response categories, lie outside this range. The confidence intervals for these thresholds are rather large, indicating that these thresholds are not estimated precisely. This is to be expected, since there are few individuals in this region of the scale and so few responses endorsing the lowest two categories from which the locations of these

thresholds can be estimated. A similar situation was observed for the Life Satisfaction scale, with imprecisely estimated lower thresholds and poor separation of many of these thresholds. The problem with the Life Satisfaction scale can be attributed to its poor targeting, as indicated by a mean person score of 2.68 when the item mean is set at the origin for the scale.

For the Anger Intensity scale, of greater importance than the low precision of the lower threshold estimates, is the lack of well-separated thresholds for items 5, 9 and 10, circled in **Figure 1**. Items 5 and 10 have quite distinct lower thresholds, but the upper two that separate the “I’d be a little angry” from “I’d be quite angry” and “I’d be really angry” indicate that these response options are not working well for these two items. Item 9 reveals an even greater problem, in that all three thresholds are poorly separated. Item 9 has a slightly high but acceptable IMS value of 1.22. In effect, its three thresholds could be collapsed into a single one with little loss of information, and it appears that the item is working as a dichotomous one. The cause of this was diagnosed, at least in part, to a typographical error when the instrument was adapted for use in Australia and the word “special” was omitted from the item, which should have read “The teacher’s pet gets to do all of the special errands in class” (Boman et al., 2006). Changing one word in an item can have a quite marked impact. This suggests, encouragingly, that apparently minor revisions can improve problematic items, but it should serve as a warning that making apparently cosmetic changes to items can have striking influences on their measurement properties.

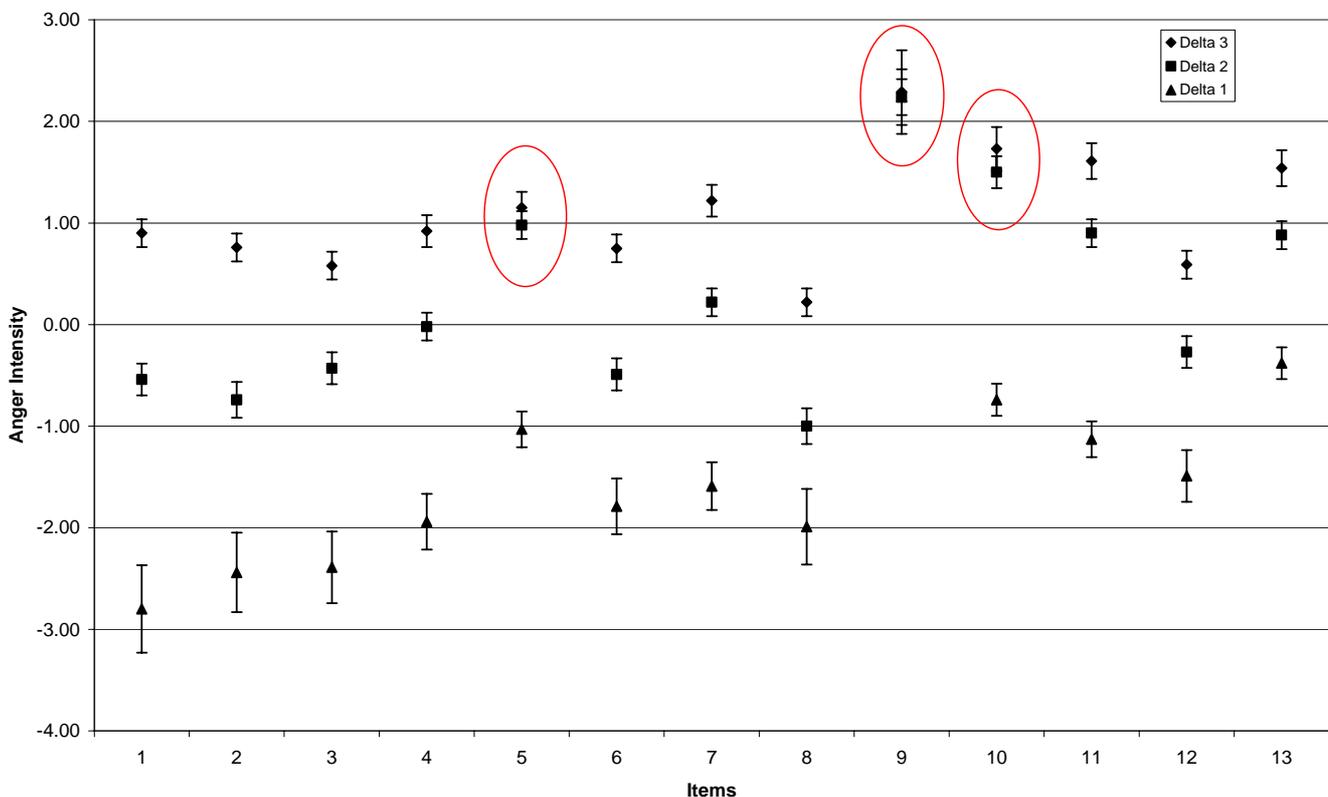


Figure 1: Thresholds for the items of the Anger Intensity scale

Differential Item Function

The Realistic Vocational Interest scale was well targeted and had ordered and well separated item thresholds. The person estimates were not very precise (standard errors > 0.6 logits) and appeared to be a good scale. There was concern, however, arising from relevant theory. The items had been selected to reflect the Holland (1985) theory of vocational preference. Gottfredson (2002) has shown that vocational choices are made through a process of comparing person attributes with perceived characteristics of occupations. One of the characteristics that is perceived early, and

accurately, in career decision-making is the gender-typing of jobs. Many of the realistic³ vocational activities used in assessing vocational interests are strongly gender-typed, so differences between the ordering of preferences were sought by gender by undertaking a differential item analysis using Quest's *Compare* command. The thresholds of items for males and females are shown separately for the four items of the Realistic Vocational Interest scale in **Figure 2**.

Two items – 'drive trucks' and 'use tools' – show very substantial differences in the thresholds for males and females. These thresholds are highlighted in **Figure 2**.⁴ Only males whose realistic vocational interest is much stronger than is the case for females endorse the 'like it a lot' option for this item. There are consistent and substantial differences in the level of realistic vocational interest between males and females on the 'use tools' item. These differences suggest that the structure of vocational interests differs between males and females. It may be necessary to calibrate these scales separately for males and females or even to consider developing different items that refer to different occupational activities for the two genders.

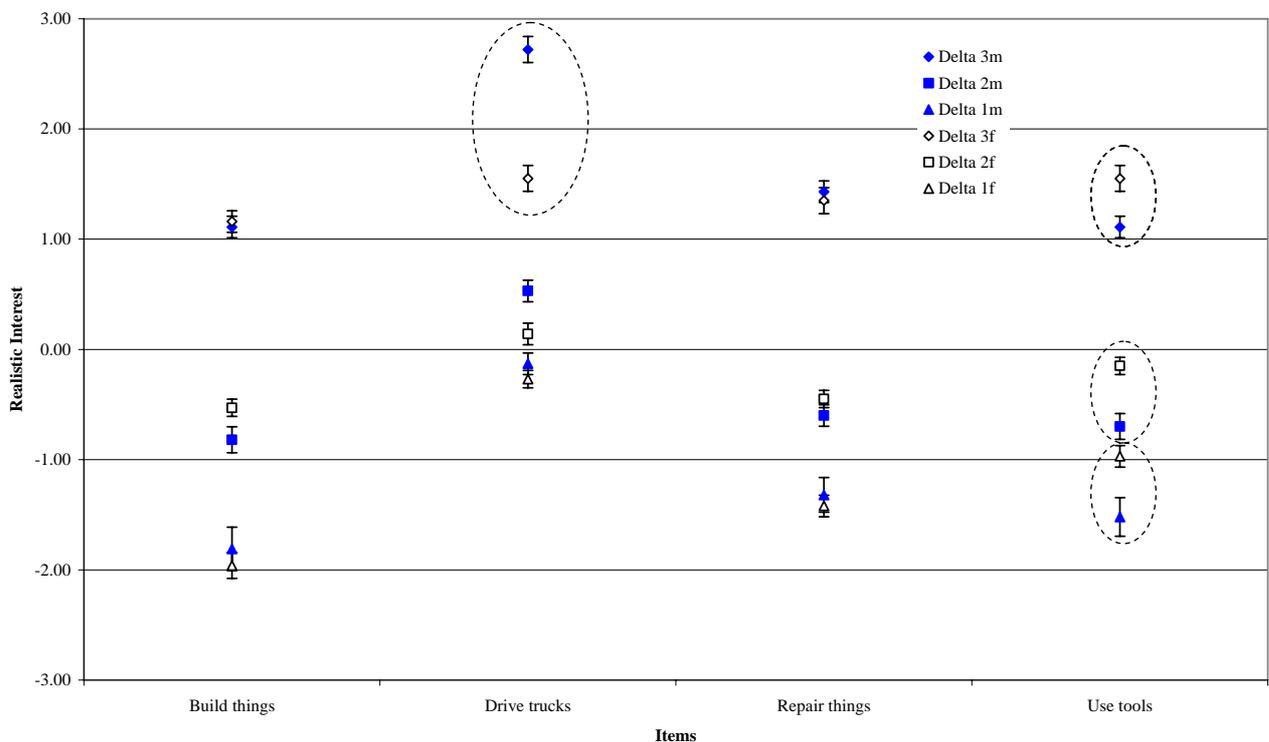


Figure 2: Thresholds for males and females on the Realistic Vocational Interests scale

SUMMARY

In the paper, we have drawn attention to three levels of analysis, namely the macro- or scale-level, the meso- or item- and person-level, and the micro- or threshold-level. At each level, Rasch analysis software produces several indicators that should be considered by analysts. At the macro-level, indices for the reliability of both item and person estimates should be examined. In addition, the degree to which the instrument is targeted for the sample should be inspected. Poorly targeted instruments will not lead to precise estimates of individuals on the trait.

At the meso-level, item fit statistics are routinely examined. The case has been made that person fit statistics and, in particular, the standard errors of person estimates must be examined to ascertain that the measures are of sufficient precision for the purposes to which the data are put.

³ According to Holland's (1985) typology, realistic interests are those most closely associated with traditional trade occupations, and males dominate employment in many of these occupations.

⁴ Alternative plots of male and female thresholds on x- and y-axes also show the effects of differential item function.

Micro-level analyses are especially informative. Having the desired measurement range well populated with precisely quantified thresholds adds to the information available for estimating person locations. The most parsimonious scales will have the full measurement range populated with thresholds but without redundant ones. It is in this respect that the “new rule” of measurement proposed by Embretson (1999) that “shorter tests can be more reliable than longer ones” may apply. Shorter tests may be better than longer ones if the thresholds are estimated with precision and if they cover adequately the desired measurement range. Thresholds within items should be well separated and certainly should not show reversals. Where these thresholds are not distinct, problems within items should be suspected. Other problems, such as differential item function, can be investigated through an examination of threshold locations for different sub-groups of the sample.

In addition to ensuring that structural and distributional properties of the data set, examination of measurement data at three levels – macro, meso and micro – inform analysts about the quality of their measurement instruments and about the quality of the measures generated through the application of their instruments. Information from each level of analysis can assist in the interpretation of information at other levels.

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A Rasch analysis of the Teachers Music Confidence Scale

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This article presents a new measure of teachers' confidence to conduct musical activities with young children; Teachers Music Confidence Scale (TMCS). The TMCS was developed using a sample of 284 in-service and pre-service early childhood teachers in Hong Kong Special Administrative Region (HKSAR). The TMCS consisted of 10 musical activities. Teachers rated their confidence levels to conduct each activity on a scale from 1 (Not confident at all) to 5 (Very confident). An exploratory factor analysis retained a 10-item single factor that was replicated using confirmatory factor analysis procedures. All items of the TMCS fitted the Rasch model adequately. In-service teachers showed higher confidence levels to conduct several musical activities with young children than pre-service teachers. Implications of these findings for measuring teachers' confidence to conduct musical activities with young children were discussed.

Music education, early childhood education, confidence,
in-service and pre-service teachers, Rasch analysis

INTRODUCTION

Music in early childhood education encompasses different areas of teaching, including singing, moving, dancing, playing percussive instruments, and listening. Several research studies have highlighted that involvement in musical activities is thought to develop one's reading and neuroanatomical abilities, verbal learning and retention (Butzlaff, 2000; Ho, Cheung, & Chan, 2003) while also promoting understanding of language, improving the ability to recall information, fostering creativity, and creating an environment more conducive to learning in other areas (Neelly, 2001; Rauscher, 2002; Rauscher & LeMieux, 2003; Vaughn, 2000). The merits associated with involvement in musical activities have encouraged many countries to incorporate music into their national curriculum from pre-school to postsecondary education (Snyder, 1997).

Furthermore, there have been growing research efforts to investigate factors that may contribute towards improving music teaching within a school context (Hamann, Baker, McAllister, & Bauer, 2000; Hennessy, Rolfe, & Chedzoy, 2001; Russell-Bowie & Dowson, 2005). One possible important factor is teachers' confidence levels to conduct musical activities. Overall, confidence is meant to refer to one's faith in one's ability. Several researchers have established a linkage between teachers' confidence levels to conduct musical activities and several desirable educational outcomes. For example, Mills (1989) reported that music taught by a confident teacher helped children appreciate music as part of the whole curriculum, and enabled greater opportunities to be provided for music. Rainbow (1996) argued that a confident music teacher was meant to help new learners master musical skills more quickly. Rainbow explained that music teachers' mastery of various musical activities such as singing and aural perception was

essential before introducing such activities to children. Similarly, Tillman (1988) and Glover and Ward (1993) highlighted that teachers' own musical skills and their levels of confidence in these skills, as well as their general teaching abilities, could be sufficient to help children learn music.

However, music teachers seem to be presented with different levels of confidence both in their own musical abilities and their abilities to teach music in a school context. For example, Mills (1989, 1995-6) and Russell-Bowie (1993) indicated that approximately 60 to 70 per cent of primary teacher education students entered their primary teachers training having minimal, if any, formal music education experiences and consequently lower levels of confidence to conduct musical activities. Similarly, Lawson, Plummeridge, and Swanwick (1994) expressed concern that there might be insufficient teachers in primary schools with the necessary confidence and expertise to implement fully the music program. Moreover, Hennessy (2000) highlighted that "many teachers believe that music requires gifts that are only attainable by, or given to, a chosen few" (pp. 183-184). Beauchamp and Harvey (2006) argued that music could be one of the problem areas for managerial and administrative staff in the school.

Furthermore, Holden and Button (2006) asked a sample of 141 British teachers to indicate their levels of confidence to teach 10 national curriculum subjects, including music, on a scale from 1 (highest levels of confidence) to 10 (lowest levels of confidence). Participants were also requested to attend a semi-structured interview. Results of the study showed that music was given the lowest ranking of confidence to teach. In addition, the interviewees showed high levels of uncertainty about music and described it as a specialist area. The results also revealed non-significant differences between Key Stage 1 (ages 4-7) and Key Stage 2 (ages 7-11) teachers in their confidence levels to teach music. However, there was a positive and significant relationship between teachers' confidence levels to teach music and teachers' musical qualifications, musical experience and training, and attitudes toward music. The semi-structured interview further revealed that singing was the most difficult aspect of music to practise confidently although it was the activity taught most frequently.

AIM OF THE STUDY

Despite the above concerns about music teacher's confidence levels, there seem to be little research that investigates teachers' confidence levels to conduct musical activities with young children. The present study attempts to build on the work of Holden and Button (2006) through developing a scale that aims at measuring teachers' confidence levels to conduct musical activities with young children; *Teachers Music Confidence Scale* (TMCS). One goal of the present study is to test the factorial structure of the TMCS using both exploratory and confirmatory factor analysis techniques. A second goal is to investigate whether the items of TMCS fit the Rasch model. A third goal is to test whether there are any differences between in-service and pre-service teachers' confidence levels to conduct musical activities with young children.

METHODS

Participants

The present study included 284 early childhood teachers (165 pre-service and 119 in-service) in Hong Kong Special Administrative Region (HKSAR). Of the whole sample, 66 per cent were aged 25 years or below. Pre-service teachers were from a local tertiary institute, and in-service teachers were from 18 local preschools. Although a cluster sample design was employed sample random simple statistics have been employed and reported in this article. Consequently, in the use of the tests some allowances must be made for the cluster sample design.

Measurements

The Teachers Music Confidence Scale (TMCS) is designed according to the Guide to the Pre-primary Curriculum (Hong Kong Curriculum Development Council, 2006; Hong Kong Curriculum Development Institute, 1996); South Australian Curriculum, Standards and Accountability Framework (Department of Education and Children's Services, 2004) and the National Standards for Music Education (1994). The TMCS is a 10-item scale that intended to measure teachers' confidence levels to conduct musical activities with young children. The question of the TMCS stated "On a scale of 1-5, how confident are you in undertaking the following musical activities with young children?" This question is followed by a list of 10 music-related activities. Teachers express their confidence level to conduct each musical activity on a scale from 1(Not confident at all) to 5 (Very confident). Scores on all items of the TMCS can be summed up to obtain a total score which represents teachers' overall confidence levels to conduct musical activities with young children.

Procedures

The TMCS was originally prepared in English. The first author translated the English version to Chinese. Two early childhood bilingual professionals compared the English and the Chinese versions of the TMCS and found the translation to be satisfactory. For pre-service teachers, the TMCS was administered and collected in-person in the same session. For in-service teachers, the TMCS was sent out by mail and returned within a period of a week.

RESULTS

Exploratory Factor Analysis

An exploratory factor analysis of the TMCS yielded a 10-item single factor (Cronbach $\alpha = 0.89$) which explained 50.5 per cent of the total variance extracted. The factor loadings of all items of the TMCS are presented in Table 1.

Table 1: Exploratory factor analysis of the TMCS (N= 284)

Factor/Statement	Factor loadings
1. Singing.	0.81
2. Dancing/Moving/Dramatising with music.	0.74
3. Playing percussive instrument(s).	0.73
4. Listening to music.	0.72
5. Composing / improvising music.	0.72
6. Integrating music into curriculum.	0.70
7. Providing various types of music materials.	0.70
8. Using multimedia tools to facilitate teaching.	0.69
9. Identifying children's musical potentials.	0.68
10. Knowing about children's musical interests.	0.60
Eigenvalue	7.1

Unidimensionality

In order to test whether the items of the TMCS fitted the Rasch model, it was necessary to examine whether or not the items of the TMCS were unidimensional since the unidimensionality of items was one of the requirements for the use of the Rasch model (Anderson, 1994; Hambleton & Cook, 1977).

Consequently, confirmatory factor analysis procedure was used to test the unidimensionality of TMCS items. Confirmatory factor analysis is a statistical procedure used for investigating relations between a set of observed variables and the underlying latent variables (Byrne, 2001; Kim & Mueller, 1978). Thus, confirmatory factor analysis assumes that the observed variables are derived from some underlying source variables (Kim & Mueller, 1978). Factor analysis may also be used as an appropriate method for identifying the minimum number of hypothetical variables

that account for the observed covariation, and thus as a means of exploring the data for possible data reduction (Kim & Mueller, 1978). However, one of the main purposes of confirmatory factor analysis is to examine the common underlying dimensions associated with a number of observed variables.

The AMOS 6.0 program (Arbuckle, 2005) was used to run a confirmatory factor analysis of the TMCS using the full information maximum likelihood estimation procedure (Bollen, 1989). The analysis showed that the TMCS could be described as a one factor model, presented in Figure 1, $\chi^2 (35, N = 284) = 45.5, p = 0.11$, Root-Mean-Square Error of Approximation (RMSEA) = 0.02, Standardized Root-Mean-Square Residual (SRMR) = 0.01, Adjusted Goodness of Fit Index (AGFI) = 0.98, Parsimonious Goodness of Fit Index (PGFI) = 0.32, Tucker-Lewis Index (TLI) = 0.99, Parsimony Ratio (PRATIO) = 0.84, and Parsimony Normed Fit Index (PNFI) = 0.85. All the hypothesized regression path coefficients of the TMCS model, presented in Table 2, were statistically significant because the critical ratio (CR) for a specific regression path coefficient was $> \pm 1.96$ (Byrne, 2001).

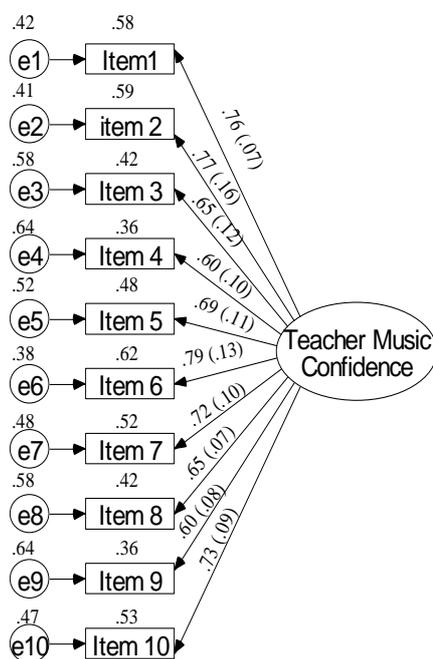


Figure 1: Confirmatory factor analysis of the TMCS

Table 2: Standardized loadings, standard error, critical ratio, error variance, and R² of the second-order confirmatory factor analysis of the TMCS (N = 284)

Paths	Music	Standardized loadings	Standard error	Critical ratio	Error variance	R ²
Teachers' Confidence						
1		0.76	0.07	10.9	0.42	0.58
2		0.77	0.16	4.8	0.41	0.59
3		0.65	0.12	5.4	0.58	0.42
4		0.60	0.10	6.0	0.64	0.36
5		0.69	0.11	6.3	0.52	0.48
6		0.79	0.13	6.1	0.38	0.62
7		0.72	0.10	7.2	0.48	0.52
8		0.65	0.07	9.3	0.58	0.42
9		0.60	0.08	7.5	0.64	0.36
10		0.73	0.09	8.1	0.47	0.53

Rasch Analysis

It is common within classical test theory to sum individual item response values to obtain a total score. However, this approach has been criticised and reviews have been made by Andrich (1978), Masters (1988), and Wright and Masters (1982). For example, Bond and Fox (2001) highlighted that the summing of individual item response values had two underlying assumptions. First, each item was measured on an equal interval scale. Thus, each item was contributing equally to the underlying trait. Second, the distances or the steps among the response categories were equal for an item and through all items of a scale, that is, the level of the underlying trait required to move from one response category to another was the same for an item and was equal across all items of a scale. Bond and Fox concluded that those two assumptions were counterintuitive and mathematically inappropriate.

The basic Rasch model is a dichotomous response model (Rasch, 1960; Wright & Store, 1979) that represents the conditional probability of a binary outcome as a function of a person's trait level (B) and an item's difficulty (D). The Rasch dichotomous response model is given by:

$$P_{ni} = \frac{\exp(\beta_n - \delta_i)}{1 + \exp(\beta_n - \delta_i)}$$

where P_{ni} is the probability of an endorsed response (a yes response to an item), β_n is the trait (or ability) parameter of person n , and δ_i is the difficulty of endorsing item i . When $\beta_n > \delta_i$, $\beta_n = \delta_i$, and $\beta_n < \delta_i$, the chances of a 'yes' response is greater than 50 per cent, equal to 50 per cent, and less than 50 per cent, respectively.

Andrich (1978; 1988) is credited for extending Rasch dichotomous response model to the rating scale. The rating scale model is an additive linear model that describes the probability that a specific person (n) will respond to a specific Likert-type item (i) with a specific rating scale step (x). It is important to note that the Likert scale can be modelled with either the rating scale or the partial credit model (Masters, 1988; Wright & Masters, 1982). The partial credit model allows the item format and the number of categories to vary from item to item (e.g., some items are scored with a 5-point scale and others with a 6-point scale). When the item format is inconsistent from item to item, the partial credit model is useful in providing estimates of the psychological distance between each set of the ordinal categories (Masters, 1988). However, the rating scale model restricts the step structure to be the same for all items (Wright & Masters, 1982). In essence, the rating scale models are a subset of the partial credit models (Andrich, 1978).

The simple dichotomous response model can be extended to provide an appropriate model for use with polytomous response categories by the addition of an additional difficulty parameter; either a second δ parameter or a τ parameter. The Rasch rating scale model is given by:

$$p_{nij} = fn \left(\frac{\exp(\beta_n - \delta_i - \tau_j)}{1 + \exp(\beta_n - \delta_i - \tau_j)} \right)$$

or

$$p_{nij} = \frac{\sum_{k=1}^m e^{\exp(\beta_n - \delta_{ij})}}{1 + \sum_{k=1}^m e^{\exp(\beta_n - \delta_{ij})}}$$

where n = subscript for persons, i = subscript for items, and j = response categories (0, 1, 2).

In the present analysis, the QUEST program (Adams & Khoo, 1993) was used to run the Rasch analysis for the TMCS. All the reported results were obtained from the QUEST program. The RUMM program (Andrich, Sheridan, & Luo, 2000), however, was used to plot the Item

Characteristic Curve and Category Probability Curve with thresholds for an example item of the TMCS.

Item Fit Statistics

One important item fit statistics was the infit mean square (INFIT MNSQ). The infit mean square measured the consistency of fit of the cases to the Item Characteristic Curve (ICC) for each item with weighted consideration given to those cases close to the 0.5 probability level. The acceptable range of the infit mean square statistic for each item of the TMCS was taken to be from 0.77 to 1.30 (Adams & Khoo, 1993). Items that had infit mean square above 1.30 indicated that the relevant items did not discriminate well, and below 0.77 indicated that the relevant items provided redundant information. Items that had INFIT MNSQ outside the acceptable range were deleted from the analysis (Wright & Store, 1979). Figure 2 shows that, in the present analysis, no items of the TMCS had been deleted because all items had INFIT MNSQ values within the acceptable range of 0.77 to 1.30. Specifically, the range of the INFIT MNSQ for all items of the TMCS were 0.90 to 1.20.

INFIT MNSQ	0.53	0.63	0.77	1.00	1.30	1.40	1.60
Item 1				*			
Item 2					*		
Item 3						*	
Item 4				*	*		
Item 5				*			
Item 6					*		
Item 7				*			
Item 8					*		
Item 9				*			
Item 10					*		

Figure 2. Plot of all Infit Mean Squares for all items of the TMCS

The RUMM program could divide the examined sample into a specified number of groups or Class Intervals (CIs) for each item. The average ability of individuals within each CI was calculated and represented by a dot on the ICC for each item. If an item fit the Rasch model, the dots should fall on or as close as possible to the ICC. Any deviations of any of these dots from the ICC represented a difference between the observed mean ability of the CI that these dots represented and the expected mean ability of the CI as predicted by the Rasch model. In the present analysis, the RUMM program divided the sample of the study (N = 284) into eight CIs that were plotted along the ICC for each item. Figure 3 shows the ICC for Item 1 of the TMCS.

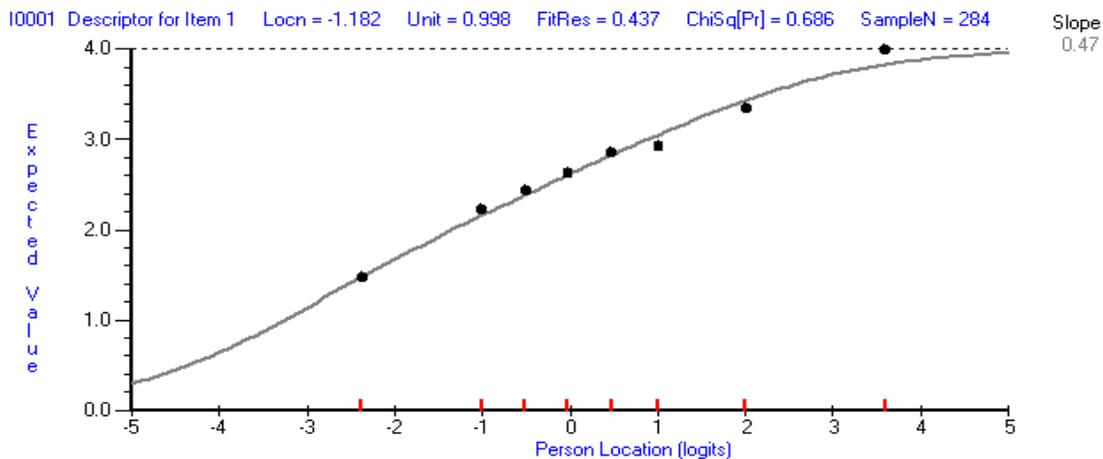


Figure 3. Item Characterise Curve for Item 1 of the TMCS

Figure 4 shows the threshold values for item 1 of the TMCS. The threshold values reflect the item difficulty for each item. According to Bond and Fox (2001) a threshold is “the level at which the likelihood of failure to endorse a given response category (below the threshold) turns to the likelihood of endorsing the category (above the threshold)” (p. 234). For example, in the case of four response categories, there are three thresholds that mark the boundaries between the four response categories: SD (*Strongly Disagree*)-D (*Disagree*)-A (*Agree*)-SA (*Strongly Agree*) and all are ordered. That is, the data are regarded as ordinal and the Rasch model transforms the counts of the endorsement of these ordered Likert categories into interval scales (Bond & Fox, 2001).

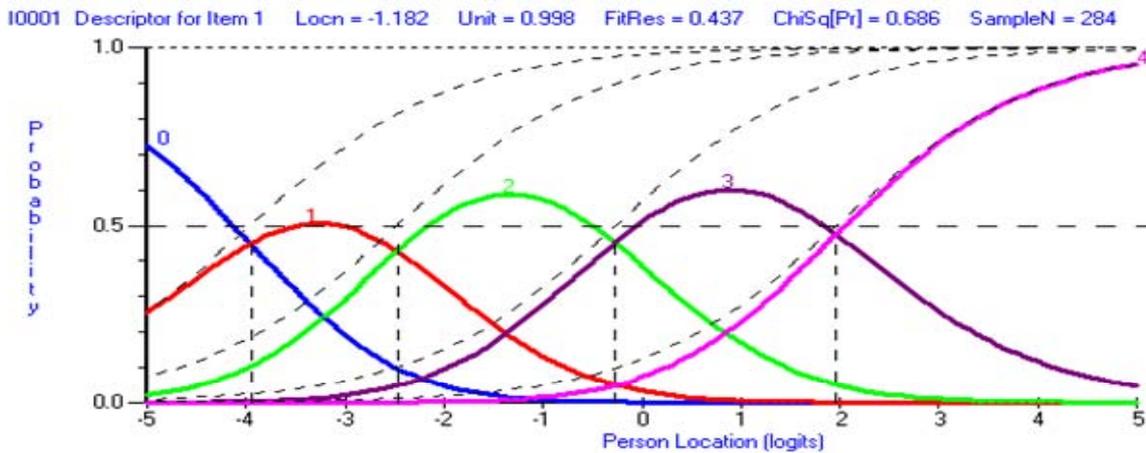


Figure 4. Category Probability Curve and thresholds for item 1 of the TMCS

Case Estimates

It is also important when investigating the fit of the Rasch scale to data to examine the estimates for each case. The case estimates give the performance level of each student on the total scale. In order to identify whether the cases fit the Rasch scale or not, it is important to examine the case OUTFIT mean square statistic (OUTFIT MNSQ) which measures the consistency of the fit of the persons to the student characteristic curve for each student, with special consideration given to extreme items. In the present analysis, the general guideline used for interpreting t as a sign of misfit was if $t > \pm 5$ (Wright & Stone, 1979). Thus, if the OUTFIT MNSQ value for a person had a t -value greater than $t > \pm 5$, that person did not fit the scale and was deleted from the analysis. In the present analysis, no person was deleted because the t -value for all cases fell within the acceptable range of ± 5 . Specifically, the OUTFIT MNSQ for all cases had t -values between - 3.4 to + 2.7, and since the normal t -value tests were not employed because of a cluster sample design, no cases were deleted.

Mean Testing

A series of independent-sample t tests is presented in Table 3 and shows that in-service teachers have higher confidence levels to conduct musical activities with young children than the pre-service teachers, including, (a) singing, (b) dancing/moving/dramatising with music, (c) playing percussive instruments, (d) composing / improvising music, (e) integrating music into curriculum, (f) identifying children's musical potentials, and (g) knowing about children's musical interests. In addition, in-service teachers show higher overall levels of confidence to conduct musical activities with young children than pre-service teachers. It should be noted that the t -tests associated with the differences between the mean values did not make allowance for a cluster sample design.

DISCUSSION

Building on the work of Holden and Button (2006), the main goal of the present study was to develop a quick and accessible measure of teachers' confidence to conduct musical activities with

young children; *Teacher Music Confidence Scale (TMCS)*. The main aim was to establish the psychometric proprieties of the TMCS using appropriate statistical and measurement procedures such as exploratory factor analysis, confirmatory factor analysis, and Rasch analysis. Mean testing procedures were also used to examine differences between in-service and pre-service teachers' confidence levels to conduct musical activities with young children.

Table 3: Differences between in-service and pre-service teachers confidence levels to conduct musical activities with young children (N= 284)

Variable	Background	M	SD	df	t
Singing	Pre-service	3.4	0.95	281	- 4.5 *
	In-service	3.9	0.71		
Dancing/Moving/Dramatising with music	Pre-service	3.0	0.88	281	- 6.1 *
	In-service	3.6	0.71		
Playing percussive instrument(s)	Pre-service	2.9	0.90	281	- 5.8 *
	In-service	3.4	0.71		
Listening to music	Pre-service	3.4	0.91	281	- 0.94
	In-service	3.5	0.76		
Composing / improvising music	Pre-service	2.3	1.00	279	- 3.6 *
	In-service	2.8	0.90		
Integrating music into curriculum	Pre-service	2.8	0.88	282	- 4.7 *
	In-service	3.2	0.76		
Providing various types of music materials	Pre-service	2.8	0.84	280	- 1.8
	In-service	2.9	0.76		
Using multimedia tools to facilitate teaching	Pre-service	2.9	0.89	280	0.43
	In-service	2.8	0.93		
Identifying children's musical potentials	Pre-service	2.7	0.81	282	- 4.4 *
	In-service	3.1	0.79		
Knowing about children's musical interests	Pre-service	3.0	0.83	281	- 5.7 *
	In-service	3.5	.65		
Overall confidence	Pre-service	29.0	6.2	276	- 5.2 *
	In-service	32.6	5.2		

Note. * $p < 0.05$

Findings from the exploratory factor analysis showed that the TMCS could be represented by a 10-item single factor that had a satisfactory internal consistency reliability. A confirmatory factor analysis successfully replicated these findings with all 10 items showing acceptable loadings on the latent trait of 'teachers' confidence'. In addition, all items of the TMCS fitted the Rasch model satisfactorily, indicating that the 10 items of the TMCS measured teachers' levels of confidence to conduct musical activities with young children.

Mean testing showed that in-service teachers had higher confidence levels to conduct musical activities with young children than the pre-service teachers, including (a) singing, (b) dancing/moving/dramatising with music, (c) playing percussive instruments, (d) composing / improvising music, (e) integrating music into curriculum, (f) identifying children's musical potentials, and (g) knowing about children's musical interests. In addition, in-service teachers showed higher overall levels of confidence to conduct musical activities with young children than pre-service teachers.

One possible explanation that can account for these differences between in-service and pre-service teachers is practical work experience and on-job training. In-service teachers may regularly interact with young children and consequently gain broader insights about children's musical needs, and the appropriate musical activities to get children involved and foster their musical growth. This familiarity with children's musical preferences and interests may have fortified in-service teachers' levels of confidence to conduct musical activities with young children. On the contrary, pre-service teachers are more likely to be presented with lower levels of experience to handle a music class, unfamiliarity with the appropriate musical activities to attract young children, and consequently a possibility of failure to meet children's expectations

about a music class. This lack of experience may add difficulty to pre-service teachers and challenge their confidence levels to conduct musical activities with young children.

Another possible interpretation for these differences between in-service and pre-service teachers may be due in part to the nature of music itself. Music can be regarded as a unique discipline or mode of discourse that entails a unique set of practices, procedures and skills (Finney, 2000, p. 208). In the present study, for example, singing, dancing/moving/dramatising with music, playing percussive instruments, and composing/improvising music are comparatively more skill-based activities relative to other activities represented in the TMCS. In-service teachers may have higher levels of musical skill and knowledge due to their possible regular practices with young children. Consequently, in-service teachers may have higher confidence levels to conduct these musical activities than pre-service teachers. This notion seems to be consistent with findings by Holden and Button (2006) that singing and composition were more difficult to conduct than other musical activities by non-music specialist teachers in the United Kingdom.

In summary, the TMCS represents a promising measure of teachers' confidence to conduct musical activities with young children. Unlike the single question that measures teachers' overall confidence levels to teach music (Holden & Button, 2006), the TMCS measures teachers' confidence levels to conduct 10 musical activities. The scores on all the 10 musical activities can be summed to provide a total score which represents a teacher's overall confidence level to conduct musical activities with young children.

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Inside The Contract Zone: White teachers in the Anangu Pitjantjatjara Yankunytjatjara Lands

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This paper represents an autoethnographic exploration of white teachers in South Australia's Anangu Pitjantjatjara Yankunytjatjara Lands, through the lens of critical whiteness studies and racial contract theory. The broad aim of the paper is to return the gaze on the white subject within the context of White Australia. Moreover, this article seeks to position the teacher as a site of representation; a site for the reproduction and potential disruption of the relations of dominance 'in situ'. I employ a narrative technique to locate my Self as a writer and as a racialised subject; to critique my structural and cultural location as a teacher in the Pitjantjatjara Lands; and to argue that autoethnography may be harnessed as one of the many tools for negotiating forms of critical pedagogy within the transcultural setting.

Autoethnography, whiteness, racial contract theory, Pitjantjatjara Lands, critical pedagogy

INTRODUCTION

In this article I develop an autoethnographic narrative with the broad aim of turning the gaze onto the white subject within the context of White Australia. To do so I map my personal experiences as a white teacher in an all-Indigenous setting onto the social and historic processes that produce that setting. Under analysis is the field of education in the Anangu Pitjantjatjara Yankunytjatjara Lands in far northwest South Australia (commonly known as the APY Lands or The Lands). A feature of education in The Lands is the phenomenon of 'tourist teaching'. This term has been adopted by some writers to capture a culture of high turnover of white staff in remote communities (Hickling-Hudson & Ahlquist, 2003, 2004); it is also used to refer to the ways that white teachers reproduce uneven transcultural relations (Hickling-Hudson & Ahlquist, 2003, 2004; Hoffman, 1996; Reyes & Bishop, 2005). My interest in this paper is to explore the latter; the subtle ways that tourist teachers reproduce relations of dominance *in situ* (Connelly, 2002). This paper also represents an entry onto the field of critical race theory and its articulations with pedagogy, and an attempt to develop a working relationship with whiteness studies and racial contract theory.

Following a method demonstrated by Wojecki (2004), I begin by telling, and then re-telling a personal narrative. Narrative is used as a "method of inquiry" (Richardson, 2002), and as a means of moving beyond the predominantly white canon, to write "more engaged sociology ... [and to reach] diverse audiences" (Richardson, 2002, p.414). I seek to invite audiences to reflect on the complexities of their own experiences, and to demonstrate how autoethnography may be harnessed as one of the many tools for negotiating critical pedagogy at the local level. This is done with a view to disrupting whiteness (Cowlshaw, 1999, 2004; Frankenberg, 1993, 1997; Langton, 1993; Mills, 1997; Moreton-Robinson, 2004a), and in the spirit of critical theory and pedagogy (Bhabha, 1994; Foucault, 1970; Hall, 1997; Hattam, 2004; Spivak, 1990). These bodies of theory help to shape my narrative. And although autoethnography is a contested term, I generally employ it as a form of writing and research that displays "multiple layers" and "connects the personal to the cultural" (Denzin & Lincoln, 2000).

Empirical data is compiled through development of two short narratives: The Arrival and The Library. These narratives represent my arrival onto The Lands as a pre-service teacher. I story events because storying, “gives us the perspective to see the story as a text outside of ourselves ... [enabling us to] make the personal experience useful politically” (Chapman, 2004, p.98). Storying provides a vehicle for moving beyond the autonomous Cartesian self, and toward an understanding of the “personal as political” (Frankenberg, 1993), by amalgamating the Self (*auto*), culture (*ethnos*) and writing (*graphos*) (Veissière, 2005). This process is subjective in that I will recall and interpret events differently today than I would have done in the past or will do in the future. And as a racialised subject, my construction of events is, “always only partially understood, always an unequal exchange” (Hall, 1997, p.4)¹. Nevertheless, by consciously situating myself in the narrative I invoke an approach to research whose roots originate in the doubt that any scholarship can occupy an objective position. I consciously seek to work within the white perspective and the relations of racism that I am, after all, unable to shake off.

Some Background

The APY Lands are located in South Australia’s remote northwest desert region; Anangu is the name the Indigenous people of the region use in reference to themselves. Although Anangu remained isolated from Europeans for much longer than most Australian Indigenous groups – with the region remaining largely untouched during the period of invasion of Australia up until the early 1870s (Riphagen, 2005; Summers, 2004) – many aspects of life in the contemporary Lands betray a legacy to colonisation. These conditions are now well documented, and are often focused upon in mainstream media. They include high welfare dependency, inadequate housing, violence, substance abuse, poor health, low school attendance, and comparatively low levels of Western literacy and numeracy (Costello & O’Donoghue, 2005). Despite there being a persuasive body of critical research which illuminates the ongoing relationship in Australia between ‘white’ privilege and ‘black’ disadvantage², the primacy of liberal individualism as the bedrock ideology of Western epistemology, “ironically ensures that *individual* investments in the *collective* sovereignty of white people remain invisible” (Nicoll, 2004, p. 21). According to Chambers, “the category of the individual is the key to white hegemony” (in Nicoll, 2004, p.21); in other words, there remains widespread ‘mainstream’ resistance from acknowledging, “the impact that *colonisation continues to have* upon the lives of all people in Australia, whether it be through disadvantaging Indigenous people or accruing unearned privilege to non-Indigenous people” (Riggs, 2004b, n.p.).

Whiteness itself is thus atomized into invisibility through the individualisation of white subjects. Whereas nonwhites are perceived first and foremost as a function of their group belongingness ... (and then as individuals), whites are perceived first as individual people (and only secondarily, if at all, as whites) (Chambers in Nicoll, 2004, p.21).

Wadham, Pudsey and Boyd elaborate the thinking that underpins the social construction of individualism in liberal societies. They explain that individualism is a belief system or philosophy, “which emphasises the sacrosanct nature of the individual and their rights to liberty ... [which] is often associated with liberalism and the Enlightenment;” moreover, individualism as a hegemonic discourse, “inhibits the potential for acknowledging social contexts,” (Wadham et al, 2007, p. 80), and thus promotes a ‘blame culture’. From the standpoint of ‘white’

¹ As a white researcher interrogating my own culture, autoethnography represents a means of “turning the gaze” and producing a form of “symbolic allegory” that is particularly useful for conducting forms of “counter discourse” (Ashcroft, Griffiths, & Tiffin, 1998, p.9), which in this case constitute the “unlearning” of whiteness (Frankenberg, 1993).

² It should be noted that ‘white’ privilege in the contemporary Australian context, while it predominantly applies to Anglo Australians of British origin, must be considered within the broader relations of class, gender and ability. Similarly, ‘disadvantage’ must be considered not only in terms of race, but also of class, ethnicity and gender.

individualism, Anangu and other non-white or migrant Australians' perceived inability to 'do well' and to 'succeed' within social institutions such as education, therefore become attributed to 'individual laziness, unwillingness or lack of ability'.

It would be erroneous to assume that Anangu, like other Indigenous Australians, have been the passive recipients of white domination or have had no access to social power. It would also be wrong to presume that 'white' teachers in the region are the passive agents of colonialism or that colonisation was not, both, destructive and creative of peoples (Attwood, 1989). However, when considering contemporary aspects of Anangu Education it is important to acknowledge that in Australia, as in other settler nations, "issues of race and whiteness have never been resolved since colonial days" (Schech & Wadham, 2004, p.i). European race thinking established a hierarchy of human variation along biological and cultural lines well before the first Presbyterian mission school was established in the APY (during Australia's protection and segregation era (Edwards, 1982)). Despite its 'paternal care', the policies imposed by the mission – grounded in racial superiority and white race privilege – were based on colonial ideas of superiority and domination, traces of which can be seen in today's Anangu Education system.

Thus Anangu Education has always been shaped by political and cultural tensions at the broader level, and race thinking, underpinned by liberal individualism, has been difficult to dislodge from the dominant Australian psyche. In some respects, race in the time of neo-colonialism and neo-liberalism, "is just as vague and just as resilient as it was at the beginning of the history of European imperialism" (Ashcroft, Griffiths & Tiffin, 1998: 206); moreover, some writers contend that race has recently re-entered the mainstream of Australian political life with renewed force (Markus, 2001). This is supported by Aileen Moreton-Robinson who contends that "the political and social climate in Australia regarding race and immigration has taken a reactive and conservative turn since the early 1990s," thus at this time in world history and global politics, questions about race, power and governance require critical investigation and engagement (Moreton-Robinson, 2004b, p.vii).

Despite the fact that Anangu people now maintain rights over their land and have policy and operational control over education in their region, struggles between Anangu and Western epistemological and ontological frameworks have created ongoing problems, both for the smooth operation of land rights within the broader context of White Australia, as well as for the governance of Anangu Education. Variations between Western and Anangu cultural frameworks have not only fettered Anangu people's successful exercise of educational control, they have also muddied Western 'readings' of Anangu proficiency and 'capacity' (Iversen, 1999). From a critical standpoint, these 'misreadings' are also patent in recent conservative media and political reports.

A Backdrop: self-governance in The Lands has failed ...

Following four youth suicides in The Lands in 2004, the State Government moved to end the region's self-governance rights³. Conservative critics⁴ have been quick to announce that, "self-governance in the Anangu Pitjantjatjara lands has failed," that "what is wrong with these remote communities are the communities," that "Aboriginal people acknowledge that the rot lies within their own communities" (Howson, 2004, n.p.), and more recently that, "some Aboriginal people use the 'cultural curtain' as an excuse to avoid participation in schooling and in the economy" (Johns, 2006, n.p.). These conservative discourses are presented as a backdrop, and as an example of the way that racism in the contemporary period frequently works to 'explain away' the history of given circumstances, and to absolve 'white' people of their collective implications in structural

³ Citing that they would not tolerate, "an executive unable to administer civil order, community service, social justice and quality of life" (Treasurer and Police Minister Kevin Foley cited in Howson, 2004: n.p.)

⁴ Such as the Bennelong Society, the Menzies Research Centre and Quadrant.

racism, thus perpetuating “the marginalisation of the targets of racism” (Wadham, Pudsey & Boyd, 2007, p.201).

My broad aim in this paper is to disrupt this pattern. I seek to inform the work of white teachers, particularly in light of the competing discourses through which the teaching role is constructed, complicated, and never finally fixed – for example, the ‘white’ teaching role is subject to contesting forms of educational governance, both Anangu governance at the local level, and ‘mainstream’ governance at state and federal levels. To highlight these complexities, several features of education in The Lands might be explored. However, to delimit the exploration I adhere to the notion of the ‘contract zone’, using contract theory and critical whiteness studies to explore ways that racial inequalities form the fundamental basis upon which society is established. I consequently argue that ‘white’ Australians, far from blaming Indigenous communities for their perceived ‘deficiencies’, need to interrogate how Indigenous spaces have been transformed and constructed within a discourse of white race privilege and how ‘we’⁵ as white people collectively continue to be privileged through the structural and discursive relations of race.

On Whiteness

To do so, I start from a premise of white race privilege, which uses ‘whiteness’ as a means of highlighting race. Whiteness traditionally operated through a discourse of non-racialness, conferring ‘race’ onto ‘other’ social and cultural groups, thereby sustaining social hierarchies built around race. More recently, however, whiteness has come to operate through a rhetoric of ‘sameness’ or ‘colour blindness’ whereby “colour blindness [works to] establish the discourses and practices of hegemonic and complicit racial relations” (Wadham, 2004, p.195). When referring to whiteness, I draw upon Haggis and Schech (2004, p.180), who denote, “a terrain of structural advantage, as well as a standpoint of race privilege which segues into [a] sense of owning the nation.” I understand whiteness as referring not merely to the physicality of race, but to the systems, beliefs, practices, and laws that shape the very foundations of society, that construct social identities, and that work to legitimise and sustain the centrality of the white subject. The significance of naming whiteness is that in doing so, we “displace it from the unmarked, unnamed status that is itself an effect of its dominance” (Frankenberg, 1993, p.6); or, as Cowlshaw points out:

... whiteness studies does more than invite reflexivity and shift the ethnographic gaze to a different object. It also expands the way we think about race. Instead of race being a problem suffered by ‘people of colour’, which we anti-racist whitefellas have to fix on their behalf, race is now recognised as referring to a *relationship* between people with different kinds of heritage, both physical and cultural. That is, race is not simply something people have, a quality, but is a comparison, a relationship, a social identity, which contrasts with that of others” (Cowlshaw, 2005, n.p.).

⁵ It is important that I acknowledge my problematic use of possessive phrases. For example, “...we as white people.” It is not only problematic to assume that all readers of this paper will identify as being white, but as many writers point out (see for example Pease, 2004; Riggs, 2004), whiteness itself is not homogenous. In taking up an autoethnographic approach I consciously reveal myself through use of first person writing, contrary to traditional academic writing where authorship is silent. This is done in the spirit of qualitative inquiry; the core of that position is the doubt that any textual staging has a privileged, objective, or disinterested position. Thus, by locating myself in the writing, I also endeavour to locate myself in the broader relations of racism, and to open my writing to self-reflexive questioning. Nonetheless, in doing so my writing also potentially gives way to what Moreton-Robinson describes as the possessive logic of patriarchal white sovereignty (see Moreton-Robinson, A. (2004). The possessive logic of patriarchal white sovereignty: The High Court and the Yorta Yorta decision. *Borderlands e-journal*, 3(2)). For the time being, I leave this problematic position unresolved, yet acknowledged. I draw on Riggs (2004a) who, facing the same dilemmas of authorship, resolves to present his position as an attempt at working within a white perspective. I make the same attempt.

THE NARRATIVE TELLING

The Arrival

We sat on the curb waiting for the bus. I assumed we had each been selected owing to our grades and our interest in social justice, and all of us, I noted, were white. The latter was suddenly as surprising to me as it was unsurprising. Virtually our entire cohort of 1500 students was white; when I thought about that against the remote, all-Indigenous APY Lands, we seemed somehow **whiter**. I glanced at the university and at the neighbouring hospital; at the lawns, the surrounding houses, the architecture enveloping us ... all of it white. I'd never thought of myself as being 'very white', not in the mainstream way; I didn't even eat white bread! I was more of a part-time 'Vegemite kid'⁶.

My location of Self within that mainstream was contested. Growing up 'working class' had galvanised in me a latent belief that I'd earned my privileges. In contrast I also had some concept of a worldview beyond the individual, and I knew that my raced, classed, gendered position in society accounted for a lot. For example, I was aware, relatively speaking, of how effortlessly I moved through mainstream society, how normal that was. And despite being a first generation Australian, with British and German heritage, I'd never once doubted my identity as a true Australian; I'd never doubted that I belonged.

Prior to The Lands trip there'd been only one occasion, though it had faded rapidly, that had propelled whiteness into my consciousness. I'd just been driven in a rickety bus from the airport to a YMCA in the heart of Nairobi. Overwhelmed by a sea of black faces I suddenly felt very white, whiter than white; I felt paralysed. But as the six voluntary months rolled out, the paralysis wore off and it became increasingly clear that, regardless of my minority status as one of the few white women, I was by no means disadvantaged; my skin colour was a constant source of unearned privilege. And though I didn't fully realise it, this was probably the first time I'd truly experienced the divergence between **difference and race**.

I tried hard to do 'the right thing' and to be a 'good' teacher in Kenya. And because I'd learned a bit about culture and power in my first degree, I hadn't yielded to the belief that 'goodness' equated to being 'a white saviour'. Even so, this hadn't made the role any clearer, and I left harbouring the uneasy feeling that I'd possibly made things worse.

I didn't want to do the same thing in my own disadvantaged backyard – which, after hearing the term 'third world' commonly applied to it, was how I latently conceptualised The Lands. I didn't know much about the place, in fact, I'd never had much to do with either Indigenous people or the desert. My primary school education had embraced Captain Cook, and maps of Australia sliced in six geometric ways. Indigeneity had been relegated to tribal imagery: boomerangs and pictures of the red centre. I once visited the red centre; I was about nine. I distinctly remember making a so-called 'explorer journal' and filling it with details like Burke and Wills' journey throughout the mysterious, dangerous outback.

According to the television, mystery and danger still personify the outback. Only days before the trip I'd caught two documentaries: one on *Getaway* about the magic of Ayers Rock; the other a

⁶ Vegemite entered mainstream discourse in the early 1920s but is now reputedly found in 90 percent of Australian homes (White, 1994). Vegemite is repeatedly proffered in mainstream media and overseas as a symbol of 'Australianness'. However, throughout 80 years of advertising, no indigenous persons are represented. In the year 2000, Vegemite's eightieth anniversary slogan read: 'it's been around since the beginning of time'. Media of this sort – invisible and benign, but common to the mainstream – has easily accorded with and endorsed, "the British political myth of *terra nullius*: [which suggested that] before 1788 Australia had been not only a land of no people but a place where nothing of significance had happened" (Haynes, 1998, p.5).

documentary about substance abuse and violence in The Centre. The latter, in particular, stuck in mind so by the time we arrived I couldn't help but expect danger.

On first impressions I was right: an ocean of red dirt, a grid of transportable houses, a clinic, a store, and the largest building, a shabby looking school fronted by a 'Proud School' sign. All of the communal buildings, and what looked like the teachers' residences, were secured with padlocks and bars. The dangerousness of the place, vested in bars and locks, stood out immediately. But interestingly enough, so did an odd sense of familiarity: the architecture, the layout of the community, the square fences and geometric plots.

An Indigenous person walked toward me.

I felt threatened.

The school bell shrieked.

The man walked idly past.

The Library

Six weeks later: I'd settled in and felt pretty good about my efforts, having made only one obvious mistake.

On my first official day the Principal, a whitefella, showed me the ropes. These included the tea and coffee area, his desk, the other white teachers' desks, the grounds, and the basic timetable – mostly familiar stuff. I then headed to the library. Glen the young Caucasian teacher was busy with some boys so I moved to a group of girls. I said hello and tried to make conversation but they seemed shy; either shy or disinterested, so I just sat for a while, rather uncomfortably, beneath a *Values for Australian Schools* poster and scanned the room. Glen eventually called for everyone to pack up. But no one moved. I looked at the girls; they were flicking pages. I leant over and said, 'c'mon girls; time to pack up'. They dropped their heads and continued to do nothing until the oldest one said something 'in language' and suddenly all of the students began to move; she was obviously a leader.

Back in the classroom Glen introduced me to Elsie, our AEW (Anangu Education Worker). I immediately recognised her as the leading girl, only then realising that she was in fact older than me. I felt awful – what a stupid mistake. Nonetheless, in the weeks that passed I went out of my way, at least outside of the classroom, to strike up a friendship. Inside the classroom things were a little more difficult. I'd been in team-teaching positions before and so I tried arranging lesson plans together, but Elsie rarely turned up and when we did meet I seemed to make all of the decisions. I seemed to take responsibility for everything. In the end I just didn't have time for us to plan together and as a consequence I had to take the reins. I knew the plan, the lessons had to be taught, and so I would plough ahead. Regardless, Glen was happy with my work and throughout the term he pretty much allowed me to do whatever I wanted. For the most part Elsie was around only sporadically. I did feel concerned about this; was there a relationship between 'my presence' and 'Elsie's absence'? I never found out.

In the end, I left with a glowing report from both Glen and the Principal, and a pile of cards from the kids saying 'Come Back'. I was pleased, but unsure about returning. On the one hand I actually missed the mainstream, and on the other I was still extremely confused about the impact and worth of Western education in a region seemingly devastated by the West. I left feeling confused and wondering if I'd made things worse.

THE RE-TELLING

The Contract Zone

To rewrite the narrative from a more critically informed position I start with the idea of the contract. The metaphor of the contract is as resonant with complex implications as it is straightforward. “The notion of society as a social contract between free, equal, and “fraternal” selves,” (Battersby, 2000, p.6) has a long history in philosophical thought. Originating with Hobbes, and stretching through the political philosophies of Kant, Rousseau, Gauthier, and Rawls. At its most general, the contract might be thought of as an agreement, an indenture, a convention or treaty. There is the notion of the social contract, the sexual, moral, and racial contract. In light of whiteness my interest is focused on the latter. The philosophy of a racial contract which underpins society and systemically works to “reflect and reproduce the perspectives of the privileged” (Mills, 2007, p.3). Mills’ *Racial Contract* (1997) was inspired by Pateman’s *Sexual Contract* (1988), and is designed to show how the ‘social contract’ is not gender or race neutral but actually privileges white property owning men (Moreton-Robinson, 2004a).

The social contract is built around the Enlightenment belief in the equality of mankind. According to orthodox contract theory, if men are essentially free and equal the same rights and protection ought to be afforded to all. However, this orthodox contract overlooks the starting point from which modern society is born; a foundation upon which all people do not start out equally. According to Mills, modern Western society is founded on racial and hierarchical beliefs. Thus those who are said to be able to ‘contract in’ to society and its benefits are those in relation to which the original contract was written – collectively, whites⁷. Moreover, as mentioned earlier, Enlightenment beliefs in the primacy of the individual continue to underpin a philosophy of ‘white’ individualism, which works to not only sustain the centrality of the white subject in social and cultural relations, it upholds asymmetrical power relations between the ‘white’ and non-‘white’ Self.

Mills suggests that a racial view of the social contract has both strategic and theoretical value. If we start with a view of reality which places at centre stage those injustices that are predicated on white race privilege, then a marginal view of injustice becomes impossible. If ‘we’ white people learn to acknowledge our implication in the construction of society, then we can no longer avoid or “‘explain away’ the materiality or the history of a given situation” (Frankenberg, 1993, p.2). A racial contract view of The Lands might assert that white people can no longer or easily avow that what is wrong with these remote communities are the communities, for the racial contract underpins of all of society.

My aim from here is to start to illuminate the racial asymmetry that underwrites education in The Lands. To do so I pose two questions: what are the material and discursive dimensions of the contract zone – indeed what is the orthodox or dominant contract? And, what do I as a ‘white’ subject bring to moments of contact? Moreover, how am I located within and shaped by orthodox contractarian thinking? *How* do individualising beliefs and practices position me in relation to non-white Australians? According to the racial contract, if I as a white, able bodied person – even despite for the time being my gender – have benefited from a range of privileges that result in the overwhelming demographic whiteness of Australia’s middle and upper class realms, then the fine-grain details of my story may be unique, but many of its overarching details will speak to the experience of ‘growing up white’ more generally. I posit that within these broad brushstrokes exists the racial contract upon which society is constructed. Also, these characteristics may be exposed through a contact perspective, which refers to “the space in which peoples geographically and historically separated come into contact with each other often within

⁷ Feminist theorists would extend this argument to mark out more specifically, ‘white men’.

radically asymmetrical relations of power” (Pratt, 1992, pp.6-7)⁸. Thus when conceptualising ‘contract zones’, history may be harnessed to critically inform the present.

I use the term ‘contract’ in place of contact to draw attention, as mentioned, to the racial contract upon which The Lands are built – both its material and discursive dimensions. Materially, the ‘contract zone’ represents: (a) transient white teachers (typified by two or three year contracts), (b) within the geographic locale of the The Lands, (c) carrying out mainstream curricula, (d) under a Settler education regime, (e) that is partially locally governed⁹. Discursively, however, the contract zone represents the historicity of each of these material dimensions and how they play out (or conflict) in actual practice. In this paper I start to unpack just two of these features, beginning with white teachers and following with the geography of The Lands.

The White Teacher

The majority of Australian teachers – like those in the United Kingdom and United States – are drawn from the ‘white’ Anglo-Celtic dominated mainstream (Causey, Thomas, & Armento, 2000; Hagan & McGlynn, 2004; Johnson, 2002; Pearce, 2003; Santoro, 2004; Santoro, 2005; Santoro & Allard, 2005; Santoro, Kamler, & Reid, 2001; Tree, 2003). Thus it is no surprise that the high majority of teachers who travel to The Lands reflect a predominantly white demographic – white as in the physicality of race. This is aptly portrayed in the first narrative by the fact that each of the student teachers is unsurprisingly white. But when we expose this unsurprising whiteness we start to illuminate the raced construction of the social contract and how its invisibility often operates as an effect of its dominance.

From this perspective the whiteness of the teaching profession is neither an anomaly nor an indicator of ‘white intelligence’. Rather, this view of whiteness “goes beyond the physicality of ‘race’ ... to include the acquisition of “cultural capital” and a “state of psychological entitlement” (Brodkin cited in Kameniar, 2006: n.p.). In re-interpreting the first narrative I suggest that the cultural capital made available to myself as a white subject, and the largely ‘white’ teaching profession, has made it not only possible but inevitable that a white demographic view has come to represent society’s professional subject positions. In this way whiteness saturates and constructs the social fabric, simultaneously reproducing racial superiority and white race privilege.

Discursively, then, the white teacher represents, and is produced through, an asymmetrical relation of power, unwittingly bringing to contact moments a state of ‘psychological entitlement’. It could be argued that this state of entitlement unconsciously plays out in narrative number two when I instinctively ‘take the reins’ – controlling lesson plans, ploughing ahead, and essentially overlooking my relationship with Elsie. However, left unquestioned albeit unintentionally are the workings of the hidden curriculum: the familiar timetable, white male management, the central organisation of white staff with individual desks, my easy relationship with Glen and the Principal, and the fact that my performance is judged according to my ability to perform in a mainstream manner and at a mainstream pace. I do not recognise these things, for at the time the privileges conferred through my whiteness cause a delay in my awareness (Wojecki, 2004).

⁸ Notwithstanding Spivak, two of the most well-known contact theorists, and those upon whom I draw most notably, are Pratt (1992) and Carter (1992). A contact perspective illuminates the historical and discursive context in which cultural interactions take place. In this way, Pratt refers to the contact zone as a space of radical racial asymmetry. Similarly, Carter utilises a contact perspective in his study of nineteenth Century explorer journals to analyse first contact interactions between explorers and indigenous Australians (Somerville & Perkins, 2003).

⁹ Operational control of education in the region falls under the governance of the Pitjantjatjara Yankunytjatjara Education Committee (PYEC). “The PYEC is composed of Aboriginal community members (Anangu) who largely retain their traditional values and customs. [Operational control] means that generally semi-literate Anangu with minimal Western school experience have decision making control over all education policies and operational practices in the communities of this geographic area” (Iversen & Thomas, 1996, p.3).

Aspects which fall outside mainstream tradition, such as the team-teaching relationship between white and Anangu teachers, garner some concern, but only tokenistic attention. To disrupt whiteness during moments of contact, Cowlishaw (2004, pp.66-7 emphasis in the original) suggests that so-called ‘whitefellas’ learn to, “establish relationships of trust and reciprocity,” and become, “*engaged with* rather than *concerned about*, others.” Were I to rewrite these experiences through lived experience I would therefore recognise that my relationship with Elsie took place within a discourse loaded with 200 years of racial history and indeed violence. By overlooking my working relationship with Elsie, because it was too hard, because it was unfamiliar, because it took ‘time’ thereby challenging the dominant Western schedule¹⁰, I was reproducing racial asymmetry, but more importantly I was enacting a form of violence. In rewriting my relationship with Elsie I would place at centre stage, rather than on the margins, the significance of the transcultural relationship. However, to understand more fully these moments of contact it is worthwhile tracking their historical dimensions.

In the early part of narrative one my structural and cultural context emerges. I am produced through a very white environment, which goes relatively unnoticed until the introduction of The Lands. From here The Lands are organised against an explicitly white mainstream; a common way for colonial discourse to produce its subjects. The Lands are conceptualised as remote against a white mainstream centre. Likewise, the white subject is conceptualised through a sense of belonging to the mainstream. My identity as a ‘true Aussie’, for example, is measured according to my stance within the dominant culture, within the colony. In this instance my whiteness is conceptualised through the vernacular of the pop media: whiter than white. While seemingly trivial, the capacity available to the white subject to affirm her belonging through mainstream media bespeaks power. Film, advertising, radio and television are influential. Defining oneself as a ‘Vegemite kid’ discursively refers to a social contract which is both inclusionary and exclusionary – what Mills calls the “Dominant Contract”. In terms of the discursive production of power through processes of media representation, it is valuable to track the history of one of Australia’s now ‘household’ names.

It therefore comes as no surprise that throughout eight decades of constructing, reconstructing and publicising a dominant national identity, indigeneity is expunged from the Vegemite advertisements. Langton describes representation in racial terms, stating that:

The easiest and most ‘natural’ form of racism in representation is the act of making the other invisible. Indeed, racism can provide a complete and satisfying comprehension of black identity (which is why it persists) and one that is linked to the viewer’s ideological framework (Langton, 1993, p.24).

In this way my own ideological framework can be traced to comprise the re-production of a black imaginary that is linked to the media. And certainly if we concede that,

The most dense relationship (between white and indigenous Australians) does not constitute physical contact but takes place between white Australians and the symbols created by their predecessors. Australians do not know and relate to Aboriginal people. They relate to stories told by former colonists (Langton, 1993, p.33).

This imaginary of black identity, fuelled by mainstream media, begins to connect more explicitly with whiteness throughout both narratives: when my student Self unproblematically conceptualises The Lands as a ‘disadvantaged backyard’; when I stereotypically conflate and homogenise ‘Indigeneity’ with ‘the desert’; when I recall and practice my explorer education; when Indigenous Australians and central Australia are mythologised on television, thus directly informing an Aboriginal imaginary; and not least, when this imaginary is tested upon my arrival to The Lands. Instantly, those imagined models of Aboriginality that had for years been informed through a largely undisturbed and altogether white lens on the world, start to be tested. One

¹⁰ Depicted in the narrative through the shrieking school bell and the familiar mainstream timetable.

example is the way that the dangerousness of The Lands, vested in 'bars, locks, the gaze of the indigenous bypasser, and a sea of red dirt', is immediately confirmed (Hayes, 1998)¹¹.

Langton (1993, p.33) describes Aboriginality, "as a field of intersubjectivity in that it is made and remade over and over again in a process of dialogue, of imagination, of representation and interpretation". She posits three broad categories of cultural and textual construction of 'Aboriginality', which are participated in by both Indigenous and non-Indigenous subjects. The first category involves dialogue, or contact, between Aboriginal people. The second category involves the familiar stereotyping, iconising and mythologising of Aboriginal people by white people who have not had substantial first-hand contact with Aboriginal people. Such as school curricula built around tribal imagery, or mainstream travel programs that mythologise stereotypical icons such as 'Ayers Rock'.

A third category are those constructions which are generated when Aboriginal and non-Aboriginal people engage in actual dialogue ... In these exchanges, as in any social interaction, the individuals involved will test imagined models of the other, repeatedly readjusting the models as the responses are processed, to find some satisfactory way of comprehending the other (Langton, 1993, p.35).

However, I do not wish to dilute the complexity of these issues through highlighting the paucity of Indigenous representation in mainstream media. If non-representation were the problem, it might just as easily be rectified by adding more Indigenous people to the mix, or by adding Indigenous teachers to the school staff. Rather, I suggest that non-representation is symptomatic of a much deeper racial contract. Mills states that:

The whiteness and Eurocentrism of the contract ... [does not] inhere most fundamentally in verbal and semantic exclusions ... [but] in the fact that this apparatus was originally designed for a population with a [white] history (Mills, 2007, p.9).

The whiteness of the racial contract through which contemporary society is largely built, which I argue issues from colonial times, has generally meant that black disadvantage and white advantage are mutually constructed. In this light, it is also little wonder that my status as a first generation Australian, presented no obstacle to my developing a deep sense of 'belonging'. Several writers have traced the relationship between European, and in particular British, migrancy to Australia and the development of a myth of national identity dependent on British origin (Anderson & Taylor, 2005; Paisley, 2003; Schech & Haggis, 2004). The Australian government's enthusiastic and exclusionary drive to create a white, British populace, vested most strikingly and alarmingly in the White Australia Policy, has resulted in what Schech and Haggis (2004, p.176) describe as the ability for white, British migrants to fit in, while other migrants and Indigenous Australians are condemned to a position of 'perpetual foreigner'. Thus, "the ideology of racial hierarchy is indeed integral to Australian culture [to its dominant contract]; white privilege and differential entitlement and the subordination of racialised minorities *are* mutually constituted" (Brewster, 2005).

I raise these examples, not with intent to vilify the white subject, but to: highlight that which is obscured by conservative views of The Lands; to bring a sense of historical specificity; and to illustrate the ways that racism is unwittingly participated in by the white subject, constantly acting to reinforce the centrality and superiority of the white identity.

¹¹ Haynes (1998) illustrates that white peoples' relationship with Indigenous Australians and with Central Australia has played out in much the same way since explorations to the red centre were first undertaken. Examining the records made by early explorers to the desert; Haynes points out that their observations, "based on preconceptions, were formed quickly rather after a long period of reflection" (p. 50).

The Lands

More could be said about the discursive formations which produce the white teacher, and the ways that these formations not only inform education in places such as The Lands, but how they characterise a more fundamental racial contract upon which contract zones are built. Nonetheless, identitary thinking is not limited to the human subject but stretches to include the land, reciprocally working to produce racialised subjects. Geographically, the Lands occupy the cross-border region of far north-west South Australia, the south-west of the Northern Territory, and adjacent regions in Western Australia (Summers, 2004). Discursively, the terms 'APY' and 'cross-border' refer to the processes through which personhood and land rights have been defined through white law in Australia (Moreton-Robinson, 2004a); these terms also reflect the historic legacy of the cultural appropriation of landscape – the making, mapping and possession of Australia.

The APY region once represented two distinct areas occupied by the Pitjantjatjara people to the west and the Yankunytjatjara to the east – regions that did not feature in my geometrically divided primary school maps. In 1981, these regions were recognised as belonging to their traditional owners and bounded together in a legal entity created by the *Pitjantjatjara Land Rights Act*, thus becoming the 'APY' Lands. However, Moreton-Robinson suggests that such laws were, and are, highly racialised. She contends that the law in Australia, designed and established by white patriarchy in their own image and to their own advantage, "is underpinned by an excessive desire to invest in reproducing and reaffirming the nation-state's ownership, control and domination" (Moreton-Robinson, 2004a, n.p.).

As such, apart from representing Indigenous ownership of the region since 1981, it may be argued that the APY covertly marks out white ownership of the rest of the more economically viable nation. And in this way, the desert is maintained as a remote, largely redundant or blank space. Discursively, the desert regions of Central Australia are portrayed as barren, remote, and blank; easily defined as *terra nullius*, easily justified as good grounds for nuclear testing, or more recently, for nuclear dumping¹² (Lowe in Bird Rose & Davis, 2005; Green, 2005). At the same time the desert is discursively depicted as being dangerous and feminine. For, "the explorers' characterisation of an implicitly gendered land, and of the desert in particular, was an important component of their public self-construction as intrepid heroes" (Haynes, 1998, pp.50-51); a construction which resonates in narrative number one during my trip to the 'red centre'.

The challenge for critical autoethnography is to establish links between colonial productions of Self and space – such as the explorers' characterisation of land – in their contemporary manifestations. Thus as a researcher of my own experiences I am unavoidably led to consider: how did history impact my incarnation as a white teacher in The Lands? What did I bring to moments of contact? More importantly, how might these brief re-writings of my lived experience help to inform my future pedagogy?

¹² In the 1950s and 1960s the British Government, with support from the Australian Government, conducted a series of nuclear weapon tests in remote South and Western Australia. Anti-nuclear campaigner with Friends of the Earth Green pointed out that permission was not sought for these tests from the affected Aboriginal communities, which included the Pitjantjatjara. Sickness and death from radiation exposure is what resulted for many of these Aboriginal peoples. Four decades later, the Australian government undertook a clean-up of the Maralinga test site, "but it was done on the cheap, and even now kilograms of plutonium remain buried in shallow, unlined pits in totally unsuitable geology" (Green, 2005, n.p.). In the late 1990s the Howard Government announced it would build a radioactive waste dump in central South Australia, though this was overturned by the Aboriginal people of the region and their supporters. "On July 7, 2003, the federal government used the Land Acquisition Act 1989 to seize land for the dump. Native Title rights and interests were annulled. This took place without forewarning and with no consultation of Aboriginal people, or the SA Government" (Green, 2005, n.p.). Although the Howard Government eventually relinquished plans to dump nuclear waste in remote South Australia, they are now planning the same construction in the Northern Territory.

CONCLUSIONS

In this article I have endeavoured to recall some of my personal experiences within the contract zone. More importantly, I have endeavoured to rewrite and therefore learn from those experiences through use of critical whiteness studies and racial contract theory. According to Mills' Racial Contract, "we should start with the reality of exclusion and inequality as the norm," (Mills, 2007, p.3). In other words, we name whiteness, draw attention to moments of contact, learn to see the racial asymmetry inherent in those moments, and engage in processes of contractual renegotiation which disrupt patterns of racial inequality inherent in the 'colonial' social contract. In asking what the dimensions of the contract are, and what I, as a white subject, bring to moments of contact, I attempt to ask how my Self and those around me, how our dialogue and interactions are positioned within racial and colonial discourses, and how those patterns may be disrupted. While I employ an autoethnographic approach to demonstrate how our personal experiences – particularly as educators – may be revised through a critical white lens, I do not attend to the many questions surrounding the ways that "such writing can serve the chilling function of simply saying, 'but enough about you, let me tell you about me' [thus] privileging the white, middle class, woman's or man's need for self display" (Chapman, 2004, p.99). Also left wanting is a more complex management of theory, which embraces a less reified articulation of 'whiteness' and 'blackness', but recognises the lines of differentiation inherent in both. However, as originally stated this paper represents an entry onto the field of critical race theory, and therefore recognises that all scholarly work at some point represents an opening for further analysis.

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Work and family roles of women in Ho Chi Minh City

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This study aims to point out the differences between the North and the South of Vietnam, more particularly, Saigon and Hanoi, in terms of family and work roles of women. It helps to explain the ways women in Ho Chi Minh City reconstruct their reproduction role, the attitudes of Southern husbands towards household tasks and the husband-wife relationship in the Southern family. The literature in Vietnamese studies shows that the regional differences remain considerable. Studies on Ho Chi Minh City therefore must take into account the geographical, historical, cultural, social and economic context. Even the notion of 'family in Ho Chi Minh city' cannot be understood as the same notion of 'family in the South' due to the differences between urban and rural life.

Production, Reproduction, Work, Family, Women, Ho Chi Minh City

OVERVIEW OF THE SOCIO ECONOMIC ASPECTS OF HO CHI MINH CITY

Ho Chi Minh City, or formerly Saigon, was established in 1698 initially with people from the Gia Dinh district with a population of 5000. It has been known as *Dat lanh chim dau* (A good land for a bird to perch), a place where many migrants from other provinces and cities in Vietnam converge. According to the statistics available in Ho Chi Minh city, there are more than one million migrants who are staying legally with household registration (*dang ky ho khau*) in Ho Chi Minh city. The numbers of illegal immigrants are even higher. Official statistics showed that the total population of the city currently is 5.6 million in which there are 2.7 million males and 2.9 million females (HCMC Statistics Office, 2003). The migrants have come from different areas of the country and have different backgrounds in terms of education, religion and custom. Compared with Hue and Hanoi, Ho Chi Minh city is a so-called 'new land' only established in the late seventeenth century. The pioneers who first came to break fresh ground (*khai pha vung dat moi*) were poor, often had a low level of education but had highly practical minds (Tran van Giau, 1987).

When the French left after 80 years of colonization, Vietnam was divided into two regions with two different political systems, Socialism in the North and a Republic in the South. The first constitution enacted by the South Vietnamese Government in 1956 declared men and women equal in dignity, rights, duties, pay and ability to vote and hold public office. In 1967, the South Vietnamese Government established a new constitution which retained these rights and emphasized the importance of the family:

The State recognizes the family as the foundation of society. The State encourages and supports the formation of families, and assists expectant mothers and infants. Marriage must be based on mutual consent, equality, and cooperation. The State encourages the unity of the family. (*Constitution of the Republic of Vietnam 1967*)

In the rural areas, today, Southern Vietnamese women work in the rice fields helping their husbands. Approximately a third of the women hold part-time jobs, usually in rice production or commerce, but only wives with no financial support from their husbands hold full-time jobs (Hickey, 1969). Urbanization has been rapid in South Vietnam partially due to the pressure of war, and many families have moved to the urban areas without their extended kin group. Even

when family groups have moved from the rural to urban areas, they have frequently had to find housing in separated areas and live in nuclear households. This has had the dual effect of relieving wives from much of their daily responsibilities when living in extended households. Living in the urban areas, women of all classes have had pressure to get jobs since inflation had made it difficult for urban South Vietnamese families who had to depend solely on a salary income to maintain their standard of living. Newspaper articles written by women in the South in the 1960s and 1970s stressed their need to work (*Viet Nam Magazine*; Chiem T. Keim, 1967). The main reasons these women quoted for working were that it made one a more mature, interesting, and understanding wife, it helped women from acquiring vices caused by idleness, and more importantly it helped to improve the standard of living for the family during inflation. In the North, there was strong governmental pressure towards getting women educated especially for technical and paraprofessional jobs. In some magazines in the North during the 1960s and 1970s there were articles that urged women to fight for their occupational rights, to get better training for higher jobs, to justify their employment in family terms, but very differently from the terms stressed in the South. Unlike their sisters in the South, women in the North were urged to expand the family role into a community duty with the campaign slogan of 'Women of Three Responsibilities'.

The development of different values and the effects of Westernization, probably, created stress on girls in the elite families (especially in the South), who bridged the gap between the Confucian tradition and French education and have since entered the professions. Even though the French developed an economic structure that made new positions available for women at various levels, they also encouraged the concept of unequal wages for men and women. The laws in both the North and the South of Vietnam after colonization, however, encouraged greater gender equality. In the North the government, while encouraging women to make the family role ideal, also extended it to the community. In the South, the government emphasised individual achievement within the social structure as the desired path.

After 1975, the country reunified the two regions under one regime of socialism. In terms of gender roles, peace signalled an end to the drive to assign women to responsible positions by means of sharing their responsibilities. Men returned from the military in great numbers to take up the civilian jobs that they had left behind while women did not move out of their place at the base of the economy. In fact, women's occupation in lower level jobs remained relatively constant throughout the period, and throughout 1986 women formed 70 to 80 per cent of agricultural labour and over 46 per cent of industrial labour in state enterprises (*Woman Workforce in Vietnam, 1987, p.5*).

From 1986, Ho Chi Minh city witnessed the reconstruction of the economy from a subsidized bureaucratic mechanism to an open market economy. This transformation breathed new life into the city, and as a result the quality of lives of its residents improved considerably. Having what was called a 'pioneer spirit', people in Ho Chi Minh city adapted quite easily and quickly to the market economy. Ho Chi Minh city had many advantages in this economic expansion because its population, infrastructure, economic activities and growth potential greatly exceeded other cities in the region (Thai Thi Ngoc Du, 1996). Until the late 1980s the economic growth rate was 4.7 per cent, 1.5 times higher than that of the whole country. The average annual income per capita in Ho Chi Minh city increased from USD 500 in 1995 to USD 850 in 1998, the highest compared with other provinces and cities (Hoang thi Khanh, 1997, p.185). A survey on 1,138 female professionals in Ho Chi Minh city (Tran thi Kim Xuyen et al, 1999, p.71) revealed that 77.3 per cent of respondents reported a higher living standard compared to the last decade. More precisely, they could afford to buy many facilities for improving their daily life. Among the population, 95 per cent had motorcycles, 87.2 per cent had gas stoves, 76.3 per cent had refrigerators, 54.5 per cent had washing machines, 97.4 per cent had television sets, and 78.3 per cent had telephones at home.

Cheap labour force from the countryside (e.g. maids) and the development of the food processing services were also reported by many women as important contributors to the reduction of household tasks for them. The budget expenses structure of the family also changed considerably. Among the 300 households surveyed by Nguyen Minh Hoa (1998, p.39), the average expenses for education, entertainment and other cultural activities reportedly increased by 4.5 per cent, 3.3 per cent and 2.2 per cent respectively in the 1990s, compared with those in the 1980s.

REPRODUCTION ROLE OF WOMEN IN HO CHI MINH CITY

Compared to the North and Centre of Vietnam, the South had been influenced less by Confucianism but more by Buddhism (Tran Dinh Huou, 1994, p.77). The authors of the Cultural Monograph of Ho Chi Minh city (Do Thai Dong, Tran Van Giau and Son Nam, 1987) shared the common views that as they moved further to the South they mainly found lesser impact of Chinese culture and the more common traits of South East Asian cultures. Accordingly, the Confucian factors diminished both in family relationship and kinship in Ho Chi Minh city. In the same vein, Truong et al (1997) emphasized the existence of regional differences based on cultural explanations. They argued that Vietnam had been influenced by two Asian family systems. The North had a closer cultural proximity to East Asia, where the family characteristics were patrilineal, patriarchal, and patrilocal. The South, on the contrary, was closer to South East Asia where a bilateral kinship system is dominant.

However, it became difficult to generalize the characteristics of the family in Ho Chi Minh City. As noted earlier, there were many migrants coming from other areas with different backgrounds. According to a southern scholar, nowadays, the percentage of the 'original Saigonese' (*ngươi Saigon co cuu*) who were born and had lived in the city for three or more generations was quite low (Tran Bach Dang, 1987, p.134). Sources from the local administration estimated that only about 7 to 10 per cent of the city population were original Saigonese who had lived in Ho Chi Minh city for three generations or more, while the rest were new settlers. Therefore families in Ho Chi Minh city today are varied, complicated and not homogeneous.

It should be noted here that the lives of urban women in Saigon and Hanoi before and after 1975 were very different in many ways. In the North a larger percentage of the men went off to war and, when they went off, they might have been gone for years at a time. In Saigon, most of the men who were involved in the war were regular Army of Republic of Vietnam (ARVN) officers and they were gone for no more than a few weeks at a time before coming home for a visit, given the nature of the war in the South. Thus urban women in Saigon were not called upon to take over the responsibilities of the men to the same extent as the women in the North. After 1975, the urban women in the South found their lives more disrupted than those in the North, many people fleeing the country or forced into the New Economic Zones, and many men being sent off to re-education camps. In the North, on the other hand, men were returning home to reassume their previous roles. Therefore there was a reversal of the situation between Northern and Southern women after 1975.

Historical conditions also help to explain the different roles that women in the South and the North played during the war (1945-1975). Although patriarchy and hierarchy were often said to be rooted in the Vietnamese family, especially in the North, the Communist Government exerted an effective policy establishing gender equality. As a result, families in the North witnessed more gender equality than those in the South. In the South before 1975 urban middle and upper class women were said to be more 'traditional' in the role of housewife than their counterparts in the United States (O'Harrow, 1995). On the basis of different survey data on the division of labour in the urban northern and southern families, it was possible to assume that northern men were more involved in household tasks than their counterparts in the South (see, for instance, Do Ngoc Ha, 1990; Nguyen Quynh Mai, 1999; Pham Khac Chuong and Nguyen Nhu An, 1996; Pham Thi Khan, 1999). Therefore compared with their sisters in the North where the communist system had created for them more equal status with the men. Southern women were likely to be more

traditional in terms of family role. It was said that after the reunification of the country many northern men could find their so-called 'lost paradise' in the South (Pham Van Bich, 1999, p. 243). They preferred Southern women who were said to be more traditional housewives¹.

There were also some differences in living arrangements after marriage between families in the North and the South. Unlike the common practice of the patrilocal residence in the North where parents often stayed with their eldest sons and daughters-in-law; in the South parents could live with their daughters and sons-in-law. A survey on 100 households in District 8 in Ho Chi Minh city found more than 24 per cent of parents in these households lived with their daughters and sons in-law and 17 per cent of them lived with their eldest sons. The findings of the survey also reported that living arrangements in Ho Chi Minh city were very flexible and not so much influenced by the traditional patrilocal pattern as by economic and sentimental factors. More precisely, parents tended to stay with children who had better economic conditions and more harmonious relationships in their family (Nguyen Minh Hoa, 1998, p.55). While in the North, the eldest sons and their wives had responsibility for taking care of old parents and venerating them after they died (Pham Van Bich, 1999, p.221), in the South the responsibility of parental care was not, it appeared, to be allocated to any specific child.

It should be noted that Northern migrants in the South were more flexible in practising family customs and habits. A survey of Tan Binh district where the majority of investigated households were Northern migrants showed that more than 20 per cent of parents of these families lived with their daughters and sons-in-law. This reality supported the assertion of Do Thai Dong (1990:76) that "Historical continuity does not exclude discontinuities, and the process of cultural adaptation in new areas has caused rapid changes in traditions" (*Tinh lien tuc cua lich su cung khong loai tru nhung gian doan va mot qua trinh thich ung ve van hoa o nhung vung dat moi da khien cho nhung truyen thong phai bien doi rat nhieu*).

FAMILY IN THE HO CHI MINH CITY UNDER THE IMPACTS OF THE MARKET ECONOMY

Family size in Ho Chi Minh City became narrowed down under the impact of industrialization, urbanization and market economy. In the old days '*con dan chau dong*' (having many children and grandchildren) brought pride and prosperity to a family, whereas nowadays people seek social status, certificates, material comforts, houses, and vehicles. Currently the average number of children in a family is down to 1.6 from 6.3 in the 1970s (Nguyen Minh Hoa, 1998, p.55). Noticeably, the fertility rate among professional families has also been reported to be strikingly low (Ho thi Kim Chi, 1999). This situation may reflect the changing power relations between men and women, as MacKinnon (1997) argued, that led to a considerable decrease in the household tasks for women through childcare.

In the agricultural and pre-industrial society having many children was considered as a choice of many families in terms of rational economic considerations. Every child in the family was a member of a production unit, they participated in the farm work or in the handicraft work of the family. In the industrial society where the family was no longer an independent economic unit, almost all household members became workers, officials, petty traders and the urban family had been transformed into a consumption unit. Children were no longer the production forces contributing actively to the family's income and, on the contrary, having a child was becoming very costly. Also, the available space for housing in the city was very limited and not suitable for big families. This situation was described by Robertson (1991) in terms of the notions of "reproduction pressures" (p.27) and "demographic transition" (p.63)².

¹ Some scholars raised the question whether southern women were more traditional in terms of their housewifery role due to the American cultural influences and aid (e.g. O'Harrow, 1995).

² In Robertson's (1990) view, as discussed above, the reproductive dynamism of households included four stages *establishment, expansion, fission, decline*. The birth of children initiates the phase of expansion, when the children are mature and create pressure to quit and start their own households, the stage of fission begins. Finally as the

A recent study on family and marriage in Ho Chi Minh city also found that patriarchy had decreased significantly in the urban city (Nguyen Minh Hoa, 1998, p.91). Once the family was an independent economic unit, the patriarchal family met the needs of family production in which men were considered as the main pillar in managing production, inheriting the family fortune and hereditary careers. The male preference, therefore, resulted in the expanding size of the family when parents sought boys. In the industrialization and urbanization age, the family became no longer an independent economic unit, leading to a decline in the need for male children, and thus a decrease in family size. It should be noted that the trend towards male preference in Ho Chi Minh city became weaker than that in the North and Centre of Vietnam. Interviews with 300 households in 1998 (Nguyen Minh Hoa, 1998, p. 57) showed that 76 per cent of the respondents aged under 30 years said it was not necessary to have one more boy if they already had two girls. If we compare this finding with the statement 'it is necessary to have a boy at any cost' by 70 per cent of respondents in a larger scale poll on family planning conducted in Hanoi and Hai Phong in 1991 (Mai Huy Bich, 1991, p.51), and the different attitudes could be clearly seen towards 'having a boy' among people in the South and the North.

The findings of the survey on the Family in Ho Chi Minh city (Nguyen Minh Hoa, 1998) also revealed that nowadays the young generation tended to live independently: 52 per cent of the respondents under 30 years of age said they wanted to live separately from their parents' houses after marriage, but would keep supporting economically their parents, partly or totally. However, it has been noted that there was a trend towards living separately from their parents' houses in terms of space and economy but not in terms of sentimental and consanguineal relationships (Nguyen Minh Hoa, 1998, p. 116). In the majority of cases couples retained their relative independence as a nuclear unit but cultivated ties and emotional attachment with their broader home base of familial groups. In the same vein, Truong et al (1997) documented a greater trend for married children to live with a parent from the husband's side in the North than in the South. Residential proximity and exchanges between non-residing kin confirmed the strength of the family institution: frequency of visits was very high among non-residing kin members, and emotional and economic exchanges proved particularly intense (Truong et al, 1997 quoted by Belanger, 2000). By and large, the family in the Ho Chi Minh city was 'residentially nuclear but functionally extended' as was described succinctly by Jones (1995, p. 189).

According to the city's new master plan, Ho Chi Minh city in the future will be enlarged twice with seven more districts, so that urbanization will be extended into the agricultural and suburban areas. The industrialization and urbanization in Ho Chi Minh city has deeply influenced the transformation of the family in terms of function. Many handicraft and small industrial units which could not compete with the large scale corporations have disappeared. According to Nguyen Minh Hoa (1998, p.113) this happened in the textiles sector (e.g. Bay Hien textiles villages with hundreds of power looms had to be dissolved) and other family-scale production units in glass, enamelled tiles, plastic, paper, and toys. Recently in many districts in Ho Chi Minh city there was an increasing number of production units in the form of cooperatives, limited companies but no longer the family scale production unit. Consequently, families in Ho Chi Minh city, nowadays, are no longer independent economic units and are becoming more consumption units in terms of using products and social services.

In the agricultural and pre-industrial society, the socialization of children was mostly based on the family. Grandparents and parents educated their children in ethical values from folk songs, fables, and proverbs to teach them how to behave properly. They taught *gia phong* (family customs and habits), *gia phap* (family rules), *gia le* (family rituals) and *gia giao* (family education)³.

original couple becomes old the household goes into decline, dissolving when the last person dies or moves out to live with another relative or in a retirement home. So there have been some "periodic internal pressure" or "cyclical reproductive pressures" on individuals as well as households.

³ See "Vietnamese Family Culture" (*Van hoa Gia dinh Viet Nam*) 1998. De Tai KX 06-11, edited by Le Minh.

Gia phong were the family customs and habits practised by the members of the family, and represented the ways of behaviours and treatment towards people inside and outside the family. *Gia phong* shaped the cultural identities of family, kinship, and a cultural basis for every member of the family that guided them in the proper behaviour.

Gia phap were the rules created to prevent, correct and punish the inappropriate behaviour of family members. *Gia le* were the practices of behaviour, language, appearance and manners which represented the order, discipline and hierarchy in the family. *Gia giao* was oriented to educating family members in ethical and moral values so that they could treat others inside and outside the family in ways that fitted the moral regulations. Women were taught to have good behaviour of *gia dinh ne nep* (strictly following family rules).

Nowadays, the education role of the family has changed and has been partly transferred to the wider society as both husbands and wives worked outside the house in order to keep up with the rising cost of living. A decrease in the educational function of the family was seen clearly in the trend of sending children to kindergarten and primary school at an earlier age and the reduced amount of time parents spent with their children. Previously children had been taken care of by their parents, grandparents and relatives until six or seven years old. More recently, they have been sent to kindergartens from the age of six months. This could be clearly seen by looking at the increasing number of kindergartens and residential schools. For example, in the school year 1994-1995 there were 89 schools with 739 classrooms; in 1995-1996 there was a total of 104 schools, both private and public, with more than 1000 classrooms (Source: Ho Chi Minh city Service of Education). Among 300 working parents questioned about how and where their children were taken care of during their working day, 70 per cent of respondents said they sent them to schools and only 28 per cent of them had relatives or housekeepers taking care of their children at home. The average time for these parents in earning their living was estimated to be from 10 to 12 hours per day and the average time used by parents for looking after their children was estimated to be from 30 minutes to one hour per day. This figure was reported by 55 per cent of the 300 working parents in the same survey (cited in Nguyen Minh Hoa, 1998, p. 165).

It would be possible to assume that the time children spent with their parents at home was becoming shorter than before and therefore the socialization of children transferred gradually from family to society with “the socio economic transformation driving young people from their home and, to some extent, loosening the parent-child bond” as stated by Pham van Bich (1999, p. 229). Moreover, in the hectic life of the market economy, the relationship among family members tended to be looser. The family sociologists in Vietnam began to raise the question of the risk of disintegration of the traditional family in Vietnam in the globalisation and integration age. Tu Giay (1995, p.6), for example, predicted that “the disintegration of the family relationship seemingly starts from the disappearance of the traditional family meals” (*su tan ra cua quan he gia dinh duong nhu bat nguon tu su bien mat cua cac bua an gia dinh*).

PRODUCTION ROLE OF WOMEN IN HO CHI MINH CITY

As noted earlier, before 1975 more South Vietnamese urban middle class women tended to be full time housewives than their sisters in the North. Financially, under the United States backed regime, the salary of a man who worked for the government as middle or upper ranking offices was often enough to cover all the expenses of his family so as to be a main breadwinner and his wife, a caregiver at home. Culturally, the husband-wife relationship in Southern urban middle class families before 1975 was seemingly more patriarchal than that of the North. However, some newspaper articles written by women in the South in the 1960s and 1970s stressed the desire to work and to justify this employment in family terms (Chiem T. Keim, 1967). The reasons quoted for them were follows: (a) work made one a more mature, interesting, and understanding wife; (b) it kept women from acquiring vices caused by idleness; (c) it helped dutiful daughters-in law get away from nagging mothers-in law; and (d) it helped families improve their standard of living.

One article ended: "So we can see why working not only makes a woman's life independent but also effectively preserves her family's happiness" (cited in Chiem, T Kiem, 1967).

After the Northern socialism forces took over the South, thanks to the gender equality policy of the government and also due to economic needs, female participation in the labour force increased steadily. In Ho Chi Minh city women from the middle and upper classes were involved more in socio economic activity, they were also more active in business and financial transactions, and in the black market in the subsidized system, while most husbands, who worked for the old regime, had to go to the re-education camps. During that time, most women in the South carried the burden of both production and reproduction roles.

After *Doi Moi*, their participation in production even became higher since the non-state sectors contributed considerably to attracting labour under various forms. Cooperatives, private enterprises, production and trade households or individuals (*ho san xuat kinh doanh ca the*) created new job opportunities for people with the so-called 'bursting out' (*bung ra*) of the multi-sector economy. According to the Service of Labour, Invalids and Society (quoted by Hoang Thi Khanh, 1997), in 1997 the percentage of female labour force in the production, service and education sectors in Ho Chi Minh city were as follows: 72 per cent in the Garment and Textiles Companies, 55 per cent in the services, and 57 per cent in education. Private enterprises in such field as textiles, leather shoes, sea product processing were said to attract many female workers.

As for as the professionals were concerned, although there were signs that the school dropout rate was higher among girls than boys due to the increasing cost of education (Mc Donald, 1995: 25); the enrolment of female students in higher education kept rising in the city. According to the Ministry of Science, Technology and Environment (1995) in the whole country, the number of university educated women increased 1.5 times from 1985 to 1994, for example, the number of female candidates for a Ph.D. (Tien Si) increased from 653 to 985. Female professionals mostly worked in the fields of Education, Health, Administration. In the school year 1997-1998, female cadres in the education and training sector comprised 71 per cent, and the percentage of female lecturers at the Universities of Ho Chi Minh city in the school year 1996-1997 was as follows: 48.5 per cent in the University of Education, 41.5 per cent in the University of Economics, 49.1 per cent in the University of Law and 1.5 per cent in the University of Medicine and Pharmacy (Ministry of Education and Training, 1998).

Recently the HCMC Statistics Office (2000) provided the population figures for Ho Chi Minh city classified by age, gender and level of education and occupation. This census provided an overview of the number and structure of female professionals in the Ho Chi Minh City which are presented in Table 1.

Table 1: The Percentage of Female Professionals in Ho Chi Minh city, by Educational Levels and Economic Sectors

Level of Education	Economic Sectors			
	State Owned	Cooperative	Private Business	Representative Office
Ph.D.	9.7	0	10.0	50
Master	33.9	1	18.0	22.2
B.A	37.8	38.8	32.1	52.9
Junior College	62.7	29.0	42.1	54.2

(Sources: HCMC Statistics Office in 2000)

It should be noted here that at the higher degree level in education there were fewer female professionals, and the percentage of female professionals were highest in the foreign companies (representative offices) and were lowest in private business. It could be argued that in the foreign companies, personnel recruitment was more likely to be based on gender equality than that by the local private business organisations.

The distribution of female professionals in the state sectors in Ho Chi Minh city was as follows in 2000: 48 per cent in Health, 47 per cent in Education, 32 per cent in Processing Industries, and 34

per cent in Commerce. In particular, the proportion of female professionals working in international organizations was 53 per cent.

The number of female professionals who played key roles in the state owned sectors had increased recently but it still remains much lower than that of male professionals. Data from HCMC Institutes of Economics (2000) on the private economic sectors indicated that the percentage of female business managers had increased from 26 per cent in 1993 to more than 30 per cent in 2000. To be precise, in Ho Chi Minh city there were among 8,025 registered enterprises, from which 77 per cent were Trading and Services, and 23 per cent were Industry, Construction, Agriculture and Handicraft, and about 2000 business managers of these enterprises were females (cited in Nguyen Thi Hai, 2000, p.35).

A survey by the Ho Chi Minh city Service of Science, Technology and Environment, that was conducted during the period of 1999–2000 on a sample of 1,138 professionals, from which 61 per cent were females, reported that the majority of female professionals who were aged from 35 years or above, were married (89 per cent). However, the percentage of single female professionals aged from 25 to 35 years old was quite high (39 per cent), reflecting the trend towards late marriage among professional women. Interestingly, the majority of the married informants, mostly in dual career families, said that the household tasks in their family tended to be less heavy than before due to the increased involvement of husbands in sharing household tasks (21 per cent), support from relatives (25 per cent) and from housekeepers (21 per cent), and the use of labour and time saving machines (33 per cent). The divisions of household tasks were reported as follows: men took responsibility for ‘taking children to school’, and ‘tutor and play with children’, women did all household chores as cooking, shopping, washing, laundry, and child care. The average hours for household tasks among these women were 6 hours per day, for work duties are 9.5 hours per day versus those of their partners at 2 hours per day and 10.5 hours per day respectively. Yet, given their higher household work commitment, women’s reported income was only 82 per cent of men’s income in the family.

It is worth noting that in terms of the division of labour, a survey on the professional dual career families in the North revealed that the participation of husbands in household tasks (though still small percentages) such as marketing, care for elderly, cooking, house cleaning and feeding livestock were low⁴. Similar findings in the survey conducted in the Ho Chi Minh city⁵ did not reveal the same results. It was thus possible to assume that the differences in fields of labour sharing, was a reflection of different extents of patriarchal attitudes towards the household tasks between the Southern and Northern men.

In conclusion, due to the historical and socio economic situations, the production and reproduction roles of women in the South, to some extent, had gradually differed from their sisters in the North over time. Before 1975, most urban middle class Southern women were housewives, and usually they carried out all the household tasks. After 1975, they also took on production as well as reproduction roles which had continued since then. However, the husband-wife relationship in the South arguably displayed more patriarchal traits than in the North, especially in the household division of labour in the family. Although, nowadays, most families in both regions became nuclear, the practice of filial duties towards parents and in-laws in the South differed from the North with more flexible living arrangements after marriage in the South.

⁴ In the survey titled “*Địa Vị Người Phụ Nữ Trong Gia Đình Nữ Trí Thức*” (The status of women in professional families) by Nguyen Thi Bich Diem (1990, Hanoi) on the division of labour in the family, husbands in the professional families reported that they carried out household tasks such as: marketing (4.5%), cooking (1.1%), house cleaning (2.4%), washing dishes and clothes (1.1%), elderly care (3.4%).

⁵ In the survey on “Professional Women in Ho Chi Minh city” (2000) by a group of female university lecturers, household tasks involvement reported by husbands in the professional families, as noted earlier, only in the activities such as tutor, play with the children or taking children to school.

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Growing physical, social and cognitive capacity: Engaging with natural environments

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Physical environments are a major contributor to human health, cognitive development, and social wellbeing but, until recently, these roles have largely been ignored. Historically the nature-nurture dichotomy divided understandings of human growth, learning and behaviour but the recent epigenetic research and the emergence of gene-environment interplay as a concept offers a contemporary integrated perspective. This paper reviews research demonstrating that environments significantly influence the expression of genetic information in ways that are critical to healthy human development. It then draws connections between these findings and studies that demonstrate natural environments support a range of significant human health, cognitive and cultural benefits. By linking the two fields the author posits that engaging with natural environments affects the expression of genetic and cultural information in ways that support human physical, psychological and social wellbeing. This hypothesis is explored through examining the measured learning outcomes achieved in naturalised school grounds. The author concludes there is sufficient evidence that 'natural' environments support wellbeing at many levels and recommends that students, communities and education professionals seek to naturalise school grounds through inclusive, action based learning programs.

Nature, nurture, environment, learning, human development, genetic information

INTRODUCTION

Contact with nature is known to stimulate healthy human development but, in many parts of the world, unfavourable public policies and changed cultural practices have reduced children's contact with nature (Collins & Kearns 2004). Moreover a range of studies suggest that reduced contact with nature is likely to have undesirable developmental, social and ultimately environmental consequences (Kellert 2002). This paper proposes that naturalised school grounds enrich learning environments and support student's physical, cognitive and social wellbeing. By summarising new epigenetic research the paper demonstrates the inter-dependence of genetic and experiential influences on both the pattern and development of human physical, behavioural and psychological characteristics. It then suggests that evolution has equipped humans with a genetic need to affiliate with nature to argue that individual wellbeing is strongly influenced by relations with the natural environment. Studies indicating that human's accrue profound benefits from engaging with nature are presented to demonstrate that, while access to nature is declining, regular experience of nature affords children significant benefits that support healthy development. Finally the paper reviews three meta-studies of learning in outdoor environments and concludes that inclusive programs that naturalise school grounds will enhance student learning and wellbeing if they are sensitive to participant's developmental and cultural needs.

In commencing, it is helpful to clarify a few definitional matters. This paper refers to 'affordances', a term coined by Gibson (1986) to describe the perceived qualities of an object, feature or change in the immediate environment. An observer, for example, might perceive a tree as affording climbing, fruit, shelter, building materials or aesthetic benefits. The 'environment'

refers to all the forces, elements, features and organisms that influence, either immediately or in an extended sense, a particular awareness. In addition it accepts that the environment is increasingly conceptualised holistically into ‘natural’, ‘built’, ‘social’ or other fragments (Rose 2001). However, while acknowledging these views, the paper necessarily discusses perceived environmental qualities that are typically described in the above terms. To this end ‘natural environments’ are defined as wild places and places with a diversity of landforms, vegetation and animals that may have been adapted by humans. Typical ‘natural environments’ include wilderness, pastures, fields, wooded parks and even golf courses (Ulrich 1993). Similarly the term ‘naturalised school grounds’ indicates school outdoor areas that reflect the qualities of natural environments. Finally ‘epigenetic’ refers to “mechanisms by which cells change form or function and then transmit that form or function to future cells in that cell line” (Gottesman & Hanson 2005, p.265).

NATURE – NURTURE

Heerwagen and Orians (2002) explain that a full appreciation of human development requires an understanding of how experiences in sociocultural, biological and physical environments influence individuals in the present and how these experiences influenced species development through evolutionary processes. However western discourse about the pattern and development of human physical and behavioural characteristics has been characterised by a long-standing, though evolving, dichotomy (Wyman 2005) that is generally described as ‘nature or nurture’ and is broadly based on arguments as to whether an organism’s qualities are pre-determined or adaptable (Tuana 1983).

The so-called ‘nature’ standpoint maintains that all organisms have a range of species-typical qualities that govern individual physical and behavioural characteristics and is epitomised by religious traditions from around the globe which consider that individual species have unalterable traits. In the western tradition, the Bible, for example, explains that God created each species with its own unique but pre-determined nature (Wyman 2005). The theory of evolution contested beliefs about supernatural origins for each species by proposing that individual features and characteristics were subject to adaptation and natural selection over very long time frames. Moreover the theory suggested that evolutionary processes would eventually alter the characteristics of the originating species or result in the genesis of new species (Plotkin 1979). However, evolution’s very long timeframes necessarily precluded adaptation within individual lifetimes and therefore required that a particular organism’s characteristics were predetermined (Brandon 1990).

In regard to human’s need for natural environments Nature perspectives argue that *Homo sapiens* evolved inter-dependently with the physical environment (Oerter 2003, Plomin & Bergeman, 1991 quoted in Saudino & Plomin 1996, Voland 2000) and genetic information embedded through evolution underlies a tendency for contemporary humans to affiliate with the natural world (Heerwagen & Orians 2002, Ulrich 1993). Lumsden and Wilson (1981) posited that human’s long engagement with physical environments had genetic implications and Wilson (1984, 1993), a biologist, extended this concept to suggest that evolution equipped humans with a genetic need to affiliate with nature, a need he termed ‘Biophilia’. In support of Wilson’s hypothesis Ulrich (1993) positioned biophilia as a survival-related adaptation for early humans describing, for example, the advantages that accrued to early humans who displayed aversions to snakes and spiders. Furthermore he rationalised evidence that snake and spider phobias commonly persist in contemporary urban populations as evidence that early human adaptations influence contemporary individuals. Using similar logic Ulrich outlined strong evidence that people respond in fundamentally different ways to natural and built environments and proposed this offers persuasive circumstantial evidence that biophilia has a genetic aspect. Heerwagen and Orians (2002) concur and note that evolutionary based fears are more strongly manifest than those associated with contemporary dangers such as guns and cars. Drawing on a range of studies

Maller et al. (2002) also concluded that humans retained a tendency to affiliate with nature. Kylin's (1999) Scandinavian study describing children's preference for places that exhibit 'naturalness', variation in vegetation and ground level, moveable materials and water is typical of findings that support this conclusion. Similarly Winter's (2005) United States-based study described places where people preferred to walk as having variety in landscape forms, trees, water and birds. In Australia *Growing Conservation in Urban Communities* (NSW NPWS 2002) also described strong human affiliation with natural environments. For example, when surveyed about their preferred living conditions, 61 percent of respondents considered "a place that's leafy and green with lots of tree lined streets and parks" extremely or very important, 47 percent of respondents considered "a relaxing place where you'd hear the sounds of lots of birds" to be extremely or very important, and 50 percent of respondents considered "a place with parks close by where kids can play" to be extremely or very important. Interestingly 53 percent of respondents considered "a place that's not too close to busy streets or shopping centres" extremely or very important and only 12 percent of respondents considered "a place that's close to lots of cafes, restaurants and bars" extremely or very important. On the basis of such studies Van Den Born et al. (2001) concluded that, at least in western societies, there was a strong tendency for humans to affiliate with natural environments.

Nature perspectives are supported by the existence of other apparently typical human characteristics which are clearly not learned behaviours. The observed ability of infants to detect and turn away from unpleasant smells even in the first few days of life (Bower 1974) is one such case. More generally, early research into human genetic disorders suggested that, except for rare mutations, an organism's genetic code was fixed and its expression unalterable (Bjorklund & Pelligrini 2000, Gottesman & Hanson 2005).

Nature positions have been called into question by a range of studies showing, for example, that disorders in genetically identical twins can be expressed differently (Jablonka 2004, Townsend et al. 2005), or that exposure to chemicals may alter gene expression over several generations without causing DNA mutations (Kayser 2005). Studies reporting genetic influence on what were thought to be predominantly learned psychological characteristics such as religiosity, divorce and parenting style have also subjected nature perspectives to strong criticism (Rutter 2002a).

Nurture perspectives propose that an organism can adapt to its environment and perhaps pass on the adaptation to subsequent generations. Also emerging from religious traditions humanism, for example, argued that children entered the world with significant unformed characteristics which could be moulded through proper guidance and learning (Wyman 2005). In biology nurture perspectives were interpreted as suggesting that organisms might be able to adapt within their own lifetimes and pass on their adaptations to subsequent generations. Lamarck, for example, suggested that giraffes which stretched to reach higher branches could develop a slightly longer neck, that this characteristic could be inherited by its offspring, and that each succeeding generation could develop successively longer necks (Brandon 1990). Until recently biologists largely rejected the notion that physical characteristics could be modified within individual lifetimes (Gorelick 2004) but the ability of individuals and social groups to learn new behaviours was widely recognised (Wyman 2005). Much contemporary research could be said to broadly conform to behaviourist perspectives because it presented evidence that the environment did influence development and learning. Environmental affordances, for example, affected human perceptions, beliefs and values (Gibson 1986) and neurological studies demonstrated that human brains responded to experience and stimulation by developing new structures (Mc Michael 2001).

EMERGING UNDERSTANDINGS, GENE-ENVIRONMENT INTERPLAY

Today there is an increasing awareness that human health and wellbeing is inextricably linked with environmental quality (Jackson 2003) and there is some support for the view that natural environments influence human learning, health and development (Kellert 1993 & 2002).

Contemporary thinking also rejects the nature-nurture dichotomy (Mohr 2003) to assert the inter-dependence of genetic and experiential influences on both the pattern and development of an organism's physical, behavioural and psychological characteristics (Gorelick 2004, Granger & Kivlighan 2003, Jablonka & Lamb 2002, Schoon et al. 2002). The integration of nature-nurture perspectives has been facilitated by studies from the field of epigenetics which showed genetic mechanisms were quite sensitive to environmental changes and that genetic information could be expressed differently in different environments (Bjorklund & Pelligrini 2000). It is now understood that mechanisms which govern the expression of genetic information are naturally responsive to environmental conditions and that the two-way interplay of genetic and environmental influences can induce changes in individual features (Rutter 2002a) which can be inherited by subsequent generations (Gorelick 2004, Kayser 2005). In terms of human physiology Wu & Suzuki (2006), for example, postulated relations between an environmentally altered expression of genetic information in mothers and the rising prevalence of obesity in children. Additionally Jablonka (2004) describes research linking epigenetic factors with cancer and inflammatory bowel diseases. Gene-environment interplay has also been described at neurological and psychological levels. McMichael (2001), for example, attributed the significantly lower prevalence of schizophrenia in young males raised in rural settings - as compared with those brought up in cities - to environmental effects. Mohr (2003) also cited studies showing that genetic and environmental factors influenced human brain development and Nelson (2000) reported these could be translated into physical changes within the brain. Significantly Rutter (2002b) concluded that early childhood experiences had cognitive, social and neurological outcomes that extended into adulthood (Rutter 2002b).

By recognising the importance and inter-dependence of genetic and experiential influences on the pattern, development and inheritance of an organism's physical, behavioural and psychological characteristics (Gorelick 2004, Granger & Kivlighan 2003, Jablonka & Lamb 2002) epigenetics and the concept of gene-environment interplay effectively integrated understandings of development and therefore refuted traditional nature-nurture dichotomies (Rutter 2006).

Moreover epigenetic studies established that an organism's healthy development required that it inherited not only a species-typical genetic complement but also an environment that initiated and supported development for which the species had been biologically prepared (Bjorklund & Pelligrini 2000, Dawkins 1989, Jablonka 2002). This paper posits that humans need to access nature because it initiates and supports the growth, learning and behaviour for which our species has been biologically prepared. Persuasive evidence does indeed demonstrate that natural environments afford humans profound benefits. Sherman et al. (2005), for example, attributed significant physical and affective benefits to paediatric healing gardens. In addition, Kellert (2002) indicated that natural elements facilitated cognitive development, and other studies identified that direct and ongoing experience of natural environments stimulated and supported psychological and social wellbeing (Cosco & Moore 1999, Elliott 2003, Moore 1986, Orr 2005). Indeed a range of authoritative studies have indicated that the benefits of engaging with nature included:

- (a) supporting and sustaining self-identity, self-awareness and social attachments (Korpela et al. 2002, Manzo 2005, Spencer & Woolley 2000);
- (b) promoting language development, collaboration and social interaction (Faber Taylor et al. 1998, Herrington & Studtmann 1998, Korpela et al. 2000, Kylin M. 2003) while reducing anti-social behaviour (Moore & Cosco 2000) through age appropriate play;
- (c) restoring attention (Korpela & Hartig 1996, Korpela et al. 2002 and Faber Taylor et al. 2001);

- (d) enhancing psychological well-being through improved feelings of security, privacy and control (Abbot-Chapman 2000, Kuo, Bacaicoa & Sullivan 1998, Kim-Cohen et. al. 2004, Kylin 2003, Korpela et al 2002, Wells & Evans 2003);
- (e) facilitating emotional self-regulation and improved self-discipline (Abbot-Chapman 2000, Faber Taylor 2001a, Korpela and Hartig 1996, Kuo 2001, Sylvie 2003);
- (f) improving cognitive functioning and academic success (Faber Taylor et. al. 2001 Lieberman & Hoody 2000, Mc Michael 2001 & Wells 2000);
- (g) advancing physical fitness, coordination, balance and agility, and reducing incidents of sickness less (Fjørtoft 2001 and 2004) ; and
- (h) contributing to the development of values and ethical use of places (Titman 1994, Vaske & Kobrin 2001).

Evidence of this type clearly illustrates that access to nature influences learning, health and development and suggests a link between beneficial environmental affordances and the healthy expression of genetic information.

ACCESS TO SUPPORTIVE ENVIRONMENTS

Epigenetic research also demonstrates that individuals have a critical need to interact with supportive environmental conditions during sensitive developmental phases (Granger & Kivlighan 2003, Mohr 2003, Mc Michael 2001, Oerter 2003, Rutter 2002b) and this is especially so for children (Neri et al. 2006). This suggests that reduced access to natural environments is likely to be detrimental to health and wellbeing (Maller et. al. 2002, White 2004). Furthermore studies showing that natural environments afford profound benefits indicate a need to design human environments so that places which afford these benefits are accessible (Kellert 2002). Studies have shown, however, that human contact with nature is decreasing in some parts of the world. For example, Tapsell et al. (2001) demonstrated that children's access to natural environments in the United Kingdom has declined *dramatically* over the past few decades and that a range of physical and social factors were accelerating this withdrawal from natural environments. Kellert (2002, p.143) notes that

Major shifts in family traditions, recreational activity, social support networks, and community relations have eroded many children's traditional opportunities for contact with nature.

Widespread urban consolidation, for example, resulted in open space becoming increasingly rare (Recsci 2005) and this reduced the number of undeveloped places that were available to children. Furthermore studies showed that children and adolescents ranged in specific territories (Sallis & Glanz 2006) that expanded with age and evolved from the interactions within and between children's personalities, parents, cultural circumstances, and the physical environment (Moore 1986) so, early in a child's development, consolidation within the territory might have the effect of removing rather than displacing access to natural areas.

There is also evidence that growing use of private cars, an associated road safety anxiety, and fear of exposing children to crime are causing parent's to increasingly restrict children's use of streets and other public spaces (Fulton et al. 2005, Sylvie J 2003, Ziniani et al. 2006). Collins and Kearns (2004) argued that a policy emphasis on private cars and related infrastructure devalued children's unstructured outdoor play and exploration. By distracting attention from the need for safe and accessible outdoor spaces they argued that the development and use of urban public spaces created the perception that public open spaces were naturally or normally adult spaces. This view is reinforced by research showing that, while children and adolescents are still major users of remaining urban outdoor environments, they are marginalised by existing planning processes, their input is rarely sought, and that the token spaces which are provided rarely meet

their needs (Tapsell et. al. 2001). Kylin (1999) describes the outcome of this type of orientation as usually resulting in children being restricted to low-risk spaces such as school grounds and playgrounds despite their valuing natural places much more highly than manufactured ones (Titman 1994).

The overwhelming weight of evidence from science, psychology and education clearly demonstrates that where natural environments are accessible to children they afford children significant physical, cognitive and emotional benefits (Wells 2000). By concluding that learning in naturalised environments supports academic achievement, the development of social skills, and wellbeing in pupils of all ages a recent United Kingdom House of Commons Education and Skills Committee (2005) report also linked findings of this type with a need to renew contemporary practice in education. Indeed there was strong evidence that, where environments had been naturalised and used as the integrating context for learning, a wide range of valued outcomes had been achieved. Lieberman and Hoody (2000), for example, reviewed a ten year United States study and found that students performed better on standardised measures of academic achievement in reading, writing, mathematics, science and social studies. In a similar Canadian study Dymont (2004) mirrored many of Lieberman and Hoody's findings. In addition she found that naturalising school grounds provided safer, healthier and more inclusive places for students and had the effect of increasing student cooperation and collaboration while reducing incidents of violence and vandalism. Her study also found that naturalising school grounds enhanced interactions among students and teachers, increased teacher's opportunities for innovation, and renewed teacher's enthusiasm for their work. Boston's Education Development Center (2000) also conducted a study of 56 schools with naturalised grounds and found strong evidence of enhanced academic, behavioural and organisational outcomes. More specifically they found that many aspects of student learning, such as enthusiasm, engagement and creativity were enhanced by naturalised school grounds. They also indicated that teaching in natural learning environments had effects that extended beyond the formal curriculum. Reduced student discipline and management problems, both in class and at break times, were widely valued by staff and students, for example, and greater pride and ownership of learning and the learning environments were reported. These outcomes and the research described above demonstrate that nature animates child development, social interaction and learning. Furthermore, they indicate that naturalised school grounds have the potential to redress impoverishment of childhood experiences by providing access to natural environments.

CONCLUSIONS: IMPLICATIONS FOR SCHOOLING

Contemporary thinking and practice in science, business and the humanities increasingly recognises that relations within and between organisms and their framework of environmental qualities significantly influence both the organism's characteristics (Mohr 2003, Rose 2001, Sterling 2002) and those of the environment which it inhabits. In western traditions of education, however, established ways of knowing and doing often stress machine-like transmission of information, efficiency and certainty (Hicks 1994) that largely undervalue or ignore contextual influences (Cosco & Moore 1999, Ridgeway & Hammer 2006, Saul 2000). Consequently, at a time when children's play in natural environments is declining (Rivkin 1990 quoted in Herrington and Studtmann 1998), the physical environment's influence on learning is to a large extent not considered or clearly understood (Cosco & Moore 1999). UNESCO (2000) stated that successful education programs required an environment that encouraged learning but the design of school grounds had changed little over the last 50 years (Heerwagen & Orians 2002). In that time, however, convincing evidence had emerged showing that environmental quality was critical to healthy development (Granger & Kivlighan 2003, Mohr 2003, Mc Michael 2001, Neri et al. 2006, Oerter 2003, Rutter 2002b). Furthermore research clearly demonstrated that the physical qualities of school grounds strongly influenced the type and diversity of learning that occurred in them (Evans 2001, Herrington & Studtmann 1998, Huse 1995) and that access to natural elements supported student's physical, cognitive, emotional and social wellbeing (Dymont 2004, Education

Development Center 2000, Faber Taylor et. al. 2001, Fjørtoft 2001 & 2004, Herrington & Studtmann 1998, Lieberman & Hoody 2000, Moore & Cosco 2000, & Wells 2000). This evidence suggested, therefore, that policy makers and practitioners should initiate processes to naturalise school grounds.

However, while naturalised school grounds clearly had the capacity to encourage and support a range of valued educational outcomes, Cosco and Moore (1999) explained that normal practice of providing and maintaining school grounds without discussion, analysis of need, or consideration of function significantly constrained their usefulness. Adults, adolescents and children often appreciated environments differently (Malinowski & Thurber 1996) and children's attention to detail often perceived intricate qualities overlooked by adults (Tapsell 2001) so that the planning and management of school grounds required the identification and assessment of children's values of learner needs, child development and teaching practices to ensure optimum outcomes (Cosco & Moore 1999).

Students, teachers and local communities know and understand their schools uniquely so must be active participants in all stages of the design, creation, and maintenance of school environments. Furthermore, projects to naturalise school grounds need to be conceived and implemented primarily as learning programs. Learning, like gene-environment interplay, is an on-going interpretive adventure which emerges from tensions between existing schema, the context in which learning takes place, and the action of using both (Brooks & Brooks 1999, Collins 1997). It follows that, while naturalised school grounds provide a context that initiates and supports learning (and by implication gene-environment interplay), their existence is not sufficient to ensure that learning will occur. Rather learning requires that environmental affordances are perceived through learner actions. Therefore students, teachers, school leaders and communities must be authorised and supported to initiate and implement projects that use and adapt school grounds. Moreover, to maximise the learning outcomes, each project needs to be designed to:

- inspire participants to believe they can effect positive change;
- model learning processes that transform participants;
- develop people's ability to realise their vision; and
- foster futures oriented values, behaviour and lifestyles. (adapted from UNESCO 2005).

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Prospective teachers' perspectives on teaching and social justice

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This article reports on a study into the ideological beliefs of first year prospective teachers. Here ideologies are understood as expressions of specific 'world views' and certain collective interests. Data were drawn from tasks that attempted to get students to position themselves relative to and reflect upon questions and propositions related to social justice as it applied to education. It was found that most students work with a variant of liberal ideology, emphasising individual autonomy, a capacity for self-assertion and the fulfilment of native potentials. While expressing a concern about inequality and misrecognition, student responses also provided insights into the limits of liberal approaches to social justice, these arising from an underdeveloped sense of the dynamic tension between society and individual.

Teacher perspectives, social justice in education

INTRODUCTION

As lecturers in an undergraduate teacher education programme we aim to encourage students to engage critically in, and with, the worlds in which they live and work. We consider that for educators generally, and teachers in particular, such a critical capacity is vital. Broadly put, education is not simply imparting knowledge about things. It is an inherently political process that actively works for certain ends, or futures, over other possibilities. For us one such end is social justice where education is directed towards the attainment of a better, more open and humanly possible world. We agree with Ayres and his assertion that education and schooling are contested arenas of both hope and struggle:

... hope for a better life and struggle over how to understand ... and achieve that better life. ... At that moment we realize that no teaching is or ever can be innocent – (we then understand that) it must be situated in a cultural context, an historical flow, an economic condition. Teaching must be toward something; it must take a stand; it is either for or against; it must account for the specific within the universal. (Ayres 1998: xvii – xviii)

This paper reports on a study into the beliefs of 535 first year prospective teachers. These students studied in two compulsory first year topics; a sociology of education topic entitled 'Key Educational Ideas' and a philosophy of education topic entitled 'Ways of Explaining Education'. Data were gathered from two sources for this report. First, student reflexive journals that were part of their assessment in the sociology of education topic were collated and analysed, and second student responses to weekly propositions about education were collated and analysed. Roughly, these data give us both qualitative and quantitative aspects to understanding how this

group of prospective teachers think about teaching and education at this time in their teaching careers.

In the first section of the paper we outline the theoretical idea of 'ideology'. 'Ideology' is the concept we use to describe the dispositions and attitudes that these students have to teaching and education. The notion of 'discourse' is also sometimes used, however we do not go to any great lengths to distinguish between the two concepts and their theoretical and political differences. Our primary aim is to describe the student's responses, and their naturalised ways of understanding and explaining key ideas in education. We then outline the study and go onto describe and make sense of the student responses in the second half of the paper.

Ideology and Prospective Teachers Ideas about Teaching and Education

As we mentioned at the beginning of this paper teaching and education are shaped by politics, or more precisely, by one's beliefs, values and attitudes to teaching, learning, students, schools and other key ideas within Education. These beliefs and values arise from someone's social background and cultural experiences within particular historical and cultural contexts to describe the student's responses, and their naturalised ways of understanding and explaining key ideas in education. Taken as those deep and often unquestioned assumptions about the world, ideologies are vital to understanding students' dispositions to teaching and education. While ideology is generally recognised within the social sciences as "one of the most equivocal and elusive concepts one can find" (Larrain 1979: 13), we take that our ideologies are the foundations from which practical engagements with the socio-political world emerge and are justified. In this sense, ideologies – or, more particularly, political ideologies – are not dispassionate theories but sets of collective beliefs that come to pass as the common-sense bases for sensible action.

Ideologies are to be understood in a positive sense: as expressions of specific world views and certain collective interests. In short, ideologies are not irresistible forces but emergent features of specific historical and cultural conditions. Likewise 'discourse' refers to the sense of ideas and networks of practices that we take for granted and use habitually to make sense and to act in the world. The strength of this idea over ideology is that it gives us a sense of the relationship between the agent, or the individual and their ways of understanding themselves and their action in a global context. In this sense individual beliefs are part of the broad networks of ideas that inform elites and institution as much as less powerful peoples and groups throughout culture.

Hence, as we look at the student responses we are both considering their local and individualised dispositions to teaching and education but also thinking to some extent about how they fit within, inform and are informed by broader cultural networks of meaning and practice.

THE STUDY – BACKGROUND AND METHOD

This research is based upon data collected from students in two large, compulsory, first year prospective teacher topics undertaken as part of the Bachelor of Education at Flinders University in South Australia. The topic 'Key Educational Ideas' is an introductory sociology of education topic that attempts to generate awareness of the social and cultural aspects of the field of education, from the classroom to educational policy. The topic implicitly addresses issues of social justice; that is, questions of social and cultural difference are considered in relation to issues of inclusion, access and the distribution of knowledge and resources. Social justice in this topic is considered in its breadth, with the aim being to help students begin to understand the contested character of education and just teaching practice. From this topic we collected and analysed materials taken from student reflexive journals that were part of their assessment. From 535 students 60 journals were analysed. The cohort include students undertaking Bachelor of Education degrees in junior primary, middle school and secondary teaching and cover students studying arts and science in more general degrees. Of the journals collected there were 27 male

and 33 female responses. Twenty-nine responses were collected from students studying junior primary teaching, 17 middle school and 14 secondary school responses.

The topic 'Ways of Explaining Education' introduces students to a number of philosophical positions concerning the nature and purposes of education. It aims to develop students' skills in identifying the raft of assumptions that inform their standing views on what education is and ought to be about human nature, childhood, the individual and the collective, morals, and in critically reflecting on the relative merits of these through engagement with others holding to more or less different views. From this topic data were derived from student responses to weekly propositions about education arranged in terms of Likert scales.

Both of these topics attempt to develop reflexivity, an awareness of asymmetries in the distribution of life-chances and power, and promote sensitivity to difference in prospective teachers. The instruments from which our data are derived were components of their assessment for these topics. These did not seek out right or wrong answers to content driven questions but rather attempted to get students to position themselves and reflect upon this positioning on questions and propositions related to the students own sense of social justice as it related to education; for example on the issues of collective influence, the cultivation of the self (both for students and teachers), the good social order and deviations from this, individual and collective responsibility and their limits, equality and sameness (or identity) and difference. They thus also served as a useful source of insights into the as yet largely unquestioned opinions and thoughts about education and teaching held by these students.

Here we are particularly interested in how the student through their responses mediates the social context and the individual, and in a more abstract manner the dynamic of structure and agency. These ideas are mediated through notions of equality, order, difference, culture and power and social justice at the sites of education, teaching, the self, and the student or childhood more broadly. Australia is a liberal democracy, and is dominated by the ideological traditions of Europe and North America. One of the key tenets of liberalism, which we are seeking to explore in this article, is the embodiment of individualism. The implications of individualism, as an ontology, demonstrate particular discourses of the individual, responsibility, action, social influence which are deployed through key ideas in education, and used as ways of explaining education and the role of the teacher. These ideas have implications for what we term broadly as 'social justice', that is the ways that prospective teachers see their place in addressing questions of disadvantage and privilege in the education system.

Perspectives and Ideologies: Making sense of the responses

What insights into the ideological predispositions of the 2006 cohort of first year pre-service teachers can give a deceptively fair appearance from our data? The first, very general impression that emerges from student self-identifications is that the greatest number of these people subscribe to what, in lay terms could be described as a 'nice liberalism'. What do we mean by this?

Entries in the reflective journals support a distribution of particular ideologies. When presented with a range of educational ideologies - conservative, liberal, social-democratic, socialist – and asked which they identified with most closely, the predominance of students opted for a liberal position, quite often tinged with social-democratic and even, though more rarely and only lightly, socialist hues. The following quote is typical of the most common responses:

I find myself agreeing with Liberal perspectives.....Each person is different and therefore will achieve different outcomes from education. By seeing everyone as individual, the main purpose of education is to better that person, rather than society.....By helping an individual to work to his/her potential the outcome of class divisions in society may be reduced.

Here the individual is positioned front and centre of consideration, with the social only emerging subsequently, and secondarily as a derivative of individual action. We can recognise here a number of key characteristics of a standard liberal world view; the naturally unique and sovereign pre-social individual voluntarily entering into relations with other individuals in the course of realizing their potential (*in lieu* of the more classical self-interest), and the good social order forming spontaneously from the aggregation of individual interactions. When ideas taken from the social-democratic or socialist traditions are introduced these tend to be grafted onto this basic liberal rootstock, as evidenced in the use of the language of equal opportunity.

Thus for example:

I find myself agreeing with the social democratic ways of education.....all people should be given the same opportunities despite their birthright and the state should help in ensuring there is equal opportunity

I find myself agreeing more with socialism, but with a lean towards liberalism.....equal opportunity, equal access and inclusivity.....are all important but the socialist also takes the notion of 'equal worth' to mean 'equal power'.....It doesn't support power or privilege of some if it means the majority of others suffer.

We can note at this point that there were far fewer takers for the type of hard-core neo-classical economic liberalism, that which would place education in the marketplace with consumer choice presented as the truest expression of individual freedom. Nor for the type of social conservatism, with whom it often keeps company in contemporary debates, emphasising discipline, traditional values and a curriculum filled to the brim with 'real', standardised and testable knowledge.

Hence the designation 'nice liberals': liberal in the emphasis on maximising individual autonomy, a capacity for self-assertion and the fulfilment of the native potentials of all. 'Nice' in the sense of an awareness of and concern about the ways society can and does frustrate and injure the capacity to individuate, and that it may do so more for some than others – and in the roseate view that through a bit of tinkering with our existing arrangements for living together (equal opportunity) these accidents or oversights might be overcome.

Too often absent or underdeveloped, however, is a clear sense of the ways socio-cultural contexts condition and suggest prevailing interpretations about what it means to be an individual, and hence how one ought to go about the task of constituting oneself as an individual; or of the ways the manner and methods through which people respond to this task affects the structure and ambiance of the society we share. That is to say there is a common difficulty in grasping how the uneven distribution of material resources, power and respect, and as such significant differences in practical capacities to individuate, results from systemic contradictions rather than deficits in the individuals and groups most adversely effected by these. This in turn impacts upon where people draw the lines demarcating what they see as the outer limits of their legitimate responsibilities.

This general impression should not come as a surprise. When asked, in their journals, to reflect upon the kinds of literacies and other forms of cultural capital that supported their transition through schooling many either identified explicitly as middle class (a very Australian tendency, see Pusey, 2003), or they described features typical of a middle class habitus (educational/managerial/professional parents who encouraged them to read and have high expectations of themselves, sufficient income to attend good schools where teachers and students shared a similar background and so forth). It might be said that that ideal of the freestanding, self-realising individual has always sat quite comfortably with or comes more naturally to those whose position in the social order allows them credibly to believe that in many important respects they are their own boss, the authors of their own destiny.

THE ROLE OF EDUCATION A MEDIATOR OF RELATIONS BETWEEN THE INDIVIDUAL AND SOCIETY

From the journal responses we have understood our students as presenting with a largely naive form of liberalism, which demonstrates some conception of responsibility to others but without a strong sense of the social and cultural forces which shape responsibility, for both the individual and the social. The discourse of individualism here delimits their capacity for any sophisticated notion of the social. We further elaborate this understanding by considering responses to the educational propositions in the Ways of Explaining Education topic.

Under this heading we paired subjects' scaled responses to propositions concerning the aims of education (from the Ways of Explaining Education topic) and the importance of justice relative to efficiency and productivity with journal reflections on the role of education in society and, more specifically on the relative weight that should be accorded individual fulfilment over the needs to secure the conditions for a viable workforce.

The distributions of rank scaled responses are summarised in Figures 1, 2 and 3.

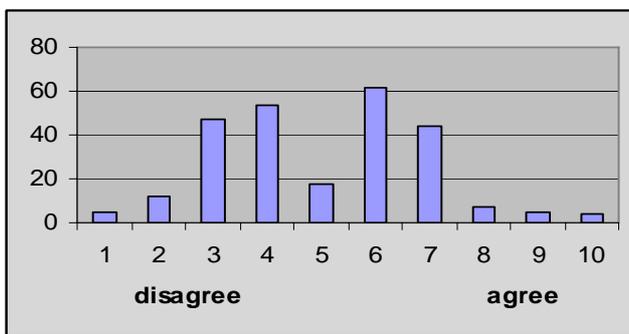


Figure 1: Education's main aim should be the transmission of community norms

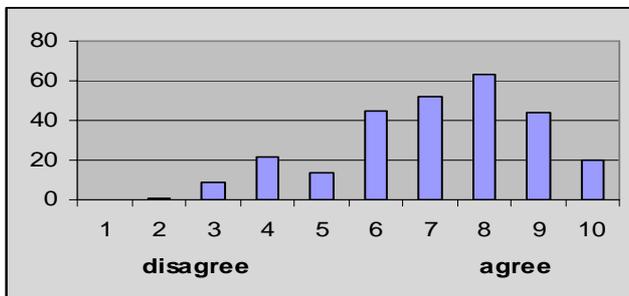


Figure 2: Education's main aim should be the fulfilment of the individual student

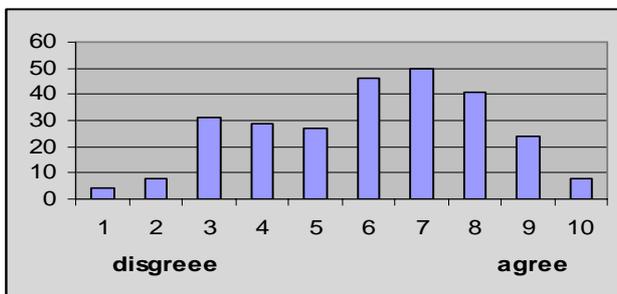


Figure 3: Justice is more important than efficiency, productivity and prosperity

In Figure 2 we see what appears to be a significant divide, though not extreme (it gathers around the median point), over whether the main aim of education ought to be the transmission of community norms. Figure 3, however, would suggest that the type of norms many subjects supporting this proposition had in mind were inclined towards those that valued individual

fulfilment. In the journals we find something similar taking place. Here there are some takers for what we might call a conventional even conservative view of education as a mechanism for the intergenerational maintenance of community norms:

...we need teachers capable of passing on the knowledge of how society works and the values it wishes to instil in every person.

A more common response was to suggest that the route to maintaining a healthy society was through the development of individual potentials:

...helping individuals to grow, develop and reach their potential to eventually become a contributing member of a changing world.

Moreover as indicated in Figure 4, individual fulfilment tended to be understood in terms much wider than those promoted by the more puristic forms of economic liberalism, where the good person is the rational calculating market actor, and the just society one organised around market ideals of free exchange, efficiency and productivity. Thus while a few did subscribe to this more limited view:

To be successful or to get ahead in today's world you have to have money. The more money you have the more successful you are seen to be. A high level of education will give you a better chance of gaining a high paying job....the needs of society can at times totally eclipse individual aims leaving an individuals life goals unfulfilled.

a far larger number tended to write in the language of self-actualisation;

....education is about liberating people so they can reach the potential of their choice....Schools should also educate a social conscience in their students which will inspire them to take on crucial jobs later on in life.

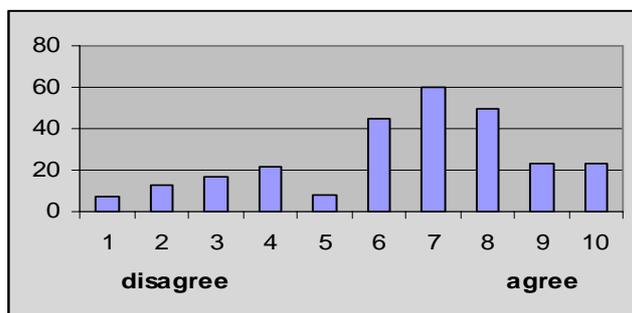


Figure 4: The enforcement of rules such as the wearing of uniform, showing respect for the teacher, is essential in education

Here we find a repetition of the idea that if we provide conditions conducive to the development and fulfilment of individual potential then the prosperous economy, as with the good society, will take care of itself.

....people fulfilling their potential is the most important. I believe that everybody has gifts and talents for different things and that helping people discover their potential is vital. In saying that for economy to go around we need to maintain the workforce, but I believe that if everyone fulfils their potential with education there will in turn be a maintained workforce.

A few were able to take this further, including under 'the development of individual potentials':

...preparing them to face an ever-changing world, and to develop in them the attributes to be a discerning individual that is able to critically analyse the global environment of which they are a part.

Order, norms and values

We can take these observations further and press more explicitly towards some of the social justice issues noted above through looking at subjects' responses to propositions concerning the importance of school rules, the grounds for these, patriotism and citizenship. These responses are summarised in Figures 5, 6, and 7.

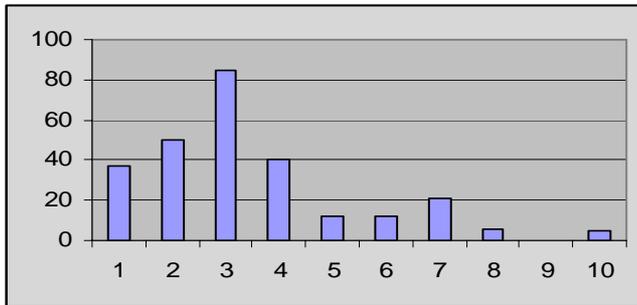


Figure 5: School rules are arbitrary conventions that have no moral value

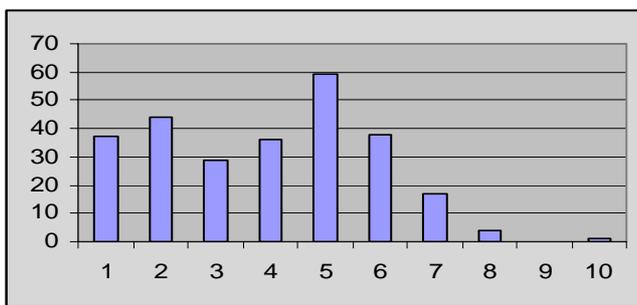


Figure 6: Patriotism is good. But no politics

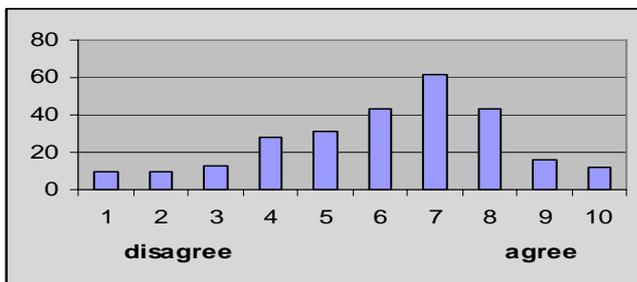


Figure 7: We should be forming a society of citizens committed to higher values than themselves

These data can be narratively summarised in the following simple points.

Rules and their enforcement are crucial ingredients in effective schooling.

These rules ought to be rooted in some core principles, involve something more than just order for the sake of order.

The core principles seen to be at stake here bear little resemblance to those popularly associated with the figure of the patriot, one who prizes most highly the unchanging survival of a particular cultural form of life.

The core principles seen to be at stake here do have something to do with the figure of the citizen, the member of a culturally diverse public-political community willing and capable of participating in deliberation over and decision about how best to organise collective living arrangements.

What support for this interpretation can be found within the journals? Here we looked at responses to questions about the cultural dimensions of education and the importance of a cultural

understanding for teaching practice, as well as those asking respondents to consider what constitutes the so-called 'good' (in the sense of well-behaved, mature) student. The type of narrative sequence that can be read from these responses both complements that just outlined and moves it forward in several interesting ways.

First we find recognition that order is a necessary or at least unavoidable fact of socio-cultural life, that schools are no exception and that growing up in and into society, a function schools are tasked with overseeing, involves in large part an acceptance of the need for rules.

Education is a way of passing on information and our way of life onto others...the transfer of culture from one person to another...which results in them becoming culturally the same as you.....Information needs to be passed down the generations in order to maintain and continue to develop a functional world.

A culture is defined by the behaviours that are acceptable within a particular society.

I don't think good kids are necessarily more mature, just more aware of the behaviour desired of them.

This is often followed closely by an observation that the task of presenting oneself as 'good' from the perspective of the prevailing order is far easier for some than for others, and that this depends in large part on the degree of fit between the culture of the school and the student's own cultural background.

Obedying rules gets more important to you if they are your rules.

Even though we are said to be a multicultural society, I think that if you are white things come to you a lot easier. People tend to see a person of another race as a troublemaker.

Around this point, however our narrative breaks in two different directions. One develops this account of differences in cultural fit in terms of a deficit view of the cultural background of the maladjusted or difficult student. What is not considered here is the possibility that schools, and the wider social order within which they are embedded and represent, might be unresponsive to cultural and other differences in life-situations, or that the attribution of dysfunctional qualities to difference might itself be symptomatic of a tendency to take the dominant culture as a sort of Archimedean point against which all departures are viewed, by degrees, as somehow pathological.

Good kids fit into the establishment more easily than naughty or disruptive kids as they are different culturally. Good kids have support at home, their parents talk to them on how to behave and understand the rules of the school and the playground.....The disruptive and naughty kid comes from a home with little support or knowledge of the schooling process, their parents would have had a bad experience at school as well as resulting in the child having difficulty understanding the establishment and how to interact with teachers and students.

A second strand did attempt to place the problem of difference in cultural fit, and hence of experiences and outcomes of schooling, in the light of an historical cultural unresponsiveness and inflexibility on the part of teachers, schools and education systems.

Australia's education was originally taught through the eyes of the white Australian. However recently as minorities have become increasingly recognised and their history which was overlooked is now being placed into many of the schools' curriculum.

...the cultural factor in Australian education...has long been based predominantly on 'white' western Christian middle class values. Thus mainstream education in Australia may benefit some students more than others based on cultural values.

What is interesting here, and especially so in view of the following section, is the way these cultural differences are couched in a language wherein culture and the ideas of race and ethnicity are seldom out of each other's sight. Without delving into the mass of scholarship that gather around observations such as these we might surmise that cultural differences that make a difference may be more readily drawn and grasped when appended to ideas of race and ethnicity, those where the lines of division between 'our kind of people' and 'the others' may be represented in a tangible form; skin deep may be made to mean very deep. Other divisions that are routine features of scholarly accounts of social inequality, privilege and disadvantage and so forth, those for instance taking in the categories of class and gender, would seem (though see below) to belong to the past having been put out of business by the corrective workings of equal opportunity law and policy (even if, as the 'what about the boys' debate indicates, this may be seen in some quarters as an overcorrection). These are, of course, divisions that occur within the parameters of 'our kind of people', where there may be a strong temptation to view, given 'we' are seen to inhabit the same socio-cultural worlds, success or failure on individual terms.

Equality, sameness and difference, responsibility and public goods

Under this head we bring together materials that relate directly to specific concerns in the area of social justice and education, equality and inequality, sameness and difference, and those that explore perceptions of the extent and limits of (individual and collective) responsibility as indicated in support or otherwise for education as a public good along with the grounds for this.

Figure 8 suggests that for our cohort (and we need to bear in mind that they are prospective teachers) there is a solid base of support for a well resourced and universally available education system.

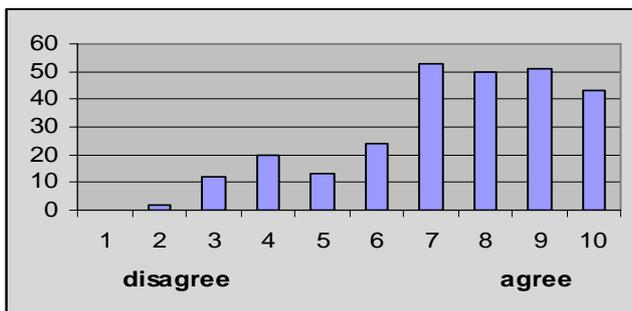


Figure 8: The state should be responsible for the provision of education to all kids (and university students too). But not a minimum education. A maximum education. No private schools. All public schools, but terrific schools

At the same time (see Figure 9) universal is not intended to mean uniform. There is also considerable support for the proposition that this education should be responsive to differences. Difference here is construed in terms consistent with a child-centred approach; that is in terms of individual potentials, needs and desires. We will look at other dimensions of difference below.

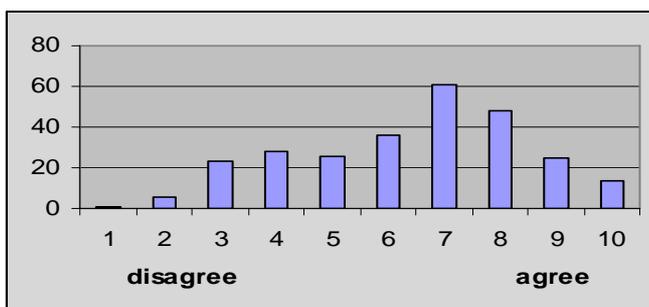


Figure 9: It is the State's duty to allow for the identification of each child's potential and the provision of appropriate education

Moreover this support would seem to be for education as a public good, one that serves all, not just those who have paid, or paid the most, for it. As Figure 10 indicates there seems to be little confidence in letting the marketplace determine the type of education system that should obtain.

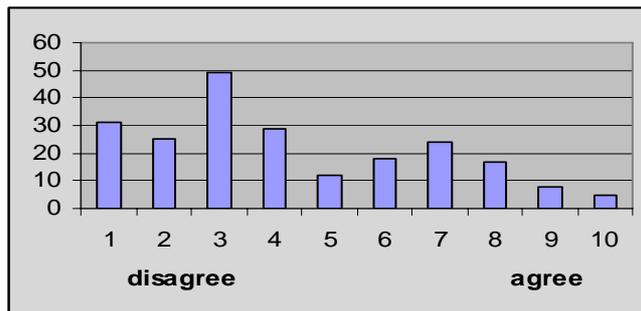


Figure 10: The State should provide for the same basic education for all, and if the family wants anything extra they can arrange for it and pay for it

Turning once more to the journal reflections we can elaborate further on these views. Here we have placed respondents' observations under sub-headings to assist in drawing out specific themes.

Class inequalities

When pressed our respondents found little difficulty acknowledging the possibility that the existing distribution of material and cultural resources along with power can work to ease or retard the passage of students through schooling. We need to be mindful here that this may be as much an artefact of their having been exposed to the idea of class as a part of their program of studies (as evidenced in the use of terms such as 'cultural capital') as it is a reflection of the schemes they routinely use to organise their perceptions and experiences of the world. Beyond a rather loose and vague reference to the 'middle class' or, less so, 'working class' when asked to identify in such terms, there is little across the body of journal reflections to suggest that class occupies an important place in their systems of identification.

For many it is the distinction between public and private schools that best allows them to grasp and describe the relation between class inequalities and schooling.

Schools are separated into three categories...public schools, catholic schools and independent.....Most families on low income or multiple children have very limited choice about what schools they can send their children to.....Even between public schools, which are supposed to be equal as they are run by the same government, they are divided. This division is done by the suburbs they are situated in, how much the parents earn that send their children there.....Some also present their schools to be imposing to newcomers and give the opinion they are exclusive.

Others noted the effects of low family incomes on the ability to meet the financial demands of schooling while a few pursued this further into a discussion of cultural capital.

I have seen school teachers set work that is impossible for disadvantaged and low income families to complete. Not all students have access to the internet at home so it would be inappropriate to set homework that requires that type of research.Monetary requirements in a school outside of traditional school fees are also out of reach for some students.

Meritocratic and deficit views

This willingness to grapple with the idea of class needs, however, to be balanced against a strong meritocratic bias within respondents' accounts of the determinants of educational outcomes. When asked what they considered to be the main factors influencing success or failure at school

most nominated hard work and talent, quite often with a glance in the direction of social circumstances though seeing these as being readily able to be offset through a bit of extra effort.

..a student's educational achievement is most likely affected by hard work and individual talent. All students start off with the same potential and with hard work and individual talent, students need to use both (to get) excellent results....However...a student's circumstances within a community may mean that they may not have all the same opportunities as others. Despite this many students, in the past, have risen above the social standing to achieve top results.

On those occasions where a student's social circumstances were accorded a higher priority we found a recurrence of tendencies mentioned earlier; a deficit (individual or family) view of disadvantage and the treatment of cultural disparities between home and school in keeping with an ethnic or race conception of culture.

Social circumstances may govern the way a student learns but it is not the sole factor of achievement or failure. A student with a hard background may have other things to consider.... (eg looking after siblings while parents work).... before learning... (so that).... schooling becomes a lower priority. On the other hand a student from a middle class or upper class family has more resources and opportunities to study and therefore achieve....Those of lower class or different backgrounds may decide to work hard and achieve in school so they can create more opportunities for themselves and their families.

...to achieve a high standard of work you need to push yourself and work hard. In saying that though many people are disadvantaged by their social circumstances and by this I mostly mean their parents, upbringing and life at home. Children may be from a wealthy background of highly educated parents who have pushed them to do well and taught them and helped them with their schooling...On the other hand children may come from a non-English speaking background, which already disadvantages them, or they may have parents that don't have much of an education and so haven't been pushed and helped with any education.

What is noticeably absent across nearly all responses to this question is any consideration of the possibility that socio-cultural advantages and disadvantages might be systematically related through the way society organises the production and distribution of material and symbolic goods. Once again this should not surprise. As already observed most students identified, when pressed, as middle class and saw their educational experiences enhanced by attending schools where the majority of their associates (staff as well as students) shared roughly the same circumstances and outlook as themselves. If one's primary reference group is made up of people just like you then it is not difficult to arrive at the conclusion that it is effort and native talent that separates the successes from the failures.

Positive discrimination

Many respondents did nevertheless support some form of positive discrimination, though once again this support tended to be referenced against an idea of cultural difference as ethnic or racial differences.

I can't see a good reason not to. Scholarships are generally given on merit, and for people from disadvantaged groups lacking financial resources can make all the difference. It's hard to stay afloat in someone else's culture, and it's hard to keep up when you're starting from behind.

Some took the view that if disadvantages had a significant cultural component then something more than just monetary assistance was required.

I believe disadvantaged groups should receive assistance to give them greater opportunities to gain education. However scholarships are of no use if teaching practices and pedagogies do not meet their specific needs culturally, academically and socially.

Among the more interesting responses here took what is effectively a conservative position towards equality, namely equality as identical treatment.

No more than any other citizen is entitled to. A balance needs to be maintained as some groups that society considers disadvantaged may be very offended if it was suggested that they were unable to cope and given handouts.

This is interesting in that by raising the issue of potential stigmatisation it opens out to a central issue confronting those working in the field of social justice within an individualised culture; that is, the way the term dependency, having been progressively denuded of any positive or even neutral connotations it might once have held, being now understood in entirely negative terms (welfare beneficiaries, drug addicts or co-dependent partners all being seen as suffering from character defects).

Welfare or work

The final set of reflections in this study respond to the proposition, “Those who are able to work and refuse the opportunity should not expect society’s support”. This proposition quite brutally pushes tolerance for difference and an awareness of the high costs of staying different, collective as against individual responsibility, and even a commitment to individual fulfilment to their limits. In the majority of responses these limits were unequivocally declared.

I think that people who choose not to work and who are able to should not expect society’s support...I don’t think you can use cultural background as an excuse for not working if you are living in Australia.

If there is a job there and they need a job, as unfortunate as the situation may be they should take it. For who is to say that if they take that job and work hard they may be able to rise up through the ranks ..to a position they are more comfortable with.

If too many people...start to refuse work our societies structure may not be able to hold.

Yet a small, but significant number opposed the proposition. For some it was a matter of striking a balance between competing values.

I was raised to believe that you need to earn things in life, not just expect it ...On the other hand I was brought up with the value that we need to help others as well...those who need it.

Others, often drawing anecdotally on their own experiences or those of familiar others, criticised the proposition for being too harsh and allowing stereotypes to eclipse empathy.

I have heard stories from already working mothers being told to work more, to pregnant women being told to look for work right up until the baby drops.

....people seem to have a particular stereotype in mind...uneducated or poorly, no culture etc. This is not always the case...consider this case: a migrant, 50 years of age, OK English ability but not perfectly fluent...His job in his country of origin was a prestigious one, which relied on his university professor-level education, his superb talent in his native language....and his network of friends, peers and connections. In Australia, the only work that is guaranteed to him is a factory job, which pays less than the equivalent of his welfare benefits.

Perhaps the most compelling negative response worked between the lines of a commitment to fulfilling individual potential and the wellbeing of society as a whole.

...putting a person in an underpaid, overworked, uninteresting job will not do much for society. Their self-esteem would suffer as well as mental health and confidence. A dissatisfied, apathetic dysfunctional workforce does not seem appealing.....The use of safety nets as in unemployment benefits is crucial not just to the health of the non-working person, but a safety net for society itself...For a person refusing to work may be lazy and should not expect support, but the inability to survive in society without resorting to crime is apparent. The costs to society in mental healthcare, increased crime rates, and flow down effects onto children are insurmountable.

CONCLUSIONS

In this article we have described some of the ways that students conceive teaching and education and its place in Australian society. This has presented, at least implicitly, a particular set of dispositions to social justice.

In this article we have drawn upon journal responses, and Likert scale propositions to questions about teaching and broader social life from a large compulsory first year pre-service teacher topic. We have argued that a particular kind of (nice) liberalism is the dominant ideological form for this cohort, even as the students express different variations and contradictions within the broad ideology of liberalism. The ideas they express and the ways they position themselves nevertheless reflect the individualistic commitments of classical and contemporary liberalism.

A key point of focus in considering these journal responses was the way in which the students negotiated the tension between society and the individual. The journal responses help illuminate the way in which liberal ideology struggles to reach an adequate understanding of this dynamic and of the social more generally. The effect of this is to decontextualise social issues, by locating the individual as the agent of action within highly impoverished conceptions of 'the social'.

This is particularly evident through the way that the students think of equality. Equality is also hamstrung by its conception of sameness and difference. Students recognise that different students have different needs, but express the view that this difference should be managed by striving to treat each student the same. This is an instrumentalist notion of equality which is supported by the broader liberal ideals of personal responsibility, possessive individualism and the split between individual and society.

In this article we were interested in enhancing our understanding of prospective teachers' perspectives of teaching in order to enhance our own teaching. We have come to understand that the tensions between various dialectical concepts central to teaching, social justice and Western culture have a limiting effect upon the pre-service teacher's capacity to manage diversity and contradiction. This is effected by an overriding concern with the individual, an impoverished notion of the social dictated by a logic of thinking and being that is highly instrumentalist, as opposed to relational. The aims of challenging this ideological form involve developing more sophisticated notions of the social, the relationship between the individual and society, the development of reflexive practices and the exposure to relational ways of thinking about teaching, the social and social justice.

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Family, learning environments, learning approaches, and student outcomes in a Malaysian private university

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This article presents the quantitative findings from a mixed methods study of students and faculty at a private medical university in Malaysia. In particular, the relationships among students' individual characteristics, general self-efficacy, family context, university and classroom learning environments, curriculum, approaches to learning, and measures of students' academic achievement, self-directed learning readiness and mental health at the student level. Data were collected from 392 students attending a private medical university in Malaysia. The findings from the partial least square path analysis (PLSPATH) suggest that: (a) parental involvement continues to impact and influence student learning process, and related student outcomes, at the university level, and (b) a surface approach to learning is related to poor quality processes and outcomes and a deep approach to learning is related to high quality processes and outcomes.

Family, learning environments, learning approaches, higher education, student outcomes

INTRODUCTION

In the context of a changing world and striving to remain competitive, Malaysia initiated major changes to the higher education system (Zakaria, 2000). The impetus to the changes in higher education was the Malaysian government's strategic initiative *Wawasan 2020*, referred to here as 'Vision 2020'. Vision 2020 was initiated in 1991 to achieve the status of an industrialised and developed country in terms of its economy, national unity, social cohesion, social justice, political stability, system of government, quality of life, social and spiritual values, national pride and confidence (Mahatir, 1991). Under Vision 2020, education was positioned as the key engine to drive the nation from an economy based on labour-intensive and lower-end manufactured products to an economy based on knowledge by the year 2020.

From 1997 on, Malaysian higher education, which was once a closed system with only a few public universities has been transformed to an education landscape where private education, in particular private higher education among the ethnic groups, is thriving and strongly encouraged by the government (Lee, 1999; Zakaria, 2000). In 1997, there were only a total of 1,508 private educational institutions established (Zakaria, 2000). As of September 30, 2003, there were 531,099 students enrolled in 5,851 private educational institutions, of which 539 were private higher educational institutions, with 294,600 students enrolled and a teaching force of 14,346 teachers (Department of Private Education, 2003). The Malaysian private higher education

enterprise is set to grow further, as it aims to be a centre of educational excellence in the region (Lee, 1999; Rao, 1997).

However, these private higher educational institutions are perceived by the public at large as being 'for-revenue' or 'profit' institutions, in that the private sector tends mainly to offer programs that have high private benefits (profits) but fewer social benefits (Wilkinson & Yussof, 2005). This perception gives rise to another related public perception that 'poor quality education' is being provided by the private higher educational institutions compared to those provided by the public universities (Wilkinson & Yussof, 2005). This related perception may be further entrenched in the minds of the public at large due to the early years after independence in 1957, where the private sector education in Malaysia had merely catered for so-called 'dropouts' or provided language and religious education for minority groups (Wilkinson & Yussof, 2005).

In order to ensure quality education, all private higher educational institutions, in addition to having to register with and be approved by the Ministry of Education, must abide by the Parliament Acts such as the *Private Higher Educational Institutional Act 1996* and the *Education Act 1996*. In addition, the government of Malaysia established the National Accreditation Board (NAB) regulated under The National Accreditation Board Act 1996, as a national quality assurance agency responsible for governing the standard and quality of courses offered by the private higher educational institutions. These measures assist to reduce the negative perceptions that the quality of teaching and learning in private higher education is inferior and comprised of inferior learning contexts for dropouts.

While it is clear that private higher education will remain as a permanent feature in the Malaysian education landscape under the auspices of Vision 2020, if private higher education is to gain greater status and standing in society, there is a critical need to consider and understand the learning environments that can foster the aims of the nation. What then are the contextual factors of a learning environment that can enhance students' learning, in particular, how they approach their learning in a meaningful way? In particular, what are the learning environments that may influence related outcomes such as the intellectual capacity, well-being, and lifelong learning capacity of a student? Lastly, how do the learning environments influence student learning and outcomes?

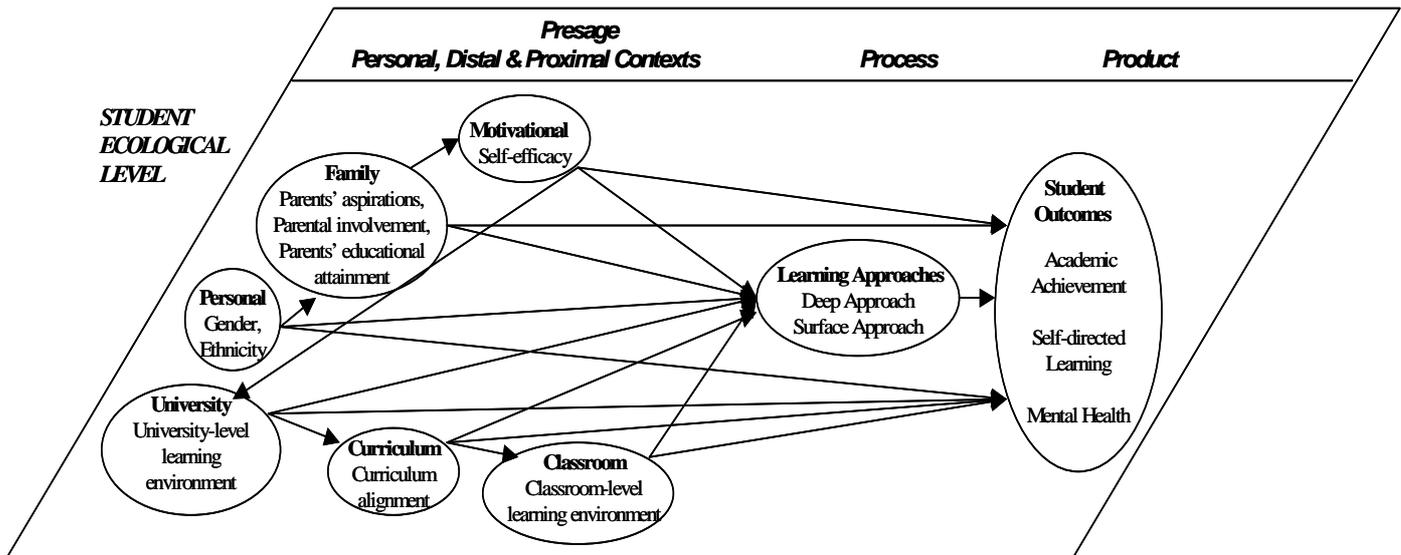
THEORETICAL MODEL FOR ANALYSIS

The study discussed in this paper was guided by Kek's (2006) proposed two-level theoretical framework which examined the student and teacher ecological systems and their influences on student learning and outcomes in higher education. The framework integrated constructs from three different but complementary fields of learning environments, approaches to learning and approaches to teaching. The theoretical base was drawn from the theories and theoretical frameworks of Bronfenbrenner's (1979) Ecological Theory of Human Development, Bronfenbrenner and Ceci's Bio-Ecological Model of Human Development (Bronfenbrenner & Ceci, 1994), Biggs' 3 P Model of Learning (2003), and Prosser, Ramsden, Trigwell and Martin's Model of Teaching (2003).

For the purpose of this paper, only the student level of the proposed two-level theoretical framework, depicted in Figure 1 is discussed. See Kek (2006) for full details of the theoretical base and theoretical framework.

Student Ecological Level

Bronfenbrenner's Human Development and Bio-Ecological (1979; 1994), and Biggs' 3 P (2003) concepts are applied to depict the interconnections between students' individual characteristics, the distal or more remote and proximal or immediate contextual factors (presage), approaches to learning (process) and outcomes (products) in higher education at the students' interrelated ecological level.



Source: Applied from Bronfenbrenner's Theory of Human Development (1979) and Bronfenbrenner & Ceci's Bio-Ecological Model of Human Development (1994), Adapted from Biggs' 3P Model of Learning (2003, p. 19)

Figure 1. Theoretical model for analysis – Student level

The theoretical model proposes that the proximal contexts are composed of the immediate learning contexts where teaching and learning occurs. The proximal contexts are the curriculum (perceptions of the curriculum alignment) and classroom-level learning environment (perceptions of the classroom-level learning environment). The distal contexts are the family context (parents' aspirations, parents' educational attainment and parental involvement), self-efficacy (general self-efficacy beliefs), and university-level learning environment (perceptions of the university-level learning environment). The distal and proximal contexts, in addition to the individual characteristics (gender and ethnicity) form the proposed presage factors.

The proposed presage factors are also conceptually placed in an orderly sequence. The placement starts with the individual characteristics, and the rest of the presage factors are sequenced from the distal contexts, moving into the proximal contexts. Hence, the sequence of the proposed presage factors is: (a) individual characteristics; (b) family context; (c) self-efficacy; (d) university-level learning environment; (e) curriculum; and (f) classroom-level learning environment.

The proposed presage factors are related to the hypothesised process of students' approaches to learning (a deep or surface approach to learning), which in turn are related to the products. Approach to learning refers to the processes adopted during learning, which directly determine the outcome of learning and predisposition to adopt particular processes (Biggs, 2001). Broadly, the two ways of relating to learning have become known as surface and deep learning approaches to learning. According to Biggs (2001), a surface learning approach focused on the extrinsic or external motivation, and used strategies that consumed the least amounts of time and effort to meet the requirements. In contrast, a deep approach to learning in general focused on the intention that was intrinsic in nature or the intention to comprehend, and adopted strategies to maximise conceptual understanding.

The products proposed for this research study are the students' academic achievement, self-directed learning readiness, and mental health outcomes.

Hypothesised Relationships and Influences

In this paper, the relationships among the contextual factors, student learning and a set of student outcomes (academic achievement, self-directed learning readiness, and mental health) at the student level were examined. It is hypothesised that there are direct and mediated relationships

between the students' individual characteristics, distal contexts (family, self-efficacy, university-level learning environment), proximal contexts (curriculum and classroom-level learning environment), learning approaches and academic achievement, self-directed learning, and mental health.

METHOD

The data in this paper were collected from a study that focused on the student and teacher ecological systems and their influences on student learning and outcomes in a private medical university in Malaysia.

Data

Evidence for this paper was derived from questionnaires administered to 475 pre-clinical students, representing three study levels from the International Medical University, Malaysia (IMU) in 2004.

The IMU started as the International Medical College, the first and only private medical college in the Asia Pacific region in 1992, had university status conferred in 1999, and has over 25 prestigious Partner Medical Schools (PMS) worldwide (International Medical University, 2005). Like many private universities in Malaysia, its students are drawn predominantly from the Chinese ethnic group¹. The medical program in Malaysia constitutes the pre-clinical phase where students have to undertake five semesters or 2.5 years of coursework. During the pre-clinical phase, the students learn basic medical sciences, clinical and communication skills, and aspects of medicine applicable to Malaysia. Upon successful completion of the foundation medical sciences, the students complete their medical degrees through clinical studies for another four to six semesters. Students can either complete their clinical studies in Malaysia at one of two IMU clinical schools at Batu Pahat or Seremban for a period of five semesters, and graduate with a MBBS from the IMU, or attend one of the 25 PMS for a period of four to six semesters, and graduate with the medical degree of the selected PMS overseas.

At the IMU, problem-based learning (PBL) was employed in the classrooms. PBL was the main curriculum delivery tool where teachers facilitated student learning in small groups to encourage teamwork, to solve problems, to learn and integrate knowledge acquired using simulated clinical problems, to do self-directed learning and become life-long learners (International Medical University, 2005). Each student at the IMU had to attend small group PBL sessions with a teacher, commonly known as the PBL tutor or facilitator, twice a week for a period of one and a half hours each session. In the PBL sessions or classrooms, the students learnt about medical sciences, and integrated the knowledge acquired through simulated clinical problems, known as the "PBL triggers" (International Medical University, 2005).

The final sample was: 179 students from 17 PBL classrooms in study level 1/ semester 1; 173 students from 16 PBL classrooms in study level 2/ semester 4; and 123 students from 11 PBL classrooms in study level 3/ semester 5. A 82.5 per cent response rate was obtained, with questionnaires received from a total of 392 students: 165 students in study level 1/ semester 1; 140 students in study level 2/ semester 4; and 87 students in study level 3/ semester 5. The response rates for semesters 1, 4 and 5 were 92.2 per cent, 80.9 per cent, and 70.7 per cent, respectively. From the final student sample, 43.4 per cent was male, and 56.6 per cent was female. The ethnic composition of the sample was 72.2 per cent Chinese, 15.8 per cent Malay, 10.7 per cent Indian, and 1.3 per cent Others. The average age of the students was 20.3 years old.

¹ Malaysia is a plural society. The 2000 Census reports the population of Malaysia to be 23.27 million and with an ethnic composition of 65.1% Bumiputera*, 26% Chinese, 7.7% Indian, and 1.2% Others (which include Eurasians, Sri Lankans and other communities) (Department of Statistics, 2000). *Bumiputera means "native of the soil". This term is used to include the Malays and other indigenous tribes such as the Ibans in Sarawak and the Kadazan Dusun and Bajau in Sabah.

Partial Least Path Analysis (PLSPATH)

The aim in using path analysis was to surpass correlation as mere association but to direct analyses towards the examination and confirmation of specified causal relationships between variables. Keeves (1988, p.724) suggested that the use of path analysis made it possible for educational researchers “to shift from verbal statements of a complex set of interrelationships between variables to more precise mathematical ones and to estimate the magnitude of the causal links involved.” In this study, the purpose was to identify the pattern of relationships between students’ individual characteristics (gender and ethnicity), parents’ educational attainment, parents’ aspirations, parental involvement, general self-efficacy, university-level learning environment, curriculum, classroom-level learning environment, learning approaches (deep and surface learning approaches), and academic achievement, mental health, and self-directed learning readiness outcomes.

The PLSPATH program was selected for this study because the technique has proved to be flexible and robust in testing complex models, did not require rigorous distributional assumptions of variables, accepted categorical and dichotomous variables, and recognised the use of complex cluster sample designs in data as is the case with this study (Sellin & Keeves, 1997). In addition, the PLSPATH program was appropriate for investigating complex models in an exploratory rather than a confirmatory fashion (Sellin, 1995, p.256). Although the approach is flexible, Sellin and Keeves (1997) argue that the PLSPATH program should not be seen to be exploratory and lacking in rigour because the PLSPATH program demands the development of a well-specified model for examination and estimation.

Therefore, the PLSPATH program was used to examine and estimate the direct and mediated relationships of the individual characteristics, family context, general self-efficacy, university and classroom learning environments, curriculum, learning approaches and outcomes at the student level. Separate analyses were also conducted for each study level in order to examine the constancy of measures across study levels through the use of replication (Sellin & Keeves, 1997, p.634). In this way, a further examination of development across study levels was enabled.

However, for this paper, only the final path result of the total student sample (n= 392) is presented and discussed.

Methodological Issues

The PLSPATH program is based on the partial least squares procedure (PLS) introduced by Wold (1985) as a method to maximise prediction and explanation of path models. The PLS procedure is conceptually related to principal component analysis, canonical correlation analysis, and regression analysis. According to Sellin (1995, p. 266), the PLS procedure is a “flexible and extremely powerful technique for the examination of path models with latent constructs measured by multiple indicators.”

A PLSPATH model is formally defined by two sets of linear equations, termed the inner model and the outer model (Sellin, 1995). The inner model refers to the relationships between unobserved or latent variables (LVs). The outer model refers to the relationships between LVs and their associated observed or manifest variables (MVs).

There are two types of relationships between LVs and their associated MVs (Edwards & Bagozzi, 2000; Sellin & Keeves, 1997). The first type is where the constructs (LVs) are viewed as the causes of measures and they are referred to as ‘reflective’ or manifestations of a construct. That is, variation in a construct (LV) leads to variation in its measures. Arrows are drawn from the LV to MVs or known as the outward mode arrows to indicate this type of reflective relationships. The second type is where the measures are viewed as causes of constructs and they are referred to as ‘formative’. That is, the construct is formed from the measures. Arrows are drawn from the MVs to the LV or known as the inward mode arrows to depict this type of formative relationships.

A number of indices are used to determine the strength of the relationships between the MVs and LVs. The most common indicator of the relationship is the loading, with other indices such as weight also being used (Sellin, 1989). To be effective, loadings should be reported where the outward mode is used, and weights should be reported where the inward mode is used (Sellin & Keeves, 1997).

The PLS procedure works by calculating an estimate for each LV, which is obtained from the corresponding MVs, thus, partitioning the hypothesised inner model into its component constructs. The PLSPATH program is iteratively processed until all the estimates are found to be stable. In this way, the relationships between LVs in the path model or the inner model signify the causal relationships between the LVs. The causal relationships are indicated by unidirectional arrows from the determining variables to the dependent variable, whereas determining variables which do not depend on any other variables are referred to as exogenous variables and are not indicated by any unidirectional arrows pointing toward the variable (Tuijnman & Keeves, 1997).

Data Preparation

Prior to modelling with the PLSPATH Version 3.01 program, data screening was undertaken to identify variables for missing data in excess of 20 percent (Keeves, 1997), so that these variables are omitted for effective analyses. The missing data are recommended to be replaced by assigning means (Sellin, 1989, p. 47). In this study, there were 12 cases or 3.8 percent missing data from the academic achievement variable, which were subsequently replaced with the mean.

The next step was evaluating the direction of the relationships of the MVs and LVs by examining either the factor loadings or correlations between the variables. The examination of the factor loadings, shown in Table 1 indicated that the directions between MVs and LVs used in the study were in the outward mode, with the exception of the university-level learning environment, which was in an inward mode due to the low correlation coefficients.

Table 1. Directions of relationships between MVs and LVs

Latent Variable (LV)	Manifest Variable (MV)	Zero-order Correlation (r)	Factor Loading	Direction between MV and LV
Family capital	Mothers' involvement	0.67**		Outward
	Fathers' involvement			
Parent aspirations	Parent aspiration for program	0.44**		Outward
	Parent aspiration for education			
University-level learning environment	Sense of membership	0.13*		Inward
	Peer support			
Deep approach to learning	Deep motive	0.65**		Outward
	Deep strategy			
Surface approach to learning	Surface motive	0.72**		Outward
	Surface strategy			
Classroom-level environment	Personal relevance		0.66	Outward
	Uncertainty		0.38	
	Critical voice		0.80	
	Shared control		0.75	
	Student negotiation		0.67	

* p < 0.05, ** p < 0.01

Model Building, Refinement and Evaluation

Falk (1987) suggested that the best way to start model building using the PLSPATH was by drawing a path diagram of the data analysis to be undertaken. All LVs and their associated MVs were defined in the input file in such a manner that they were all systematically ordered.

In refining the model, two approaches were used. The first approach was to use the jackknifing method (Sellin, 1989). This method examines the effects that elimination of a variable has on the model parameter estimates. Sellin (1989) suggested that a path coefficient (betas) of 0.07 or

greater was considered to be significant in large samples or 0.10 for small samples. Darmawan (2003) further recommended that the path coefficient (betas), and corresponding weight and loading to exceed twice the corresponding jackknife estimate of the standard error at a 95 per cent confidence interval. For noteworthy paths, the path coefficient, and corresponding weight and loadings may be above 1.68 jackknife estimate of the standard error at a 90 per cent confidence interval.

The second approach was the use of minimal values for loading, weight and path coefficient proposed by Sellin and Keeves (1997). For the outer model, a weight of 0.10 is the minimum value for inward mode, and a loading of 0.30 is the minimum value for outward mode. For the inner model, a path coefficient minimum value of 0.05 to 0.10 is acceptable. In this manner, paths with a loading, weight and path coefficient smaller than the minimal values were removed from the model and only those paths were retained which contributed substantially to explaining a dependent LV.

In addition to examining point estimates such as loadings, weights, and inner model coefficients, fit indices were also used to indicate the predictive power for model evaluation. The indicators obtained from PLSPATH analysis, namely R^2 and jackknife standard error estimates are commonly used (Sellin & Keeves, 1997). The R^2 value represents the amount of variance explained in each endogenous LV. It indicates the predictive strength of the inner model relationships. Jackknife estimates of standard errors provided in brackets in all the paths, together with the loadings, is indicative that all the estimates are substantial when considering the jackknife rule of thumb for refining models.

In order to evaluate the noteworthiness of specific LVs, the factor loadings (l) of the MVs, which reflect the specific LVs, can be examined. The size of the factor loading provides an indication of the relative contributions of the different MVs.

The key consideration guiding the development and refinement of the model is parsimony. In this context, parsimony refers to the creation of a model that is meaningful and well-fitting, and that contributes to prediction and explanation of variance (Sellin & Keeves, 1997).

Hypothesised Path Model

Figure 2 presents the hypothesised model derived from the theoretical model for analysis. In Figure 2, the MVs and LVs used in the model are also indicated, with MVs represented with small rectangular boxes, while the rounded rectangular boxes represented the LVs or constructs derived from the MVs. A summary of the MVs and LVs used is provided in Table 2.

The inner model depicted in Figure 2 represented the hypothesised relationships between the LVs, in a way that LVs at the left-hand side of the model influenced LVs assigned to the right-hand side in the path. Conversely, the LVs at the far most left (antecedent variables) were not influenced by LVs to the right of the path model. The criterion variables (outcomes) were placed on the furthest right.

From the theoretical model, it was proposed that the presage factors are the students' individual characteristics (gender and ethnicity), distal contexts of family (parents' educational attainment or human capital, parents' aspirations and parental involvement or family capital), self-efficacy (general self-efficacy), university-level learning environment (sense of membership in the university community and sense of peer support), and the proximal contexts of classroom-level learning environment (personal relevance, uncertainty, critical voice, shared control, and student negotiation) and curriculum (curriculum alignment).

The proposed presage factors are related to the hypothesised process of students' approaches to learning, which in turn are related to the products. The products proposed for this research study are the students' academic achievement, self-directed learning readiness, and mental health outcomes.

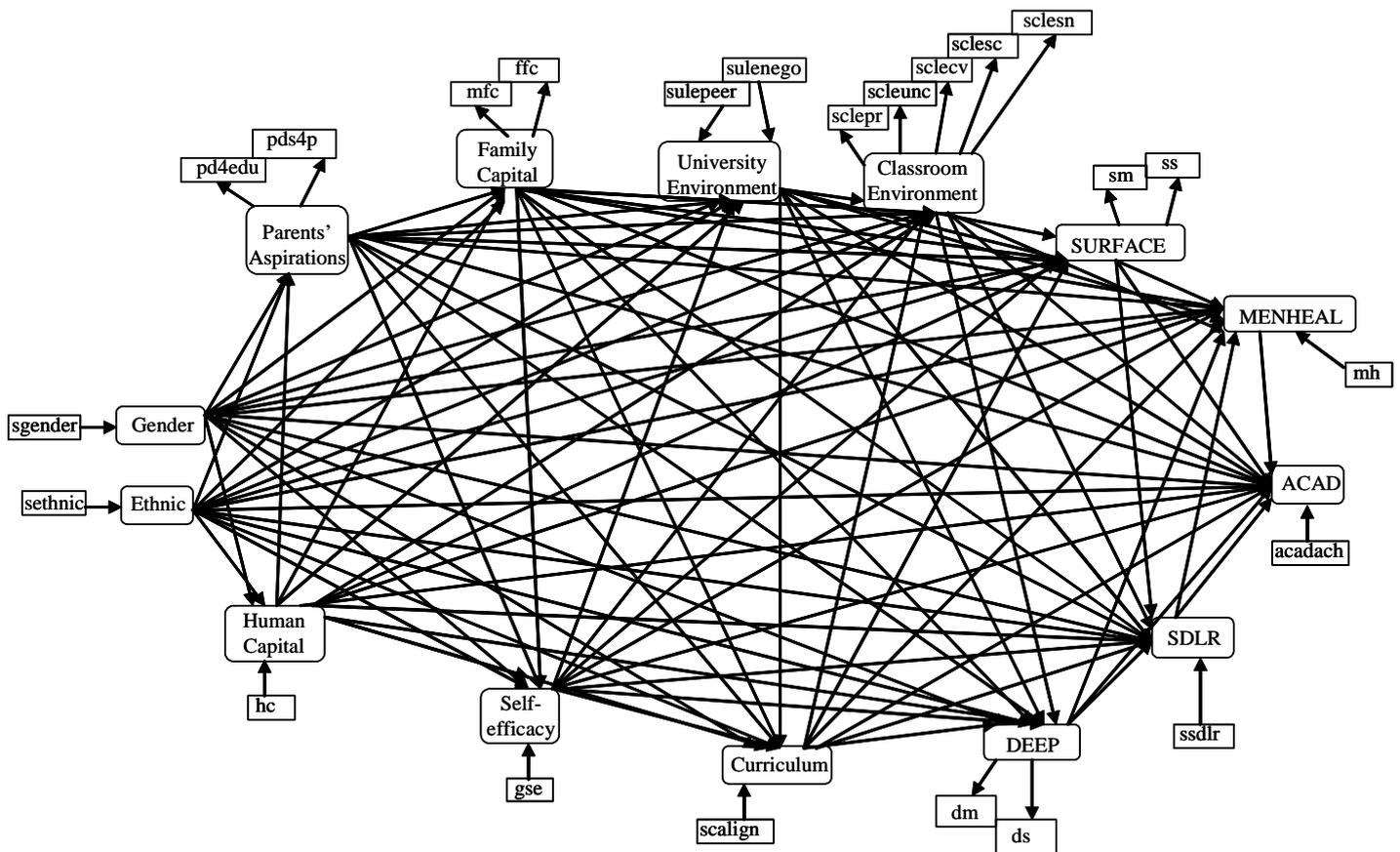


Figure 2. Hypothesised path model of individual characteristics, family context, general self-efficacy, university, classroom, learning approaches and outcomes

For the path analyses, gender and ethnicity are hypothesised as exogenous variables or antecedents, as they are not influenced by other LVs. The remaining presage factors and process are viewed as endogenous because they mediate the effects, or are influenced by other LVs.

The criterion variables are the product factors: academic achievement, self-directed learning readiness, and mental health. For path modelling, self-directed learning readiness and mental health are also hypothesised as the LVs influencing the final criterion variable of academic achievement. It is coherent to posit that students with high self-directed readiness scores, armed with the necessary knowledge and information, would be less stressed mentally and achieve good academic results.

Final Path Models

The patterns of relationships between the students’ individual characteristics (gender and ethnicity), distal contexts of family (parents’ aspirations, parents’ educational attainment or human capital, and parental involvement or family capital), self-efficacy (general self-efficacy), university-level learning environment (sense of membership and sense of peer support), the classroom-level learning environment (personal relevance, uncertainty, critical voice, shared control, and student negotiation), curriculum (curriculum alignment), learning approaches (deep and surface learning approaches), and outcomes (self-directed learning readiness, mental health, and academic achievement) are examined.

The final path model for the total student sample shows their respective patterns of relationships of both outer and inner models. The information in each model represents the following:

Outer model (MVs): Factor loading or weights of outward or inward modes

Inner model (LVs): The causal paths with standardised path coefficients or beta, and jackknife estimates of standard error in brackets

Residuals: Represented in circles, are given by $\sqrt{(1-R^2)}$

Table 2. Summary of variables in path models

Theoretical Dimensions	Latent Variables	Manifest Variables	Description
<i>Presage</i>			
Individual characteristics	Gender	sgender	1= Male, 0= Female
	Ethnic	sethnic	1= Chinese, 0= Others
Family Context	Human Capital	hc	Parents' highest educational attainment levels
	Parents' Aspiration	pds4p	Perceived parents' desire for success in medical program: 1= Parents, 0= Others
		pd4edu	Perceived parents' desire for success in education: 1= Parents, 0= Others
	Family Capital ²	mfc	Perceived mothers' involvement in studies
ffc		Perceived fathers' involvement in studies	
Self-efficacy	General self-efficacy	gse	Perceived general self-efficacy beliefs
University Context	University Environment	sulepeer	Perceived university-level learning environment on the scale of peer support
		sulenego	Perceived university-level learning environment on the scale of sense of membership
Classroom Context	Curriculum	scalign	Perceived alignment of curriculum
		sclerpr	Perceived classroom-level learning environment on the scale of personal relevance
	Classroom Environment	scleunc	Perceived classroom-level learning environment on the scale of uncertainty
		sclcev	Perceived classroom-level learning environment on the scale of critical value
		sclesc	Perceived classroom-level learning environment on the scale of shared control
		sclesn	Perceived classroom-level learning environment on the scale of student negotiation
<i>Process</i>			
Learning Approaches	DEEP	dm	Deep learning approach on the scale of deep motives
		ds	Deep learning approach on the scale of deep strategies
	SURFACE	sm	Surface learning approach on the scale of surface motives
		ss	Surface learning approach on the scale of surface strategies
<i>Product</i>			
Outcomes	SDLR	ssdlr	Scores on self-directed learning readiness
	MENHEAL	mh	Scores on mental health (High = Poor Mental Health, Low= Good Mental Health)
	ACAD	acadach	Grades based on the university's 4-point grade system

For this study, the causal relationships between the LVs, that is, the inner models are of interest. The inner models results where the direct effect, total effect, and R^2 for each inner model equation are presented in Table 3. As mentioned earlier, only the results of the total student sample are presented and discussed in this paper.

FINDINGS

The following section presents the patterns of relationships of students' individual characteristics (gender and ethnicity), parents' educational attainment, parents' aspirations, parental involvement, general self-efficacy, university-level learning environment, curriculum, classroom-level learning environment, for each learning approach and outcome, of the total student sample.

² In the validation of the Family Capital instrument, one factor component was extracted to represent parental involvement measure. In the path analysis, this measure was re-assigned to form mothers' involvement and fathers' involvement, to indicate the differences in the involvement between mothers and fathers.

Table 3. Summary of direct and total effects for inner models

Latent Variables	Total Student Sample (N= 392)		R ²
	Direct	Total	
<i>Human Capital</i>			.04
Gender	-0.11	-0.11	
Ethnic	-0.14	-0.14	
<i>Parents' Aspirations</i>			.05
Gender	-0.21	-0.19	
Human capital	-0.13	-0.13	
<i>Family Capital</i>			.18
Gender			
Ethnic	-0.34	-0.36	
Human capital	0.21	0.21	
<i>General self-efficacy</i>			.04
Gender	0.13	0.13	
Family capital	0.16	0.16	
<i>University Environment</i>			.22
Gender	-0.15	-0.12	
Ethnic			
Parents' aspirations			
Family capital	0.24	0.30	
General self-efficacy	0.34	0.34	
<i>Curriculum</i>			.15
Gender			
Human capital	-0.12	-0.09	
Family capital			
General self-efficacy			
University	0.38	0.38	
<i>Classroom Environment</i>			.41
Gender			
Human capital			
Family capital	0.24	0.39	
General self-efficacy	0.23	0.35	
University	0.28	0.35	
Curriculum	0.20	0.20	
<i>Deep Approach</i>			.28
Ethnic			
Human capital	-0.12	-0.06	
Family capital	0.11	0.27	
General self-efficacy	0.26	0.37	
Classroom	0.32	0.32	
<i>Surface Approach</i>			.08
Gender	0.23	0.24	
Ethnic	-0.15	-0.14	
Human capital			
University	-0.13	-0.13	
Curriculum			
<i>Self-directed Learning Readiness</i>			.53
Gender			
Ethnic			
Family capital	0.09	0.31	
General self-efficacy	0.39	0.57	
University	0.18	0.26	
Classroom	0.10	0.17	
Deep approach	0.25	0.25	
Surface approach	-0.11	-0.11	
<i>Mental Health</i>			.18
Gender			
Parents' aspirations	-0.09	-0.09	
General self-efficacy	-0.17	-0.31	
University			
Curriculum			
Surface approach	0.15	0.18	
Self-directed learning readiness	-0.24	-0.24	
<i>Academic Achievement</i>			.08
Gender			
Ethnic	0.27	0.28	
University			
Deep approach			
Surface approach	-0.10	-0.10	

control ($f = 0.77$) and student negotiation ($f = 0.70$) largely contributed to a student adopting deep approaches to learning.

That is, a student was more likely to employ deep approaches to learning when the classroom learning environment was relevant to the students (personal relevance), fostered expression of opinions about the teacher (critical voice), encouraged active participation to question, explained, justified and evaluated ideas (shared control), and allowed assessment of new ideas (student negotiation).

In addition, another factor with sizeable total effect in influencing deep approaches to learning was general self-efficacy (direct effect= 0.26, total effect= 0.37). The students who had employed deep approaches to learning were highly self-efficacious.

The negative sign between parents' educational attainment or human capital (direct effect= -0.12, total effect= -0.06) and a deep learning approach suggested that students from families whose parents were not highly educated were more likely to employ deep learning approaches. However, the parents' low educational attainment were compensated for by parental involvement or family capital (direct effect= 0.11, total effect= 0.27), having a positive influence on a deep approach to learning. This finding indicated the importance of parental involvement in influencing students' adoption of deep approaches to learning in university study. An active involvement from parents in showing interest and support in their children's university studies influences how the students approached learning in higher education.

Examination of the Indirect Effects

Table 3 shows the result of the indirect effects (total effects minus direct effects) of the LVs found to influence a deep approach to learning. The strongest LV of classroom-level learning environment revealed only a direct effect (0.32) on a deep approach to learning. The other three LVs revealed both direct and indirect effects on a deep approach to learning: general self-efficacy (direct effect= 0.26, indirect effect= 0.11), parents' educational attainment or human capital (direct effect= -0.12, indirect= 0.05), and parental involvement or family capital (direct effect= 0.11, indirect effect= 0.16).

Of these variables, parental involvement or family capital's indirect effect of 0.16 was of sizeable significance and a critical indirect factor in influencing a student to adopt deep approaches to learning. The indirect effect of family capital was larger than its direct effect. That is, in addition to having a direct effect on a deep approach to learning, family capital critically influenced a student adopting a deep approach to learning indirectly through the following mediating paths, indicated in Figure 3 through:

- (a) general self-efficacy,
- (b) university and classroom,
- (c) university, curriculum and classroom,
- (d) general self-efficacy and classroom,
- (e) general self-efficacy, university and classroom.

This finding revealed that the distal family context, in particular parental involvement, continued to play an important role in university education, both directly and indirectly. In this study, the path analysis showed that parental involvement was significant in influencing the adoption of deep approaches to learning, directly and more importantly indirectly. In other words, students who had come from families with high parental involvement were more confident, and reported the adoption of deep approaches to learning when they were in the university environment. In addition, when these students perceived that they had good peer support in the university environment (the factor loading of MV, peer support $f = 0.83$, in comparison to the sense of membership $f = 0.46$), they reported employing deep approaches to learning. This finding suggested that students who engaged in informal collaborative learning or informal group learning were more likely to adopt deep approaches to learning.

In summary, the path analyses for a deep approach to learning indicated that in a home environment with high parental involvement, students were more likely to adopt deep approaches to learning. When the students were in a formal learning context, the tendency to adopt a deep approach to learning depended on their perceptions of the classroom and university learning environments. Students employed deep approaches to learning when the classroom learning environment was perceived to be relevant to them (personal relevance), fostered expression of opinions about the teacher (critical voice), encouraged active participation among them to question, explain, justify and evaluate ideas (shared control), and allowed the assessment of new ideas (student negotiation). In addition, students tended to employ deep approaches to learning when they perceived that there was peer support in the university community (university-level learning environment).

Surface Approach to Learning

From Table 3 and Figure 3, three LVs were identified to have an impact on surface learning approach, namely gender ($\beta = 0.23$), ethnic ($\beta = -0.15$) and university environment ($\beta = -0.13$). The results indicated that being male was the most significant and critical factor in the adoption of a surface learning approach. The negative sign observed for ethnicity revealed that the non-Chinese students were more prone to employ surface approaches to learning. When the students entered a formal learning context, perceptions of a lack of peer support ($t = 0.80$) in the university environment influenced them to employ a surface learning approach.

The indirect effect of gender was 0.02, operating positively through the university environment. While the indirect effect of ethnicity was 0.01, operating positively through parental involvement or family capital and university environment, there was no indirect effect for the university environment. These results further indicated that the individual characteristics of gender and ethnicity were stronger contextual influences on the adoption of surface approaches to learning than the instructional contextual factors such as the curriculum and classroom-level learning environment. That is, a student who was male and non-Chinese was more likely to employ surface learning approaches.

In summary, the path results revealed that the individual characteristics of a person such as gender and ethnicity together with a lack of peer support in the university environment, were the significant factors in influencing a student adopting a surface approach to learning.

Self-directed Learning Readiness

Table 3 and Figure 3 show the path analyses for self-directed learning readiness outcome. The path model indicated a R^2 of 0.53 for the total student sample, explaining a substantial 53 percent of the variance of the outcome of self-directed learning readiness in all students. Similar to the case of the deep learning approach, there were a number of LVs that directly and indirectly influenced self-directed learning readiness.

Examination of the Direct Effects

The most significant and critical factor in influencing self-directed learning readiness was the positive and direct effect of general self-efficacy (direct effect = 0.39, total effect = 0.57). This suggests that students who had reported high self-directed learning readiness were highly self-efficacious.

Another factor with a sizeable direct effect was the deep approach to learning (direct effect = 0.25). There was no indirect effect. Students who reported as highly self-directed learners had employed deep approaches to learning.

The positive direct effect from the university-level learning environment (direct effect = 0.18, total effect = -0.26) indicated that students who reported high self-directed learning readiness scores had positive perceptions of the university, specifically in terms of peer support ($t = 0.83$). The

negative direct effect from surface approach to learning was -0.11 , with no indirect effect. That is, students with low self-directed learning readiness scores had reported employing surface approaches to learning. The positive direct effect from the classroom-level learning environment (direct effect= 0.10 , total effect= 0.17) also indicated that students who reported high self-directed learning readiness scores had positive perceptions of the classroom, specifically in terms of personal relevance ($t= 0.65$), critical voice ($t= 0.80$), shared control ($t= 0.77$) and student negotiation ($t= 0.70$).

Lastly, the distal contextual factor that had direct and indirect influences on self-directed learning readiness was parental involvement or family capital (direct effect= 0.09 , total effect= 0.31). That is, students who reported high self-directed learning readiness scores came from families where their parents were highly involved in their studies.

Examination of the Indirect Effects

Table 3 shows the result of direct and indirect effects of the LVs found to influence self-directed learning readiness. Of all these indirect effects, parental involvement or family capital presented the largest indirect effect in influencing a student's self-directed learning readiness level.

The indirect effect of parental involvement or family capital (0.21) was larger than its direct effect (0.09), making parental involvement or family capital a significant indirect factor in influencing self-directed learning readiness. That is, parental involvement or family capital, in addition to having a direct effect, indirectly influenced self-directed learning readiness through 11 mediating paths, shown in Figure 3. The indirect paths operated through the following through:

- (a) general self-efficacy,
- (b) a deep approach to learning,
- (c) university,
- (d) classroom,
- (e) general self-efficacy and a deep approach to learning,
- (f) general self-efficacy and university,
- (g) general self-efficacy and classroom,
- (h) general self-efficacy, university and classroom,
- (i) general self-efficacy, university, classroom and a deep approach to learning,
- (j) university and classroom,
- (k) university, classroom and a deep Approach to Learning.

The indirect effects of family capital revealed that parental involvement or distal family context continued to play a critical role in university education, both directly and indirectly. In this case, parental involvement or family capital was significant in influencing the level of self-directed learning readiness among university students. That is, students who reported high self-directed learning readiness came from families whose parents were highly involved in their studies and consequently, indirectly influenced high levels of general self-efficacy.

In summary, students' high self-directed learning readiness scores were influenced by their parents' high involvement in their university studies, their possession of high general self-efficacy beliefs, their positive perceptions of the university and classroom learning environments, and their adoption of deep approaches to learning.

Mental Health

Table 3 and Figure 3 also show that mental health was influenced by four LVs. The path model indicated a R^2 of 0.18 for the total student sample, explaining a substantial 18 percent variance of mental health outcome in all students.

Examination of the Direct Effects

The factors that directly affected mental health were self-directed learning readiness ($\beta = -0.24$), general self-efficacy ($\beta = -0.17$), surface approach to learning ($\beta = 0.15$) and parents' aspirations ($\beta = -0.09$). The negative signs indicated low mental health scores, which signified good mental health. That is, students who reported good mental health (low mental health scores) were those students who reported high self-directed learning readiness scores, highly self-efficacious and had parents with high aspirations for them to succeed in medicine and education. However, those students who reported poor mental health were those who had employed surface approaches to learning.

Examination of the Indirect Effects

From Table 3, the factor with sizeable total and largest indirect effect was general self-efficacy (total effect = 0.31, indirect effect = 0.14). The remaining factors had trivial indirect effects of 0.00, 0.03, and 0.00 for parents' aspirations, surface approach to learning, and self-directed learning readiness, respectively. As shown in Figure 3, a student's mental health state was influenced directly by general self-efficacy (-0.17), and indirectly (-0.15) operating through the following mediating paths:

- (a) self-directed learning readiness,
- (b) a deep approach to learning and self-directed learning readiness,
- (c) university and self-directed learning readiness,
- (d) classroom and self-directed learning readiness,
- (e) university, classroom, and self-directed learning readiness,
- (f) classroom and a deep approach to learning,
- (g) classroom, a deep approach to learning, and self-directed learning readiness,
- (h) university and a surface approach to learning.

Students, who perceived themselves as highly self-efficacious, supported by peers in the university and in enabling classroom learning contexts, had employed deep approaches to learning and experienced good mental health. In contrast, students who similarly perceived themselves as highly self-efficacious, but encountered a negative university environment, adopted surface approaches to learning and this directly resulted in the student experiencing poor mental health.

In other words, students with high general self-efficacy and perceived supportive university and classroom learning environments, adopted deep approaches to learning and possessed high self-directed learning readiness scores, reported good mental health. In contrast, students with low general self-efficacy, perceived lack of peer support in the university environment and adopted surface approaches to learning, reported poor mental health.

Academic Achievement

Table 3 and Figure 3 show the outcome of academic achievement to be directly affected by two LVs. The larger of the two factors was ethnic (direct effect = 0.27) with a small indirect effect of 0.01. The other factor was the direct and negative sign of a surface approach to learning (direct = -0.10). There was a small indirect effect.

The results indicated that Chinese students had more academic successes than the non-Chinese students. The ethnic background of the students had the biggest, sizeable effect on academic achievement (total effect = 0.28). The small indirect effect (0.01) of ethnicity had operated through the family capital, university environment, and surface approach to learning, with the surface approach to learning directly resulting in low academic achievement.

The path analyses indicated that the students who employed surface approaches to learning, directly resulted in them achieving poor academic outcomes. It was revealed in the earlier path

analyses for a surface approach to learning that a lack of peer support ($t = 0.80$) in the university environment had influenced students to adopt surface learning approaches.

In summary, students who reported low academic achievement were those who employed a surface approach to learning, perceived that there was a lack of peer support and they were more likely to be from a non-Chinese ethnic background. In other words, the path analysis results suggest that a low academic achiever is one who adopts a surface approach to learning, requiring additional educational resources such as peer support from the university community (outside classroom learning environment), and from a non-Chinese ethnic background.

SUMMARY OF RESULTS

- A deep approach to learning was influenced by the classroom-level learning environment ($\beta = 0.32$), general self-efficacy ($\beta = 0.26$), parents' educational attainment levels ($\beta = -0.12$) and parental involvement ($\beta = 0.11$). The indirect effect of parental involvement was 0.16, which was larger than its direct effect of 0.11. This finding indicated parental involvement to be a sizeable mediated factor in a student adopting a deep approach to learning.
- A surface approach to learning was influenced by three LVs, namely gender ($\beta = 0.23$), ethnicity ($\beta = -0.15$) and university environment ($\beta = -0.12$).
- Self-directed learning readiness was influenced by general self-efficacy ($\beta = 0.39$), a deep approach to learning ($\beta = 0.25$), university-level learning environment ($\beta = 0.18$), a surface approach to learning ($\beta = -0.11$), classroom-level learning environment ($\beta = 0.10$) and parental involvement ($\beta = 0.09$). The indirect effect of parental involvement was 0.21, which was bigger than its direct effect of 0.09. This finding indicated the parental involvement to be a sizeable mediated factor in a student's self-directed learning readiness.
- Mental health was directly affected by self-directed learning readiness ($\beta = -0.24$), general self-efficacy ($\beta = -0.17$), a surface approach to learning ($\beta = 0.15$) and parents' aspirations ($\beta = -0.09$).
- Academic achievement was directly affected by two LVs. The larger of the two factors was ethnicity (direct effect = 0.27) with a small indirect effect of 0.01. The other factor was the adoption of a surface approach to learning (direct = -0.10).

DISCUSSION

The path model analysis showed that learning was dynamic and inter-related. From a general perspective, the path analysis revealed that the approaches to learning which students adopted mediated the relationships between the students' individual characteristics, distal family contexts, general self-efficacy, curriculum, university-level and classroom-level learning environments, and related outcomes.

The negative and poor quality processes and outcomes were explained by the adoption of surface approaches to learning, while the positive and better quality processes and outcomes were explained by the adoption of deep approaches to learning.

The study showed that a deep approach to learning was directly influenced by: (a) parents with low educational attainment; (b) parents who showed great interest in students' university studies; (c) students' great personal confidence in their competence in coping and managing challenging environmental demands (general self-efficacy beliefs); (d) students' positive perceptions of the classroom particularly characterised by shared control, critical voice, and student negotiation (classroom learning environment). It also influenced directly (e) high level of self-directed learning readiness; and (f) indirectly good mental health.

In contrast, the paths to students' utilisation of surface learning approaches and influences on outcomes were different from the paths that influenced adoption of a deep approach to learning. First, surface approach to learning was directly influenced by gendered roles and ethnic cultural

differences and negatively by perceptions of the university environment. Secondly, surface approach to learning directly influenced all three related outcomes with low academic achievement scores, poor mental health, and low self-directed learning readiness levels. Overall, the study showed that a surface approach to learning was directly related to: (a) female students; (b) students of non-Chinese ethnicity; (c) students' negative perceptions of the university characterised by a lack of peer support (university environment); and gave issue to (d) poor measures of academic achievement, low self-directed learning readiness and poor mental health outcomes.

More importantly, the present study contributes to the study of student learning through the path findings which revealed that the distal or more remote family context influenced student approaches to learning, and subsequently, the students' cognitive and affective outcomes in higher education. Most of the time, the effects of family were indirect but the impacts were sizeable. In particular, this was demonstrated in the importance of parental involvement in the students' adoption of deep approaches to learning and development of high self-directed learning readiness levels.

This was despite the path analysis showing a negative relationship between parents' educational attainment and a deep learning approach. That is, students with parents of low educational attainment reported higher deep approaches to learning scores than students with parents of high educational attainment. This finding is consistent with Biggs' (1987) large data study where the results revealed that university students whose parents had had only primary education reported the highest deep approaches to learning scores when compared to students of parents with post-secondary education who reported lower scores on surface and on deep approaches to learning.

However, the path analysis from the present study further revealed that the parents' low educational attainment levels were eventually compensated by the impact of parental involvement to exert a positive influence toward a deep approach to learning through their children's general self-efficacy beliefs. The path analysis signified that an active involvement by the parents in supporting the students in their university learning motivated the students to be confident learners (general self-efficacy) and thus indirectly to adopt a deeper approach to learning.

This finding suggested that the lack of financial resources (some form of economic hardships due to inaccessibility to economic resources related to low educational attainment) provided in the students' households did not hinder their learning and achievements if their parents provided resources to these students, in the form of being interested and being attentive to their studies in the university (parental involvement or family capital). This finding lends support to Bronfenbrenner's general proposition that the family factor could affect university students' development, throughout their life, where there was the "establishment of strong attachment, support and involvement from their parents or primary caregivers" (Bronfenbrenner, 2005, p.9), because the parents were committed to the students' well-being and development. Such attachments enabled the university students to "internalise their parent's activities and expressed feelings of affection, which in turn motivated their interest and engagement in related activities" in the learning settings (Bronfenbrenner, 2005, p.9).

Thus, the demonstrated relationship between parental involvement or distal family context and student approaches to learning revealed in the present study contributes to the field of student learning by providing another window on the psychological and social mechanisms of environmental factors in predicting students' success in higher education. The nature of the relation between parental involvement, deep approaches to learning and self-directed learning also supports Bronfenbrenner and Ceci's (1994) theoretical proposition that the proximal processes as the primary engines of outcome can only occur when the distal environmental resources are jointly considered and determined.

This study using path analysis at the student level has revealed the importance of the family context in influencing how university students approached learning and related outcomes. Most of the literature on family had overwhelming evidence focusing on young children and early adolescence. The present study's findings have revealed that parents can still be important in promoting meaningful outcomes in their children's education, even at the university level. This study further endorses Marjoribanks' (2002, p.1) claim that "it is generally agreed that if parents are involved positively in activities associated with children's learning then the school outcomes of those children are likely to be enhanced" and extends the claim to outcomes at the university level.

In the Malaysian context, the present investigation supports the need for proper governance and evaluation of the credibility of private universities. By showing the particularly important relationship between parental involvement or family environments and student learning and related outcomes, at the university level, the study provides impetus to the Malaysian private higher education sector to understand further the factors that influence a university student. It is the distal or more remote, as well as, the proximal or more immediate factors in the learning environments that need to be considered. The private higher education administrators need not just be overly engrossed about having the most appropriate facilities or most advanced equipment in the university and classroom learning environments, but also be concerned about understanding fully the total learning environment of their students – the distal and proximal learning environments – that are potentially related to an outcome.

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Emergence of professional identity for the pre-service teacher

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This article highlights the potential influence of reflective writing upon the emergence of a professional identity during pre-service teachers' practicum placements. Links between reflective writing and identity formation were made during a project which required pre-service teachers to reflect upon their responses to, and observations of, a number of broad elements of the teaching environment both within the classroom and in the wider school context. The author reports on this small study involving teacher education students at Flinders University in South Australia and makes recommendations which could enhance the value of reflective writing as a personal and professional development tool.

Professional identity, teacher education, practicum, reflective writing, pre-service teacher

INTRODUCTION

This article encapsulates the author's journey in responding to two questions about the teaching practicum. These questions asked, What might shape a robust teacher identity? and What might be some indicators of a professional identity? Responses were provided by the project itself and through an exploration of the literature on identity formation. The project involved a small scale study at Flinders University, South Australia, on the potential role of reflective writing in the development of professional identity within the pre-service teacher, during practicum placements in schools. The literature supports the notion of broadening pre-service teachers' understanding of the nature of teacher responsibilities and professional role (Valli, 1997). A thorough understanding of the breadth and complexity of the teacher's role is a key element in identity formation. Consequently, this study required pre-service teachers to reflect upon their responses to, and observations of, various elements of the teaching environment such as daily classroom interruptions, parent liaison and staffroom activities.

Reflective writing was chosen as the method for gaining pre-service teachers' responses to their observations of school life. Reflection is seen as a vehicle for considering the management of "uncertainty and ambiguity" which is experienced in the wider culture of the school community with the potential for "changed dispositions" (Jay and Johnson, 2002, p.76). The meaning of reflection is summarized elsewhere by authors such as Jay and Johnson, (2002) and by Valli, (1997).

Choice of terms used in this paper may differ to the various terms found in current education literature when referring to teacher education students, and the teachers with whom they are placed in the practicum. The term 'pre-service teacher' rather than 'student teacher' is used in order to distinguish between tertiary student, as against school student, since in Australia the term 'student' could refer to both tertiary and school students. Further, Australian schools do not usually use the term 'pupil' to identify 'school students'. 'Mentor teacher', 'supervising teacher'

and ‘cooperating teacher’ are terms used synonymously to refer to the teacher of the class or subject, with whom the pre-service teacher is placed within the practicum.

PROFESSIONAL IDENTITY DEVELOPMENT

As professional identity development is a key component of this study, it is important to provide a backdrop for the findings and discussion, by drawing from the literature. ‘Professional identity’ may be described, by borrowing from the narrative literature, as the fostering of “self-descriptions” (Winslade, 2002, p.35), but which are confirmed by the social and cultural norms within their context (Winslade, Crocket, Monk and Drewery, 2000). This notion of a “socially constructed identity” (De Ruyter and Conroy, 2002, p.11) is particularly relevant for the pre-service teacher, as the context within which professional identity emerges, changes from one practicum setting to another. Identity is said to develop as a nexus of the “ideal person and professional image” (De Ruyter and Conroy, 2002 p.515; Atkinson, 2004) and professional identity as seeing self as a teacher and “by others” (Coldron and Smith, 1999, p.712) while “continually constructing a sustainable identity as a teacher” (Coldron and Smith, 1999, p.714). For the pre-service teacher, the sustainable aspect of identity is particularly vulnerable from one practicum experience to the next, as each school placement can differ widely. This demands of the pre-service teacher to exercise “fine judgments about contextual factors” (Coldron and Smith, 1999, p.716). Therefore by the end of the third and final block of practicum, totalling 18 weeks within a two year period, which was the situation for participants in this particular study, there was much opportunity for the pre-service teacher to develop a sense of ‘where and how do I fit?’ in the school context. Yet it is important to be mindful of Zembylas’ (2003, p.113) description of identity as, “the self, never completed”. This suggests that to know yourself is therefore to not know yourself, as we are always in the making. Uncertainty about self could therefore be seen as inviting the new and suggests an openness to change. This notion of fluidity of the professional self could be captured in the words of Hoveid and Hoveid (2004, p. 74) who describe teacher identity as a “strange quality in bonding with people who change,..”.

In Australian schools a large amount of autonomy is bestowed upon the teacher and also the pre-service teacher in practicum settings, especially when making decisions about curriculum and teaching methods. While this may be welcomed by most, it also imposes a large responsibility upon, while adding to the vulnerability of, pre-service teachers. As Coldron and Smith (1999, p.718) point out there is a “personal dimension to most aspects of a teacher’s daily work”. It follows therefore that the more decisions pre-service teachers make, the more chance there is of these being critiqued by others. Provision of feedback, both positive and negative, is often seen as the required role of supervising teachers, and hence the pre-service teacher’s sense of competence, an important element of professional identity, is once more undermined if there is an overabundance of negative feedback. Self-preservation or “care of teacher-self development” (Zembylas, 2003, p.106) is indeed an important requirement for a sustainable teacher identity. Pre-service teachers who choose to take risks in their pedagogies are particularly vulnerable if by doing so, their mentor teachers identify them as being out of tune with their own way of thinking. This could lead to self-doubt on the part of the pre-service teacher. If the chosen pedagogy is substantially different to that of the mentor teacher and this in turn leads to criticism of the pre-service teacher, the latter’s growing sense of professional identity could well be shaken. Power relations between the supervising teacher and pre-service teacher can then become the focus of the relationship, often having a detrimental impact on the desired development of a robust professional and personal identity.

Several factors influence the progression of teacher identity, which by nature has “messy meanings” (Zembylas, 2003, p.109) and is “rich and complex” (Sachs, 2001 p.160). These influencing factors upon the fluid nature of the pre-service teacher’s formation of a professional identity, include the degree of general self-confidence and the strength of relationships with

others. This quality of relationships is especially important with supervising teachers as the relationship is often sensed as involving power over, if the supervising teacher also has the role of assessor in addition to mentor. The emotional experiences in the practicum setting and the nature of feedback given on teaching skills, all play a part in the development of self-efficacy and hence, also of self and professional identity. Yet the pre-service teacher, as with experienced teachers, would not be deemed a competent professional if they were not able to uphold the paradoxical nature required of a teacher as proficient, skilled and knowledgeable while ever self-questioning and displaying the disposition of a life-long learner (Bloomfield, 2004; Bullough and Young, 2002; Hargreaves, 1998; Graham and Phelps, 2003).

An additional need beyond the practicum for the development of a strong sense of professional identity is to endeavour to reduce the high drop-out rate of beginning teachers (Ewing and Smith, 2003; Darling-Hammond, 2003; Darling-Hammond 2006, Martinez, 2004; Pietsch and Williamson, 2005). This is not to suggest that a robust professional identity in itself is sufficient to curtail the disenchantment experienced by some beginning teachers. However, a strong sense of personal and teacher identity that strengthens beginning teachers' understanding of the demands and nature of the teaching role upon entering the profession, may go some way to reducing the concerning early fall-out rate. If reflection, perhaps through reflective writing, could deepen the understanding of the teaching role then it could play a valuable role in reducing this international concern about retention rates of beginning teachers.

Professional identity inevitably starts to form during the practicum for the pre-service teacher, but the strength of this development is best not left to chance but by providing supportive contexts (ten Dam and Blom, 2006).

THIS STUDY

The pre-service teachers in this study each experienced three different school contexts during their practicum placements for their Bachelor of Education Degree. The first part of this two stage study was reported in an earlier paper, (Cattley, 2005), while this current commentary reports on the last part of a project in which pre-service teachers wrote reflective statements in their final practicum and at a follow-up stage five months later. The practicum, as differs from many other studies, is an important point in teacher formation upon which to focus exploration of professional identity. While other researchers focus on reflective writing for the development of the teaching skills of experienced teachers, fewer authors talk about professional identity of pre-service teachers. Atkinson (2004), Sugrue, (2004) and Twiselton (2004) are, however, some exceptions but these focused on reflective discourse on practice whereas this current study focuses on the use of reflective writing and its possible influence on the development of professional identity for pre-service teachers.

Given the complexities of the nature of, and responsibilities involved in teachers' work (Connelly and Clandinin 1999; Valli,1997), the focus for reflection in this present study was upon non-instructional aspects of teaching. The importance of a wider focus for teacher development such as the development of "self as teacher" is supported by writers such as Tickle (1999, p.137) and Bjarnadottir, (2005). This is not to say however that competence in teaching practice is not important. It is of course inextricably involved in professional identity development but it is the notion of teaching as a "relational profession" (Connelly and Clandinin, 1999, p.85) that behooves us to focus on a broad range of school situations in which the pre-service teachers find themselves. Their emotional responses to these, warrant attention rather than the more common single focus on lesson delivery.

The process for this part of the study involved the eight participants writing reflective logs on at least four occasions over their eight week practicum block. The participants were placed in eight different school settings. A further question through email was posed to participants five months

after the final practicum. All participants volunteered for this project, were female and in Bachelor of Education courses ranging across all year levels of schooling from junior primary to secondary. These pre-service teachers left school themselves from between 5 and 20 years previously, thereby representing a range of ages and life experience.

METHOD

The method chosen for this study could be described as a combination of a biographical and case study method (Burton and Bartlett, 2005) whereby participants wrote their responses to situations through using a reflective log (Appendix 1). Their written statements were considered alongside a framework for reflective writing (Campbell-Evans and Maloney, 1998). This framework was chosen since its four levels of analysis were about the quality of reflective statements. This differs from the focus of other frameworks (Valli, 1997; Spalding and Wilson, 2002; Jay and Johnson, 2002) which related more to content of statements about teaching skills.

This study, that is the second stage of the project, followed some explicit teaching about reflective writing. Each participant had received the results of the analysis, according to the Campbell-Evans and Maloney (1998) framework, of their stage one (Cattley, 2005) statements. Participants were required to analyse 12 of their combined reflective statements and rate them according to the four levels of the framework. Their analysis was then discussed in terms of the quality of each statement. This was a deliberate decision to coach the pre-service teachers in achieving the richer levels of reflection, given my supposition that it is these levels of reflection which are most likely to enhance the development of professional and personal identity. This rating task therefore became a teaching tool with the group of pre-service teachers in analysis of their own reflective statements written previously in their involvement in the first stage. Individual feedback was given using this schedule and participants could identify with ease, the differences in quality of reflective thinking, since they were analysing their own written statements. In other words the pre-service teachers were able to apply the framework used in this study, (Campbell-Evans and Maloney, 1998) to their own reflective statements written from stage one, before engaging in the second part of the study.

DISCUSSION AND FINDINGS

I suggest that it is when the quality of the pre-service teacher's reflections cluster around Campbell-Evans and Maloney's (1998) third and fourth levels, which they describe as involving analysis, evaluation, reconceptualising and stating a philosophy and vision of teaching, that a development of self-identity best occurs, in terms of the personal and professional. While these specific qualities of written reflections can be taught explicitly, the same quality could perhaps be achieved through a second method, that is by the careful selection of prompt questions (Appendix 1). After the completion of the reflective log writing stage, the pre-service teachers gave verbal feedback, stating that the prompts were extremely helpful to them when writing their reflections. Such questions are used in narrative therapy and the prompts on the reflection log sheets were borrowed from this arena (Winslade, J. (2002); Winslade, Crocket, Monk and Drewery, 2000). Brookfield (1995, p.73) who indicates that a reflective log gives the teacher "insights into your own emotional and cognitive rhythms", suggests similar prompt questions.

Furthermore, since the role of teacher is broad and complex it is necessary to encourage pre-service teachers to reflect upon their multifaceted role, as was the case in this study. As a result, the pre-service teachers in this study raised issues such as time-management, team work, student engagement on learning tasks, managing differences between parent and teachers' values and balancing the workload of the teacher role with relaxation activities. None of these specific aspects of a teacher's role was suggested on the Reflection Log Sheets but rather, these were additional issues raised in the written reflective comments made by these pre-service teachers.

This suggests that by reaching the deeper levels of reflective expression the pre-service teachers focus more on, what Moore (2004, p.150) describes in his explanation on reflectivity, “the broader picture of social contexts of classroom interactions” rather than what can be deemed a more technicist interpretation of reflective practice when the focus is exclusively on teaching skills or lesson delivery. For example, one pre-service teacher reflected upon the interactive nature of time and effort and the impact of these on student-teacher relationships:

‘...the more I get involved the more I realise just how much teachers really do. It is certainly not a profession you can leave at work! I found myself doing a lot of marking and class preparation in the evenings and on weekends. However, the more effort I put in the more I get out of the job and the more I love it! I find teaching so rewarding. The best part of the job is the relationships with the students. I have found that by doing lots of preparation and having really well organized and varied lessons that students respond to you. Students know if you are putting in the effort and they tend to reciprocate the effort you put in, thus helping that bond and relationship.’

Connelly and Clandinin (1999, p.95) claim that the “different facets and different identities can show up to be reshaped and take on new life in different landscape settings.” This could be applied to the various facets of the teaching role in which these pre-service teachers found themselves involved. For example, whereas they may have felt confident about their curriculum choices, several mentioned how they felt intimidated when liaising with some parents. As one pre-service teacher commented, “*I was surprised by my feelings of inadequacy when questioned by parents.*”

I am suggesting therefore that by encouraging pre-service teachers to reflect upon the breadth of their roles, they are more likely to shape a robust professional identity.

Involvement in writing a reflective log, could in itself have contributed to the development of the participants’ identity as a teacher, if they saw themselves in the role of researchers, which as (Burton and Bartlett, 2005, p183.) propose, is a normal part of professional identity. Knowing that they were a part of a research project with requests to comment on their own experiences, could well have supported the pre-service teachers in viewing themselves as researchers and hence, if Burton and Bartlett’s (2005) views were valid, also strengthened their sense of teacher identity.

It can be seen that many elements are involved in developing professional identity. Hoveid and Hoveid (2004, p.53) advocated that the process of teacher identity formation should be made a “conscious pursuit” and I propose that by explicitly guiding pre-service teachers in reflective writing, which is “directed towards one’s own self among others” (Hoveid and Hoveid (2004, p. 53), they strengthen confidence and competency in the relational nature of a teacher’s role. A common feature of the pre-service teachers’ reflections in this study is their response to the paradoxical nature of a teacher’s work and in particular within the relational aspects. For example one pre-service teacher commented:

‘However, as my relationships with the parents grew I soon became caught up talking to them in the mornings and listening to them. Finding a balance between building a good rapport and knowing when to carefully send parents on their way is difficult’.

Another comment was in relation to a student with a medical condition:

‘Although he is aware of his condition I am responsible for his health while he is with me. I find it difficult to get the balance between fussing and responsibility, that is, getting duty-of-care right.’

The importance for teachers in their understanding of self is acknowledged widely in the literature. As Hamachek, (1999, p.209) poignantly expressed, “Consciously we teach what we

know; unconsciously we teach who we are". A strong sense of self is vital if pre-service teachers are to develop positively their professional identity during the practicum. This is particularly important when these teaching novices are questioned by their students. The following reflective statements from one middle schooling pre-service teacher in the study, highlighted this notion of interplay between self-understanding, self-efficacy and relationships with students:

'The students were not really engaging or responding to my questions. I wonder if they sensed my own internal fears about not being able to teach this subject adequately. I guess as time goes on and I begin to feel more comfortable both as a teacher and in my relationships with students, that this issue would cease to cause so much concern. I found the Year 7s to be more accepting of information, as opposed to Year 9s who love to question everything. This questioning can be quite intimidating. I especially found it intimidating during lessons where I wasn't quite as prepared as I would have liked to be.

I guess I have gained a certain level of comfort with admitting that I do not always know the answers to everything – but students are welcome to help me research to uncover information which will enable us to gain better understandings'.

Similarly the same inner strength and sense of competence is needed when managing questions from parents. A primary school pre-service teacher in the study made the following comments addressing her concerns:

'Decision making needs to be suitable or 'good' enough to suit all persons concerned. This may include the students, parents, colleagues, principal, and the surrounding community members. I have realized that when I make a decision I need to know in myself that it is the right thing to do, because there is every chance that I will need to justify my reasons to any of the above people.

The parents are obviously only looking out for their children and possibly concerned about something they would like to find out more about. On the other hand the teacher could feel somewhat put out by these questions and come to the conclusion that the parent feels they are not doing their job as a professional.

I feel I need to gain a high self-awareness and self worth before even attempting to teach in a school where parent liaison may not be a pleasurable task.'

Tickle (1999) suggested that the interface between the personal and professional was paramount in the development of teacher identity. It can be argued that reflection on self-as-teacher during practicum period is an opportune time for this activity and more easily achievable than for beginning or experienced teachers. This may happen because pre-service teachers may be more willing to self-question, as they do not expect of themselves to have all the answers, whether in relation with students or parents.

Recognition of and responsibility for ones emotions is certainly part of professional identity formation. There was strong evidence of emotional expression in the reflective statements of the pre-service teachers in this study. Zembylas (2003, p.105) reminded us that acknowledgement of emotions was essential in identity formation while teachers were required to adopt the "emotional rules" acceptable for the professional teacher in a specific school culture. Reflective writing could therefore be argued to provide a medium for the expression of otherwise unacceptable emotional portrayal in the school context, while providing a forum for the investigation of both the "personal and social" (Zembylas, 2003, p.112) aspects of emotions and the link to self-formation.

Hargreaves (1998, p.838), agreed that teachers had a "heavy emotional investment" in their relationships with both students and the parents within the school community. This emotional aspect of the role of teacher and hence the development of teacher identity was always present

(Bullough and Young, 2002, Flores and Day, 2006). This is not surprising since much of teachers' work is on show to an audience of one type or another, and usually a large number at any one time, be it students, parents or colleagues. This differs from other service professionals, such as in health, who more often are interacting with one client at a time or other types of professionals who produce a product such as an engineering report, which is not usually under surveillance during the act of writing. Teaching differs largely as the delivery of the service is instantly observable by an audience, perhaps more akin to a surgeon, along with its successes and mistakes. Furthermore this "gaze" on teachers is constant (Kosnick and Beck, 2003, p.20) especially for the pre-service teacher on practicum. It is difficult therefore, for them to escape the sense of pressure and vulnerability to emotional responses that emerges, when thought to be under surveillance or being judged for high career stakes.

In this study there is a range of both positive and negative emotions expressed such as "empowered, frustrated, confident and relaxed". Other comments included feelings of concern, vulnerability, privilege and amazement. One pre-service teacher spoke of her fear for not getting control when she found herself shouting at her students. She explained how she gradually learnt other strategies leading to what Britzman (1986, p.450) described as "social control", thus contributing to her sense of competence.

'I know now that I can gain attention effectively without feeling stressed about it. I guess the stress factor is caused by fear that one may never be able to effectively gain attention of students. I am very, very pleased I have overcome this fear.'

Some striking aspects of this study emerge from attempts to analyse the data in terms of the quality of the pre-service teachers' reflective statements. While frameworks such as Campbell-Evans and Maloney's (1998) are useful in this regard, a further scale or framework may have been useful in determining indicators of professional identity. Such a framework can capture the richness of content and diversity of the topics included in the written reflective statements. In other words, a system for acknowledging the breadth and wealth of content in the themes that emerge in the comments, beyond those listed on the Reflective Log sheet. For example an indicator of professional identity formation can be the recognition of the role of responsibility for teachers.

Several of the pre-service teachers in this study wrote about their "heavy responsibility" for the decisions they made in the course of their professional duties. Further themes, as previously alluded to, included their sense of professional competence when interacting with various members of the school community, the paradoxical nature of teachers' work and perspective taking of others, particularly of parents. For example, one pre-service teacher was clearly able to put herself in the parents' shoes through her reflection:

'At first I felt uncomfortable with parents watching my teaching, however, as I became more confident with my own abilities I realized they were wanting to know how I relate to their children.'

The theme of heavy responsibility which emerged could sound a caution by being alert to what Moore (2004, p.104) described as the pitfall of reflective activity becoming an "unhelpful over-personalisation" or indeed personal "blame". To avoid this Moore (2004) suggested that there was a sharing of reflections with others. This was achieved to a small degree in two ways in this study. Firstly the researcher read and collated the comments and secondly through a short de-briefing meeting with the participants at the conclusion of the practicum. A recommendation would be, however, that this sharing aspect should be expanded upon if teacher-educators wished to ensure change, which was in this case, progression in professional identity within the pre-service teacher. One way might be to encourage the pre-service teachers to share and examine personal biographies of their own schooling experiences, (Moore, 2004,) underlying beliefs and

assumptions (Darling-Hammond, 2006) before engaging in their practicum placements, thus enhancing possibilities for “change in direction” (Moore, 2004, p.148) as a result of reflective writing.

As mentioned earlier the final data gathered were composed of participants’ responses to an email sent by the researcher five months after their Reflective Log involvement. They were asked the question ‘What do you consider to have been the effectiveness of this reflective writing task for developing your professional identity?’. Six participants responded and of these four used the two deeper levels of reflective statements exclusively (Campbell-Evans and Maloney, 1998).

Their responses to this further question showed evidence that their teacher identity clustered around five elements which are summarized below.

A common element mentioned was relationships with others, particularly other staff and parents. As one participant answered:

‘I think it also helps to develop more professional relationships with other staff members as you seek their ideas and opinions when you have had time to reflect and can then make more relevant and meaningful inquiries and engage in more meaningful discussion.’

Another strong element was their awareness of wider social and political world beyond the classroom. For example one pre-service teacher responded,

‘My cooperating teacher appreciated that I could converse not just about the ‘vener’ of the job but about the social and political issues that influence the education system.’

Awareness of the need to support their colleagues with their work was a further element which emerged in their answers,

‘Rewarding knowing that my journal was going to be used for an academic purpose – helping someone else in their work.’

The pre-service teachers were mindful of how their reflective writing had helped them in observing self and others, taking responsibility and further, being able to analyse reasons for their own successes.

‘Reflections have helped me to look at how certain situations actually made me feel and how experiences can allow new teachers to build on understandings. It is very easy to handle certain interactions and forget to look at how we decide on these actions or strategies in our practice.’

Finally, the pre-service teachers acknowledged the benefit from analyzing and understanding their emotional responses to situations.

‘I think written evaluation forces you to acknowledge your new found understandings about education and relationships and this is extremely useful in establishing your professional identity.’

CONCLUDING COMMENTS AND RECOMMENDATIONS

This article draws links between the nature of pre-service teachers’ statements in their reflective writing and their understanding of the teacher’s role. Given the complexity of the development of professional identity in teachers, it is considered to be important in this study to focus on non-teaching elements of teachers’ work in order to expand the pre-service teachers’ notions of the range of teacher responsibilities (Valli, 1997) and the nature of school culture, if they are to

develop a strong identity as a teacher professional. I demonstrate that reflective writing is a valuable tool for professional identity formation in this group of volunteer pre-service teachers. As for recommendations for the wider application of this tool, there needs to be supportive structures in place in addition to setting a reflective writing task. First, the skills for reflective writing need to be taught explicitly. Second, the provision of a scaffold of suitable prompt questions, such as those on the Reflection Log proforma (Appendix 1), is more likely to result in reflections which support identity formation, since the questions invite analytical and evaluative reflection. Further, providing a strategy which encourages the sharing of reflections and personal experiences is likely to enhance the potential influence of reflective writing on professional identity development. Finally, it is recommended that a framework, which identifies indicators for evidence of professional identity development, is a valuable contribution to the analysis of reflective writing and as an important learning tool in the teacher education curriculum.

APPENDIX 1

Research Project: Student-Teachers Reflections on Observations in Practicum Setting

Week _____ (of practicum)

You may wish to reflect upon any aspect of the life of a teacher. This could include:

decision making, questions asked of teachers, teachers as a school community member, staff room activity, parent liaison, daily interruptions to programs or any aspect of teaching.

Reflective Log Proforma

*Here are the **reflection prompts** to guide you.*

Reflection on Observations	General Reflections	Summary Reflection
What impact have these observations had upon you? Have you been surprised by the outcome of any of your observations? How were things different to what you had expected? What sorts of self-talk have you found yourself having during or as a result of your observations? What emotions have you experienced during your observations? Have these changed over time? What has influenced these changes?	What makes you feel 'like a teacher' during this prac? Does anything threaten your sense of self as a teacher?	What are your views, philosophy or vision about what is involved in being a teacher? What has influenced you to come to these viewpoints?

Note: These questions were adapted from the work of (Winslade, J. (2002); Winslade, Crocket, Monk and Drewery, 2000). Brookfield (1995)

Brief description of situation/context (optional)

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On how to solve the problem of the avoidance of phrasal verbs in the Chinese context

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This article discusses the reasons why Chinese learners of English avoid using phrasal verbs in an English community context or when using English as an inter-language in China. The avoidance of phrasal verbs often leads to ineffective communication. By adopting appropriate pedagogical and methodological approaches or providing proper guidance to learning, Chinese learners of English may achieve the goal of using phrasal verbs appropriately in the context of English as an international language in China.

Phrasal verbs; avoidance, oral communication, Chinese context

INTRODUCTION

A phrasal verb is a phrase which consists of a verb in combination with a preposition or adverb or both, the meaning of which is different from the meaning of its separate parts: 'look after', 'work out' and 'make up for' are all phrasal verbs (Koprowski, 2005). The most common English phrasal verbs are as important as other more frequent phrases during the process of English learning. Phrasal verbs play rather an indispensable role in communication particularly in oral forms. Native speakers of English tend to use phrasal verbs in everyday conversation and generally reserve one-word verbs (i.e. 'investigate' instead of 'look into') for more formal occasions such as business letters (About, Inc., 2007). Moreover, native speakers of English, like Chinese learners of English, tend to avoid using phrasal verbs when communicating in the foreign language (Liao & Fukuya, 2003).

In addition, a survey (Chen, 2005) involving 300 subjects in a regular university in China clearly showed the avoidance of English phrasal verbs. The subjects were 240 non-English major students and 60 English major students with different academic levels. The survey indicated two important findings. One finding was that they were not deliberately avoiding phrasal verbs but they had a relatively weak understanding of the body of English vocabulary. For example, many students knew the meaning of such difficult words as 'accomplish', 'extinguish' and 'tolerate' but they had difficulty in identifying the contextualized meanings of the phrasal verbs like 'carry through', 'put out' or 'put up with'. The other finding was that they often preferred one-word vocabularies to phrasal verbs no matter when phrasal verbs were more appropriate in the context.

These findings imply various problems in the teaching of English in education systems in China. In the internationalization and globalization of the world, English is becoming an international language in the Chinese setting (Xu, 2002) so that effective and efficient teaching is more pressing and crucial than ever before in the field of English language education in China. This article identifies the most common English phrasal verbs and explores the reasons why Chinese learners of English are weak in understanding phrasal verbs and their tendency to avoid using them, especially in oral communication. In the concluding section some recommendations are provided to help solve the problem of the avoidance of phrasal verbs in the Chinese context.

AVOIDANCE ANALYSIS

There are various factors contributing to the avoidance of English phrasal verbs by Chinese learners. They are related to societal factors, institutional factors, teacher and learner factors as well as ineffective curriculum documents.

First, the lack of a long existing foreign language environment is likely to be the most important factor to cause the problem of the avoidance of English phrasal verbs by Chinese learners. They are exposed to very few opportunities for English communication except where there are some opportunities provided to practise English in the classroom. In the meantime classroom English and everyday English are more often than not employing different discourses. The words the English learners have learnt at school can rarely be put into immediate use and practice outside the classroom. Lack of practice and individually spaced repetition, that is the opposite of massed repetition, on topics related to everyday life is likely to result in ineffective or less confident communication even though the relevant language knowledge has been taught in the classroom (Nation, 2001). However, research evidence shows that communicative practice in the classroom is not sufficient to lead learners to a high degree of fluency and accuracy in all aspects of language production (Lightbown, 2000). As one of the most important parts of communication (Hoey, 2005), phrasal verbs that are usually employed by native speakers cannot be used and are often avoided by the Chinese learners of English due to the foreign language environment. A foreign language context leads to the situation in which the language learners are exposed to so little real or authentic context that it is exceptionally difficult for them to have a good command of English phrasal verbs. Moreover, the author is not arguing that a good mastery of phrasal verbs is the only important feature of learning the language well. Nevertheless, it is safe to say that phrasal verbs, especially those commonly used ones, are very important components in effectively spoken communication no matter in what kind of language community context it lies. From the angle of language learning for the sake of effective communication phrasal verbs should by no means be avoided.

Second, the foreign language learning context and the development of economy largely influence the design of the curriculum in relation to language teaching and learning. In past decades English to a great extent belonged to a small number of people who learned the language for the sake of reading English documents. Therefore, the College English Curriculum (Ministry of Education of the People's Republic of China, 1988) clearly indicated the purposes of learning and relevant learning outcomes, that had remained the same over a couple of decades. Consequently communication skills were largely ignored in the curriculum. The situation did not change until more and more educators and teachers became aware of the importance of communication especially oral communication with the rapid development of China's economy and the growth of China's international status in the world.

An increasing number of foreign investors including many international enterprises are flowing into the Chinese market and therefore the English language is becoming the *lingua franca* with the trend of an English education becoming essential for a globalising career in almost all industries. There is a wide agreement among educators that the concept of learning English for the purpose of reading materials can by no means meet the needs of this dramatic social and linguistic change (Wu, 2001). Many employers complain that graduates who have passed College English Tests (which is a nationwide examination usually used to gauge the English level of its examinees) are unable to handle even simple situations for communicating with clients who speak English only. It is high time to reform the English education curriculum. With the efforts and help of many English educators, administrators and experts, new College English Teaching Requirements (Ministry of Education of the People's Republic China, 2004) have been produced. A distinguishable difference from the former one lies in the emphasis on listening and speaking. Communication skills are put in an exceptionally prominent place. There is, therefore, evidence that English phrasal verbs, that are important components in communication, need to be emphasized in English language teaching and learning.

Third, in an age when English is for reading comprehension and understanding some materials written in English with a sizable vocabulary is clearly required and is probably essential, but it cannot be overemphasized otherwise the Chinese learners would be seriously misled. Even when English is regarded as an international language in China, a huge number of learners take it for granted that without a considerable vocabulary size, that is commonly about 4000 words according to CET-4, effective language learning cannot proceed. This idea is unarguable in terms of understanding a relatively difficult text, but this view needs to be changed if learners are going to converse on some common topics in English, because there is some mismatch between the vocabulary required for reading and conversational discourse (Wetherell, Taylor & Yates, 2002). In addition, the body of learners tends to exclude that part of vocabulary that consists of more than one single word including phrasal verbs. As a matter of fact, the misconception among the Chinese learners of English is a misunderstanding of the vocabulary size required for different functions. To make matters worse, there has been an overemphasis on vocabulary among learners, that can be seen in the fact that an overwhelming majority of undergraduates possess a vocabulary dictionary. It is not exaggerating to say that much of their time involved in learning English is being occupied by memorising the so-called required words instead of those most commonly used phrasal verbs. It should be noted that those phrasal verbs are widely used because of their characteristics of flexibility, practicality, adaptability and efficiency for oral communication. Therefore, phrasal verbs should be given a greater emphasis than before with the goal of achieving effective and efficient communication in the English speech community rather than the use of those much more academic words. What is more important, there is much less room for those academic words in oral communication than in written communication.

Fourth, another peripheral reason that leads to the avoidance of English phrasal verbs is the lack of appropriate educational resources for oral communication. On the one hand, most teachers do not see the need for developing their own materials for students. Moreover, their diverging efforts have not been united in such tasks. On the other hand, the highly commercialized book market, apparently driven by huge profits, consequently produces a large number of low quality educational resources (Li, 2004). There are very few resources that cater for the needs of learning a language. The weak points in producing customer tailored teaching and learning materials together with the large book market lead to relatively few high quality resources including most of those available for English education. Incidentally, there are fewer educational resources in relation to learning and teaching English phrasal verbs or how, by using appropriate phrasal verbs, it is possible to achieve effective communication. They are usually collected by being picked up from the curriculum without identifying whether they are suitable for written or oral form of communication or roughly by being put together without being clearly interpreted. In addition, without sound resources that relate to learning to use phrasal verbs, effective teaching methods for learning vocabulary can hardly be employed in the classroom and efficient learning can never be guaranteed.

Last but not least, Chinese learners of English have been greatly influenced by their mother language, Chinese, in the process of learning the foreign language, English. In both ancient and modern Chinese, there are quite a few words or phrases that have the same composition as English phrasal verbs – a main verb plus one or more particles. For example, the two Chinese characters '*renshou*' share their single but very similar meaning of 'tolerate' in the ancient Chinese language whereas in the modern Chinese it is a combination with the single meaning 'tolerate'. '*Ren*' and '*shou*' are both two verbs in ancient Chinese but only one word in modern Chinese. In order to make things clearer, in English 'tolerate' may sometimes be expressed in the form of a phrasal verb 'put (main verb) up with' but in Chinese '*renshou*' can never be interpreted in a similar way. Apparently, the composition in L1 and L2 is completely different. The word '*panwang*' can also illustrate the same issue. '*Pan*' and '*wang*', two Chinese verbs, share the meaning 'look' in ancient Chinese but in modern Chinese the combination means 'expect' or 'look forward to'. '*Fu*' means 'again' but '*xi*' means study in ancient Chinese while in modern Chinese the word '*Fuxi*' means 'review' or 'go over'. In reality the Chinese learners of

English are influenced by the design features of the modern Chinese language (Liu, 2003); most modern Chinese words are one in meaning even though they consist of two or more characters. In the Chinese context, the learners are more likely to translate consciously or transfer unconsciously every single Chinese word (e.g. 'renshou') into corresponding English expression (e.g. 'tolerate') instead of a phrasal verb (e.g. 'put up with'), even on the occasions when phrasal verbs are more idiomatic or authentic than one-word equivalents.

SOLUTIONS

The issue of avoidance of English phrasal verbs among Chinese learners of English is complicated because it involves many factors as mentioned above. They may be generalized into six major aspects, namely, objective context, curriculum problem, internalized ineffective learning concepts and habits, educational resource development, teaching methodology and L1 impact on L2 learning. In order to help solve this problem, some suggestions are provided below.

First, it is necessary to reconsider the following *cliché* questions in the context of English as an international language in China so that people may be able to reorientate English education.

Question 1: What is English learning for millions of Chinese undergraduates?

In order to answer the question it is necessary to know the learners' motivation of learning the foreign language. As indicated in Gao, Zhao, Cheng and Zhou (2003), the predominant motivation of 80 percent of the Chinese learners of English is purely to gain a certificate. In other words, they learn the language in order to pass examinations, particularly CET, and to obtain the diploma (graduate diploma). This is because CET-4 certificate is an indispensable condition to obtain a graduate diploma in most universities of China. This motivation, strictly speaking, is a sub-type instrumental motivation. According to Gao et al (2003), the other motivations can be classified as cultural and situational ones. Cultural motivation is related to the learners' cultural interests and concerns while situational motivation is independent of the other two motivation types, indicating the influence of the learning environment. Having a clear picture of the motivation types of Chinese undergraduates is useful in order to adopt sound educational ways to achieve more effective curriculum design.

Question 2: What learning outcomes will English education gain?

The reformed College English Curriculum of 2004 is a very important guideline, that manifests the learning outcomes in terms of listening, speaking, reading and writing. But listening and speaking are emphasized and the learners are expected to be able to understand what English speakers are saying and at the same time to be able to carry out productive communication with them. However, reading and writing are not the focus of this article, hence they are not discussed here.

Question 3: What vocabulary is more efficient for the learning outcomes?

Since oral communication is particularly emphasized in the curriculum document, and since the goal is to achieve the learning outcomes, it is necessary to identify the base vocabulary that is required. Alternatively, what is the threshold vocabulary size for effective oral communication? Is the CET vocabulary equally effective to speaking and reading? According to discourse theory, speaking and reading utterances often belong to different discourses. Therefore, it is necessary to regroup the vocabulary that is effective for oral communication and identify the vocabulary size. However, it is first of all necessary to know the difference between the old and new outcomes and the different vocabulary caused by different learning outcomes required in the curriculum documents. In order to understand what is involved, it is necessary to identify what phrasal verbs are base ones for oral speaking purposes.

In addition to the reconsideration of the questions above, some ways of solving the problem of high quality educational resources with respect to English phrasal verbs must be investigated. Some possible ways are to organize some experienced teachers to undertake a collaborative

project pertaining to the topic involving the development of school-based material. This educational resource development initially must cater for the learners' needs and be easy to memorize, and be adaptable in communicative situations. The material is likely to need to be updated to meet the needs of linguistic development for its small-scale publication and limited use. Another way may be through the cooperation of outstanding teachers with a reputable publishing house. There must be some compromises between the two parties for various reasons but as long as the work is good for the learning of English phrasal verbs it is worthwhile undertaking the task. Perhaps it is necessary to recommend that some foreign materials are adopted to realize the authentic learning of English.

Besides, teachers should hold positive attitudes with respect to teaching methods. There are no best methods in education, particularly with respect to English phrasal verbs (Prabhu, 1990). However, effective methods need to be explored in the Chinese context. Direct instruction on learning strategies needs to be provided over time. Some innovative and creative approaches are very welcome. In order to test new approaches, teachers may have to spend more time and energy in doing relevant research. Consequently, there is a lot to do in this field. For this particular area, it is advisable to probe the methods that are related to learning and teaching English vocabulary. Hunt and Beglar (2005) provide some ideas for teachers. The author also wishes to elaborate her approaches to the teaching of English phrasal verbs, namely the downward and upward approach. This is an approach to teach English phrasal verbs whose meanings are familiar to the learners and it is stressed that almost every common English phrasal verb consists of particular words that the learners must be very familiar with. Doing so initially makes the learners feel that phrasal verbs involve nothing difficult and they can be more confident to learn them well. This is a psychological strategy. This is the so-called downward approach. After that, the upward approach can be used, namely to introduce the meanings that are closely related to daily communication. Various meanings can be gradually added to each item. The purpose of doing so is to help the learners to become aware of the powerful service provided through oral communication. Given that some learners may like to challenge something new, and may feel bored to learn the phrases with their familiar components, some equivalent forms may be introduced in an appropriate way to make sure the learners are not overloaded with new ideas. This approach is especially suitable only when the vocabulary size for oral communication has been lowered down to a certain level where the learners do not have to memorize so many inapplicable words for use in speaking situations. There must be many other different methods in this field, that must be explored by interested teachers and educators.

CONCLUSIONS

The primary impetus for discussing the avoidance of English phrasal verbs has been my experience and study in 2005 and although vocabulary education is of major concern of English as a Foreign Language (EFL) learners, the problem of avoidance is frequently undervalued by English teachers and instructors. However, the details of the reasons for avoidance and suggestions to resolve this problem continue to give rise to controversy. I still believe that there is need to discuss the negative impact of the problem and considerable reform of College English vocabulary education needs to be urgently launched. Nevertheless, it is essential to note that further study remains to be undertaken. The questions to be addressed are (a) The threshold vocabulary size for oral communication needs further study and investigation; (b) If the phrasal verbs that are commonly used in English countries are the same as in Chinese context, what are those that the Chinese learners need? There has been little research undertaken into the avoidance of English phrasal verbs by Chinese learners in the foreign context and this is a systematic project that requires efforts made from many different directions.

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Inspired Learning: Creating engaged teaching and learning environments for university and school students through university to school mentor programs

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The Inspire Peer Mentor Program (Inspire) operates at Flinders University in the southern suburbs of Adelaide, and has received funding from the Department of Family and Community Services and Indigenous Affairs (FaCSIA). The experience gained during the past three years has indicated that a mentoring program between the University and schools located in its local region, which includes key areas of low socio-economic status, can be a major form of community engagement for Higher Education. Inspire received a commendation in the recent Australian Universities Quality Agency (AUQA) Report (2006) as a strategy for community engagement. This article is written in two sections. The first will use the experience gained from Inspire to discuss the Higher Education sector's involvement in school-based mentoring programs as a strategy for community engagement. Catherine Koerner's analysis of the literature on mentoring, finds that mentoring programs can be an effective intervention with communities to increase school retention rates and engagement with formal learning if they are adequately resourced. She argues that the implication of this finding for the tertiary sector is that mentoring programs can be a strategic form of community engagement. In the second section, John Harris provides a case study of the adoption of the school-based mentoring model by the Teaching Experience Office of the School of Education at Flinders University as one example of how mentoring is being embedded within faculty programs. Anecdotal evidence suggests that those pre-service teachers who had participated, as Inspire mentors were better prepared for their teaching practicums. As a result, second year education students are placed on 20 days of school experience over two semesters to better prepare them for their teaching practicums in their third and fourth years of their Education Degree.

University to school mentoring, engaged teaching and learning environments,
Higher Education community engagement

INTRODUCTION

The Inspire Peer Mentor Program (Inspire) operates at Flinders University in the southern suburbs of Adelaide, and has received funding from the Department of Family and Community Services and Indigenous Affairs (FaCSIA) Mentor Marketplace Program. The first funding was to pilot the program from 2004 until July 2005 and the second round has extended the funding until July 2009. The experience gained during Inspire's relatively short existence is indicating that a mentoring program between the University and schools located in the local region south of the University, which includes key areas of low socio-economic status, can be a major form of community engagement activity for Higher Education. Flinders University has committed, in the

funding application, to continue to fund the program at the end of the current funding round from FaCSIA. Inspire is implemented out of the Career & Employer Liaison Centre as a strategy for community engagement and received a commendation in the recent Australian Universities Quality Agency (AUQA) report, 2006 as a community engagement strategy for Flinders University. Flinders students from across all disciplines volunteer as mentors and receive training, monitoring and support throughout their involvement. Some mentors can gain 6 units credit for a minimum of 120 contact hours and written assessment.

This paper is written in two sections. The first will use the experience gained from Inspire to discuss the Higher Education sector's involvement in school-based mentoring programs as a strategy for community engagement that creates an engaged teaching and learning environment for both tertiary students (as mentors) and school students (as mentee's) across all discipline areas. Inspire is in the process of embedding mentoring within several degrees (such as education, science and mathematics, legal studies, languages and social work) as both a community engagement and service learning strategy. The second section is a case study that focuses on the adoption of the school-based mentoring model by the Teaching Experience Office of the School of Education, at Flinders University. Anecdotal evidence from pre-service teachers, supervising teachers and practicum assessors suggested that those pre-service teachers who had participated as Inspire mentors were better prepared for their teaching practicum's. As a result, the Teaching Experience Office implemented a school experience placement for second year education students who are placed for 20 days in schools over two semesters in their second year to better prepare them for their teaching practicum's in their third and fourth years of their Education Degree.

INSPIRE AND HIGHER EDUCATION

(A note on terms: In this section, 'children', 'young people' and 'students' refer to mentee's participating in the program. 'Mentors' are all Flinders University students).

Before a discussion on mentor programs as a strategy for community engagement by the tertiary sector, mentor programs themselves need to be considered. The last 25 years has produced an impressive amount of academic literature on mentoring, though there is reportedly a lack of consensus on defining mentoring (Colley 2003). Certainly, in contrast with role modelling, tutoring, coaching and buddy systems, mentoring is concerned with a 'whole of person' development that is actively supported by the mentor: "...mentoring focuses on explicit action by the mentor to assist the young person to reach their goal" (MacCullum & Beltman 2002, p.8). Further, Mentoring Australia (2000) define effective mentoring as:

- (a) a relationship that focuses on the needs of the mentee;
- (b) fosters caring and supportive relationships;
- (c) encourages all mentees to develop to their fullest potential; and
- (d) is a strategy to develop active community partnerships.

While the first three points above are important for the implementation of mentoring programs, the final point is of interest in terms of developing university-community partnerships as a community engagement strategy. Inspire community partners have consistently reported that Flinders University is viewed as a 'community participant' by the southern community due to the implementation of the mentoring programs in schools and alternative education programs (Inspire Feedback 2004, 2005 & 2006).

What does the research say about the benefits of mentoring, and what kinds of mentoring programs are worth the time and effort that they take to set up and implement well? There is a large body of research emerging out of the United States, where formal mentor programs, such as Big Brother/Big Sister, have been operating for 100 years. The research arose from a concern that mentor programs were becoming more prevalent without the accompanying rigour of empirical research to determine if the participants really do benefit, what those benefits actually are and

also to develop bench marks and models of good practice for existing and new mentor programs. With an increase of interest in youth studies during the 1970's and 1980's, research documented the growing number of young people without sufficient adult support to meet adolescent developmental needs (e.g. Coleman, 1974; Timpane, Abramowitz, Bobrow & Pascal, 1976; Lipsitz, 1977; Hamburg, 1987; Steinberg, 1986). Youth programs targeted specific issues (such as homelessness, drug use and teenage pregnancy) and focused on developing specific skills (academic skills for school, job search skills etc), but did (and still do not) allow for the development of a substantial relationship with a supportive adult to support their development through adolescence (Sipe, date unknown, p.1).

If the mentors are students in a tertiary institution, they also become a resource to the school, teacher and young person, in addition to providing a link to the university that is personalised. Thus the university students become a resource for building individual and community capacity. Knowledge and skill transfer occurs through the mentors' relationship with teachers, youth workers and young people and as a strategic intervention to increase school retention rates in low socio-economic areas. If we consider that "...young people who leave school prior to completing year 12 are twice as likely to become unemployed by age 24 than if they had completed year 12" (Bean, 2002 p.2), then it is essential that university's become active participants in programs to improve retention rates in schools as a key strategy to build both individual and community capacity.

Sipe (date unknown) provides a synthesis of 8 years of research undertaken on mentoring programs in the United States and the following section is taken from this synthesis. By looking at ten studies (Freedman, 1988, 1991; Styles & Morrow, 1992; Greim, 1992; Tierney & Branch, 1992; Furano, Roaf, Styles & Brancy, 1993; Mecartney, Styles & Morrow, 1994; Roaf, Tierney & Hunte, 1994; Morrow & Styles, 1995; Tierney, Grossman & Resch, 1995) over the eight-year period, Sipe is able to report the major findings organised around five questions that guided the research. I will respond to the five research questions identified by Sipe with a discussion and analysis of other literature on mentoring, and feedback and evaluation of Inspire over 2004, 2005 and 2006.

Can participating in mentoring programs make important and observable changes in the attitudes and behaviours of at-risk youth?

An impact study on young people matched with Big Brother/Big Sister mentors and a control group of young people waiting to be matched by Tierney, Grossman & Resch, (1995) provides clear evidence that young people can benefit from being involved in a well-run mentoring program. The findings include that the matched young people (called Little Brothers/Little Sisters) were 46 percent less likely than controls (who were young people on the waiting list to be matched with a mentor) to initiate drug use and 27 percent less likely to initiate alcohol use. They were nearly one-third less likely to hit someone and had 50 percent less days of school absenteeism as the control group. These findings have been reflected in anecdotal feedback from Inspire partner-organisation staff and mentors. If there is an increase in school attendance, this could indicate a re-engagement with formal learning that statistically leads to better employment outcomes and, as mentioned on pages 2-3, breaking the poverty cycle that dis-engaging from formal education contributes to. More detailed data collection to measure outcomes for young people involved in programs funded through Mentor Marketplace will be implemented through FaCSIA from February 2007.

Are there specific practices that characterize effective mentoring relationships?

Sipe (date unknown, p.15) found that effective mentors are more likely to engage in the following practices:

- (a) They involved young people in deciding how the pair will spend their time together.
- (b) They made a commitment to being consistent and dependable – to maintain a steady presence in the young person’s life.
- (c) They recognized that the relationship may be fairly one-sided for some time, and may involve silence and unresponsiveness from the young person. The adult takes responsibility for keeping the relationship alive.
- (d) They paid attention to young people’s need for ‘fun. Not only is having fun a key part of relationship-building, but it provides young people with valuable opportunities that are often not otherwise available to them.
- (e) They respected young people’s view point.
- (f) They sought, and utilized, the help and advice of program staff.

The findings across the ten studies indicate that at least 6 months of regular meetings are required to before young people report that they have a trusting relationship with their mentor. These findings support those reported by Hartley (2004, p.15) in Australia, that short-term mentoring relationships, or broken/disbanded mentoring relationships have the potential harm children reinforcing vulnerabilities of young people feeling abandoned. Consequently the importance of appropriate support for mentors in their role is paramount to the success of mentoring relationships. This will be the subject of a research project to commence in 2007 where Inspire mentors are invited to participate in a qualitative research project to identify key factors that increase the retention of volunteer mentors and therefore increase the outcomes for the young people participating in the program and have implications for universities that implement mentoring programs as a strategy for community engagement.

What program structures and supports are needed to maximize “best practices among mentors?”

Across the ten studies the strongest conclusion drawn is the importance of providing mentors with support in their efforts to build trust and to develop a positive relationship with the young people. The structures that need to be in place include orientation and training for mentors, ongoing supervision and support. Sipe (date unknown) found that matching is the least critical element and that requirements to be matched in common interests, demographic backgrounds etc were overridden by the mentor’s approach as mentioned in point two above. Jekielek, Moore and Hair (2002) have also found that the quality of mentoring relationships correlates with good program structure and planning. Interestingly their findings highlight the importance of the mentor and mentee’s interests in the matching process, social and academic activities and undertaking social activities that assist to build trust by taking a ‘youth development’ or youth-centred approach to the relationship. While this seems to contrast with the findings in Sipe’s synthesis of ten research projects as referred to above, it may be that the mentors in Jekielek, Moore and Hair (2002) also exhibited the effective characteristics identified by Sipe. In an early consideration of school-based mentor projects in the U.S., Herrera found that “agency support for school-based mentors is essential in creating strong, long-lasting mentoring relationships that can make a difference in youth’s lives” (2004, p.26, see also MacCallum and Beltman, 1999, pp. 29-30 for features of successful mentoring programs). The feedback in the Inspire evaluations is consistent with these findings. Schools that have good communication and support for mentors have a much higher retention rate of mentors (some returning for 3 years). Schools that do not have good communication with their mentors do not retain their mentors despite the mentors who left early reporting that the support from Inspire project staff was excellent (Inspire Mentor Feedback, 2005). Universities that establish good program structures and supports will also strengthen their relationships with their community partners.

Can mentoring be integrated into large-scale youth-serving institutions?

The ten research projects in Sipe's analysis of mentoring found that not allocating sufficient resources to programs (i.e. youth services attempting to provide mentoring programs on top of their already full work load) did not succeed. This is a vital finding in the context of university to school mentoring programs as a strategy for community engagement. The implication is that if universities implement mentoring programs as a strategy for community engagement, they must be provided with adequate funding for the required coordination, support and follow up to the schools (as partners) and the mentors.

Are there large numbers of adults with enough flexible time and emotional resources to take on the demands of mentoring at-risk youngsters [sic]?

The studies in Sipe's review found that over a six-month period, the BB/BS programs received over 2,500 inquiries, with 1,099 following up with a formal application. Inspire's recruitment reveals similar levels of actual application (less than 50 percent of inquiries lead to attendance at a training session). By being based at a university, Inspire, (like other university-based programs such as Project Partnerships at Victoria University and STAR at Murdoch University) has the whole student body to recruit mentors from. Inspire's partner organizations include two community-based mentor programs operating in the area that are unable to recruit enough mentors for their school-based programs with students at risk. Inspire recruited and trained the mentors, while these partners identify the young people requiring the support. In practice this means that the two local programs can continue to operate, maintaining service provision in the south, rather than losing them. Inspire mentors increased each year from 45 mentors in first semester 2004 to 160 in the second semester, 2006.

The literature cited in MacCallum and Beltman (1999) on school based mentoring indicates that outcomes for young people who are at risk of dis-engaging from formal education includes: academic improvement, increased achievements for particular subjects, increased retention and increased participation in class room or school activities. Other benefits include personal and social development, such as increased feelings of self-worth and self-confidence. This results in students being more willing to attempt school tasks (MacCallum and Beltman 1999). The observations from the partners of Inspire in 2004, 2005 and 2006 concur with these findings. Herrera's study of school-based mentoring in the U.S. is more cautious, stating: "youth involved in school-based mentoring appear to receive some benefits from their involvement, but these benefits may be limited" (2005, p.26), however.

So, can school-based mentoring programs that universities implement target low socio-economic areas as a strategy for community engagement? An evaluation of the Mentor Marketplace Programs reports that mentor programs can build community capacity by contributing to the capacity of participating communities to develop mentoring projects and by developing community capacity more broadly (Wilczynski, Ross, Schwartzkoff, Rintoul, & Reed-Gilbert, 2004). Lastly, the research by MacCallum & Beltman (1999, p.20) and feedback from Inspire mentors in 2004, 2005 and 2006 showed that mentors gained significant community-based experience, some finding employment opportunities from their volunteer work, and 95 per cent of Inspire mentors reported that they increased their communication skills, negotiation skills, conflict resolution skills, planning and time management in addition to their own self-confidence and feeling of being connected to their own community. Inspire received a commendation in the recent Australian Universities Quality Agency (AUQA) report, (2006) as a community

engagement strategy for Flinders University¹. This indicates the validity of Higher Education implementing mentoring as a form of community engagement in low socio-economic areas.

CHANGING THE TEACHING EXPERIENCE – A CASE STUDY

(Note on terms: this section refers to ‘teachers’ as school teachers, ‘teacher mentors’ as a school teacher who is supervising a ‘pre-service teacher’ and ‘students’ and ‘pre-service teachers’ as education students on placement in schools).

This section will discuss how the success of the Inspire Peer Mentoring program has been embedded with the Education Degree, and also provided encouragement for the development of a new model for the teaching practicum program for the Flinders University School of Education.

The decision to introduce a double degree for education students provided the incentive for a staff forum held in December, 2003, to examine the possibility of changing the teaching practicum. The existing teaching practicum program had been operating for some years and was relatively easy to administer. Four year undergraduate students and two year graduate entry students were placed in schools for a four week practicum followed by a six week practicum in their third and first year respectively and both completed an eight week practicum in their fourth or second (final) year. For many students, the first experience they had in a school since their own school days, was not until after they had completed two or more years of their degree course and in some instances, students then discovered they no longer wished to pursue a career as a teacher.

At the same time, a number of students had volunteered to act as mentors for the Inspire in their second year (or first year graduate entry). Anecdotal evidence suggested these students were far better prepared for their teaching practicum and they demonstrated a greater awareness of the general operational aspects of a school. As one secondary principal remarked, the Inspire students ‘knew what went on in the corridors of the school and their experience was not just restricted to a couple of classrooms.’ As the Inspire program developed and expanded with more secondary and then some primary and junior primary schools becoming involved, more second year and first year graduate entry students were gaining a ‘school experience’ that clearly assisted their preparation for the teaching practicum the following year. Many of these Inspire students continued to mentor a student or students over an extended period, even through to the end of their degree.

Flinders School of Education staff advocated promoting schools as ‘Communities of Enquiry’ to support the pre-service (student) teachers in their developmental journey and self-development as co-learners, co-reflectors and co-teachers and to help them develop their professional identity. (Cattley, 2004)

It was recommended that this could be achieved by supporting groups of students in schools rather than students being allocated to specific teachers, providing students with a wide range of in-school experiences and integrating university studies with school experience.

A survey of some 300 teachers from government and non-government schools in March 2005 showed that over 80 per cent of teachers responding to the survey preferred student teachers to complete 20 days of observation in a school as a general ‘school experience’ in the student’s second year (first year graduate entry). This school experience was not to be assessed and was to give student teachers an experience of the overall operation of a school and an indication of the complexity and value of teachers’ work. The new ‘Teaching Experience’ program was introduced in semester one, 2006.

¹ For more information on AUQA go to <http://www.auqa.edu.au> - Full report available at: http://www.auqa.edu.au/qualityaudit/sai_reports/index.shtml. Flinders University under ‘State and Regional Engagement’ p.51.

All second year undergraduate students enrolled in a double degree (and all first year graduate entry students) would be placed in a school for 10 days of school experience in semester one and 10 days in semester two. This 'school experience' would be linked to specific education topics.

The first teaching practicum block of 20 days would be in semester two (school term 3) of the third year of the double degree course for undergraduates (the first year for graduate entry students). All students would then be placed for a six week block in school term 2 for their second (final) practicum the following year. Prior to commencing their second teaching practicum, all students are now required to spend 10 days in the school in school term 1, as preparation for the final practicum.

In addition, a Teaching Practicum Elective topic has been incorporated into the teaching experience program. Offering a range of choices, the teaching practicum elective also gives the Inspire mentors recognition for their work in schools. Inspire mentors are awarded a non graded pass in the teaching practicum elective after completing a minimum of 120 hours of peer mentoring, completing a reflective journal, or a 1,000 word reflection of how the experience has benefited them as a beginning teacher and gaining a brief report from their school.

The overarching notion was to develop a partnership with schools where the professional experience is seen as an essential element of teacher education and a positive way to create links between university students and staff and professionals in the field.

The recognition that in-school learning is the focus of professional experience, rather than mere assessment of the student teacher, creates a very different environment from traditional supervision practices. For pre-service (student) teachers, being welcomed into a school community leads to learning and professional growth that cannot be simulated in the university setting. The experience allows them to observe teachers in all aspects of their role, experiment with pedagogical practice and begin to understand how supportive learning environments are established.

Changing the language and terminology of the teaching experience was seen as a way of influencing changing attitudes and practices. School experience is different from a teaching practicum, which by necessity, has to be assessed. Supervising teachers are now referred to as teacher mentors and the university supervisor is now a university liaison to reflect the new role of linking university studies with the school experience.

Feedback from teachers who take on a mentoring role is overwhelmingly positive (Churchill & Walkington, 2002). They speak of the satisfaction they receive from fostering a future teacher. Teacher mentors also speak of what they learn from the student teacher and about how they are challenged to reflect on their own practices.

The trend towards a more broad based school experience is clearly developed in the OECD publication, *Teachers Matter: Attracting, Developing and Retaining Effective Teachers*, OECD 2005

In particular, there is evidence that teachers who receive increased amounts of field experience remain in the profession at significantly higher rates than those prepared through largely campus-based programs.

The duration of the field experience varies widely. Some programs provide for brief periods of classroom experience, others are year-long internships with regular teaching obligations. Most often, practice teaching occurs following coursework near the end of the teacher education program. However, this training is increasingly being incorporated throughout the entire teacher education program, especially in concurrent programs, and its scope is being broadened. Teacher trainees are asked to participate in school activities, observe classrooms, tutor young people and serve as teacher aides prior to actual practice teaching.

The trend towards establishing specific school and college or university partnerships that create linkages between teacher education coursework and school practice is gaining ground.

Actual school and classroom experience has the potential to provide teacher trainees with insight into the complex dynamics of schools and teaching, and opportunities to learn about strategies and their capacities for implementing them.

The contribution of field experiences to teacher preparation is enhanced when they are well prepared and based on a close co-operation between the teacher education institution and the schools; when student teachers are well prepared in subject matter and pedagogy before practice teaching; when teacher trainees are given opportunities to conduct research in the classroom, and to integrate the course-based and field work components; and when both teacher educators and supervising teachers receive appropriate and often shared training. (OECD, 2005)

Starting the new model for Teaching Experience, incorporating the new School Experience and a changed Teaching Practicum format, has not been without its challenges. It was far easier to organize and administer the former teaching practicum format.

A member of the senior leadership team from one metropolitan secondary school remarked that establishing the new school experience program into their whole school program had taken a significant amount of extra work, but that extra work had been worth the effort in creating a far superior teaching experience for the student teachers. He especially noted that second year students teachers had 'crossed over the line' from being a student teacher to becoming a beginning teacher much earlier in their degree program.

One principal of a metropolitan primary school refused to take university students for the school experience program as 'it was too much extra work'.

Principals of country schools attended an information session at Flinders University and voiced an opinion that the new school experience was 'a metropolitan based program'. Modifications had to be made to the structure of the school experience, originally intended to facilitate visits to schools on a one day a week basis and linked to specific education study topics at the university, to allow students to gain experience in country schools, especially relevant as the majority of teaching vacancies are in country locations.

There were problems for students who worked a part-time job and now needed to make time to visit a school on a one day a week basis, similar problems for students with children, for students who rely on public transport and for students who attended university part time.

Initial confusion occurred with the use of the new term 'school experience' along with the term 'teaching practicum'. When senior school personnel were first asked to accept students for school experience placements, they often mistook the placement to be a teaching practicum. When later asked to accept teaching practicum placements, many principals and school coordinators remarked 'we already have 10 of your student teachers in the school – we can't take any more!'

The number of actual places available in schools presented an additional challenge. With over 250 second year and around 90 graduate entry students to place, the first indications were that fewer than 200 places had been secured. Many hours of telephoning schools and, at times, pleading with senior school staff after lengthy explanation of the benefits and intentions of the school experience, were necessary to gain the additional places required.

Expectations by academic staff also needed clarification back in the university. Some academic staff responsible for linking the school experience to the students' university studies expected far too much of the schools and the students and have had to review their students' workloads. Also, an inconsistency occurred between the expectations for assessment by the topic coordinators for the middle school and secondary school topics and the topic coordinators for the junior primary

and primary topics. Students became frustrated and confused while these inconsistencies were resolved.

In spite of the difficulties and challenges experienced by the Teaching Experience Centre staff, early indications are that the new school experience is having a positive influence on the development of students' understandings of the school learning environment, on the development of their professional skills and on their awareness of educational settings as their future worksites.

Students who in the past had often questioned the relevance of some university topics are now acknowledging the links between their studies and the way children learn. In their curriculum studies tutorial workshops each week, students are enthusiastically talking about their school experiences and showing a depth of understanding and reflection not previously demonstrated.

While the difference between schools was first seen as a further challenge to students, it soon became apparent that students were developing a richer understanding of the nature of schools when they discussed their experiences with their peers and with their university tutors.

Furthermore, teachers and schools are developing approaches to collaborative mentoring rather than the previous 'one teacher to one student teacher' model and, in some instances student teachers have been encouraged to keep in touch with 'their' school throughout their teacher education.

CONCLUSIONS

In conclusion, if mentoring programs are adequately resourced, with 'good practice' structures and support, mentoring is an exciting strategy for community engagement for the tertiary sector that has been acknowledged by the AUQA framework. By using tertiary students, university's can directly contribute to increasing retention rates in their local secondary schools and build the capacity of local programs, staff, young people and their own student body. Additionally, mentor programs can be embedded both across all disciplines, and within specific faculties to involve university students in volunteer work in their own communities. Schools can access tertiary students and Higher Education sites as a resource for the community and create opportunities for university students across all discipline areas to develop their graduate skills. In the words of one of the Principals involved: "It's win-win all round!" (Lindsay Bowey, Principal, Forbes Primary School).

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Your place or mine? Evaluating the perspectives of the Practical Legal Training work experience placement through the eyes of the supervisors and the students¹

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BACKGROUND

In order to qualify as a lawyer in Australia, each law graduate must complete a recognised practical qualification.² In 2002, the Australasian Professional Legal Education Council (APLEC) published a recommended set of competency standards which all entry level lawyers should meet in order to be eligible to be admitted as a legal practitioner.³ Upon completion of a recognised and accredited course of Practical Legal Training, potential lawyers must apply to the Supreme Court of the state in which they wish to practise for admission as a legal practitioner. The admission application process is rigorous. Not only does an applicant have to demonstrate completion of all of the academic and practical requirements, but an applicant must also certify to being a 'fit and proper person' to be admitted as a legal practitioner.

In Australia, each state and territory has different admission requirements but this is slowly changing as the country attempts to adopt a national profession. This is still not a reality, but we are getting closer. A major step in the creation of a national profession is the fact that each admitting authority has now adopted the APLEC competency standards.

The APLEC National Competencies prescribe a program of academic study incorporating at least 90 hours of workplace training⁴ as a minimum for all students who complete PLT at Graduate Diploma level or equivalent.⁵ So wherever a student completes Practical Legal Training, there is a work experience Placement involved.

The work experience Placement is an integral component of any Practical Legal Training (PLT) program. At Flinders University, our Placement requirement is 225 hours in a legal office. This

¹ This paper has been compiled for the National Association of Field Experience Administrators Annual Conference to be held at Flinders University and Tabor Adelaide on 16 and 17 November, 2006.

² Some jurisdictions enable applicants for admission to have completed Articles of Clerkship with a principal solicitor, but the majority of states and territories require a PLT qualification.

³ Students at Flinders University complete a Bachelor of Laws and Legal Practice in which the PLT component is at Graduate Diploma level but is taught within the undergraduate degree.

⁴ Australasian Professional Legal Education Council and the Law Admissions Consultative Committee, *Competency Standards for Entry Level Lawyers*, November 2000, updated February 2002.

⁵ The Practical Legal Training (PLT) programme at Flinders University Law School is integrated within a Bachelor of Laws and Legal Practice (LLB/LP) and allows our graduates to become formally admitted as members of the legal profession without undertaking any further training. The PLT component of the course is at post-graduate level (equivalent to a Graduate Diploma in Legal Practice) but it is part of the LLB/LP. In other words, there is no separate qualification awarded for the PLT course as the course is intimately integrated within the substantive law course. The Flinders LLB/LP is more than just an LLB. It is the equivalent of an LLB plus a GDLP. For this reason, we are unable to offer our PLT course to law graduates from other universities. The PLT course is only available to students who complete the entire LLB/LP at Flinders.

may be completed full time or part-time (see below) and is usually unremunerated. Placement supervisors must have been admitted as legal practitioners for a minimum of five years.

Timing of the Placement

At Flinders, students complete their work experience Placement within the last twelve months of their studies within a topic called *Legal Practice Management*. They are required to attend a full week (9 a.m. to 5 p.m.) of classes covering practice management, time management, trust accounting and Placement preparation. Students may commence their Placement any time after that first week of preparation, which is held in early February, before the start of the official academic year.

There are three possible ways of organising a Placement:

1. Students may find their own Placement and complete it at a time convenient to the student and the supervisor; or
2. Students may complete a Placement within their existing employment, if they are employed in a legal office and their supervisor has been an admitted practitioner for five years or more; or
3. Students may apply to have an allocated Placement during one of three specific Placement blocks during the year.

Students finding their own Placement may negotiate to do the Placement on a part time basis, if that is acceptable by the supervisor. There is a minimum requirement of sixteen hours per week. Students who have an allocated Placement are generally expected to complete the Placement on a full time basis. Many law firms and other legal offices (eg the Director of Public Prosecutions, Crown Solicitor's Office) prefer to have students on Placement on a full time basis. This creates several difficulties for many students.

- Many mature age students have children and find attending a Placement full time extremely difficult. Many cannot afford to pay for child care during this time.
- Many students are not financially independent and have to work to survive, pay their rent/mortgage and put food on the table for themselves and their families. One student put it this way:

Understand that this Placement does not pay. Therefore most students, particularly those living independently, cannot afford to take 6 weeks off work. I worked 7 days a week for 6 weeks or so and was exhausted; I didn't think I got as much out of my Placement as I could have because of this. [We] should have [been] given an option to only work 3 days per week for 3 months.

The difficulties experienced by students wanting to do their Placements part time reflect the overall conservatism of the legal profession which has been very slow to accept the notion of part time work. The literature on this topic would fill another entire paper but it is important to mention in the context of the student perspective of the practicum. One student observed:

Whilst I can understand the rationale around the decision not to help those of us seeking part-time placements, I do feel that since we are 'upholders of the law' the legal profession should be more mindful of discriminatory practices.

The Purpose of the Placement

Many students are keen to secure a Placement in a legal office where they would ultimately like to work. At first blush, this approach is understandable in an increasingly competitive market place. Many PLT students have very fixed ideas about the type of work they would like to do and the area of law in which they would like to practice. These students will seek a Placement which matches their ideas about their future.

It is of concern that this component of the educational journey is sometimes seen as little more than a six-week job interview, with an emphasis on potential permanent future employment overshadowing the learning of important practical legal skills.

Students who secure a Placement in a firm where they would ultimately like to work do have the advantage of being able to display their skills and talents over an extended period of time. Many are offered full time employment as a direct consequence of their Placement. On the other hand, students who do not secure a Placement in their “dream firm” may be disappointed, and lacking in enthusiasm to complete a Placement in an organisation which is not where they see themselves in the future. By imbuing the Placement with a negative overtone, these students are denying themselves the primary purpose of the Placement: an opportunity to experience life as a lawyer.

Whilst PLT providers are indebted to the legal profession for providing Placements for our students, we need to be pro-active in educating the current profession about the needs of tomorrow’s profession. Good lawyers are not necessarily good teachers. The notion that students “had better see what it is like in the real world” is short-sighted and unrealistic in its naiveté. This paper analyses the real gaps between the expectations of students on Placement and the supervisors who host them.

Best educational practice involves both summative assessment and formative assessment. Summative assessment can be likened to a gate-keeping exercise; the student passes or fails in a particular exercise or competency. Formative assessment assists deep learning. In the legal context it would involve reflective practice and learning by doing tasks, asking questions and observing senior practitioners with expertise. The Placement program is designed primarily as formative assessment. The summative assessment is carried out by the PLT providers.

There are many differences between learning in a classroom and learning in a work experience environment. Students have to transform their learning. The **objects** of learning (the laws, the rules, the theory) become the **means** of the workplace. Suddenly, a wide range of knowledge has to be processed and integrated. The student changes roles from observer to actor. Some commentators call this a change from “cold learning” to “hot learning”.⁶

There has been much research conducted indicating that assessment drives learning⁷ and that assessment is the most significant influence on the quality of student learning. In the context of the Placement, the ‘assessment’ involves feedback from the supervisor. A student who produces work that disappears onto a partner’s desk and is never mentioned again will learn little from the experience. A student who produces work and then receives some feedback about it will learn a lot. The feedback does not have to be extensive. It might just involve a quick email saying *That research you did was very useful* or a note on the bottom of some settled pleadings or a re-drafted letter saying *Good effort. Have a look at the changes I have made*. It need not involve vast amounts of time, but makes a world of difference to students who are uncertain about the quality of their work.

The purpose of the Placement is to provide a student with the opportunity to observe at first hand how a lawyer works. It is supposed to be about learning the ropes in an unthreatening environment. Students should feel comfortable to ask questions, observe practice and procedures from an experienced practitioner and to learn from any mistakes they might make. Is this what actually happens? Is the focus on providing a sound educational environment for the student, or does the student have to ‘sink or swim’ in shark-infested waters?

⁶ See Lesley Cooper, Janice Orrell and Margaret Bowden, *Workplace-learning management manual: A Guide for Establishing and Managing University Work-integrated Learning Courses, Practica, Field Education and Clinical Education; Flinders University Staff Development and Training Unit, 2003.*

⁷ See for example, Val Wass, Cees Van der Vleuten, John Schatzer and Roger Jones, *The Lancet*, 24 March 2001; 357, 9260; Health Module p. 945; and also Val Wass, *British Journal of General Practice*, June 2005, p. 420 – 422.

Tasks to be Completed whilst on Placement

Whilst on Placement, students must complete a 'Handbook' where they record their hours worked and also make notes about the completion of the various tasks they are required to accomplish. Being on Placement encompasses more than just being in a legal office for 225 hours. Students are expected to participate in a range of tasks, including:

- Research
- Observing interviews
- Observing the provision of advice to clients
- Observing court hearings
- Observing a negotiation
- Discussing practice management
- Analysing risk management practices
- Drafting various documents
- Attendance at court registries and public records offices

Wide choices of tasks are given to students to cover the range of practice areas in which students might find themselves working. For example, not all students will be placed in a firm where there is a lot of court work; some students may complete their Placement in a Criminal Law Firm where there is very little Civil Law practice to observe. Students may choose from a range of tasks in order to complete the requirements.

In September 2006 I hosted a focus group of students who had completed their Placement in 2006. As a consequence of the discussions within that focus group, I have planned some changes for the Placement Handbook for 2007, as follows:

- Changing the name of the 'Handbook' to a 'Placement Journal'
- Inclusion of a reflective element to the Journal⁸
- Inclusion of more choices in the compulsory tasks
- Clarification of some elements of the Journal

THE STUDENT PERSPECTIVE

Student feedback about Placements is, in the main, extremely positive. Comments like: *This was the best part of the whole PLT program* are common. Students get very excited about working in a real legal team, in a real office with real clients. The challenges and pressures of legal practice are usually met with nervous excitement. Written feedback suggests that for many students, the Placement reinforces their decision to become a lawyer and most can't wait to be admitted and get started. The transition from student to lawyer is a rite of passage for many, and the sense of achievement in completing the Placement is often verbalized in the unsolicited letters and emails I frequently receive. Quite clearly, students relish the opportunities that the Placement provides and are very grateful to their host supervisors for sharing their time and expertise.

Time and expertise are the two major qualities which Placement students want most from their supervisors. A common thread woven through the feedback I receive is the fact that students acknowledge how busy their supervisors are. Students are grateful for the most minimal time that supervisors might share with them. There seems to be an inherent acceptance that "my supervisor

⁸ This will be based on a practice I have already adopted in my Clinical Legal Education classes which are based on a pro bono legal advice clinic based at the Adelaide Magistrates' Court. See Spencer, R., *The Adelaide Magistrates Court Legal Advice Clinic – An intimate look into how it was set up and how it operates*, (2002) Newcastle Law Review Volume 6 No 2.

is busy and mustn't be disturbed", but "if she/he does spend some time with me, I must be forever and undyingly grateful". Some firms take on Placement students without recognising the responsibility that this really entails, often leaving students to their own devices. It is not unknown for partners in private law firms to treat Placement students very badly, having done very little to prepare for the student's time at the firm. Many regard the visiting student as a source of free labour rather than engaging in an educator/student relationship.

Many students anguish over their Placement, knowing that it might be the doorway to a full time position. One student says:

To many students, the legal Placement is approached with trepidation ...with a general expectation of being the 'go-fer' for six or more weeks and having to somehow keep their head above water at the same time. This is not how the Placement should be viewed – it should be an instructive, engaging experience as students decide what direction they want their legal career to take.⁹

The most common complaint I receive from students about their Placement is that they have received little or no feedback from their supervisor, and operate on the basis that "no news is good news". In other words, if there is no feedback, the student may assume that their work is satisfactory. If something is wrong, they presume that they will hear about it.

Many students receive no feedback at all until the end of their Placement when the supervisor signs their Record of Attendance¹⁰ and perhaps makes a comment. It is most unfair for students to have to wait until they have finished their time with their host firm before they receive any acknowledgement about their performance. It is doubly disappointing for those students whose supervisors who do not even deign to write a comment at all.

It is certainly no news that lawyers are busy people. It is equally unsurprising to read feedback from students that partners in law firms (usually designated as Placement supervisors) are extremely busy racking up billable hours. One of the human costs of case flow management for litigation lawyers (solicitors in particular) is the enormous pressure placed on them to complete work in accordance with court-ordered deadlines. Many lawyers will not emerge from their offices for hours at a time. For the work-experience student, this leaves little opportunity for interaction.

Therein lies the rub. The Placement student feels, "How am I supposed to learn anything? I hardly saw my supervisor, and she was never available to discuss anything. I gave her my work but I never knew what she did with it, if what I did was OK, or if it was any good." The supervisor will say, "I am so busy. I have so much work to do; I have a budget to meet, and incredible pressure from particular clients. I don't have time to sit down with students."

Of course, this is not always the case. There are many supervisors who go out of their way to accommodate students, involving them in their work, meeting clients, and offering valuable feedback on the work conducted by the student.

One student noted of the supervisor:

He often had a chat with me about how I was going, what needed to be done etc.

Another student said:

Supervision provided by the firm was very good. He supervised any work I did, explained where I was going wrong and also complimented me when I had done a good job.

⁹ 2006 Placement student

¹⁰ Students at Flinders University keep a Placement Handbook which they submit at the end of the Placement after recording the work they have done. Students must complete 225 hours in their Placement office and within that time must complete a number of specified tasks.

Many students in larger offices work with more than one supervisor, as this student explains:

I rotated among all partners and associates for work and received supervision and guidance from each of them rather than one single person.

One student has described the need to learn by osmosis” because his supervisor never took the time to discuss tasks with him or explain what was happening on a file.

THE SUPERVISOR’S PERSPECTIVE

Senior practitioners who supervise Placement students are aware that the student is there to learn. But what exactly is the student going to learn, and how? Supervisors with the best intentions might observe after six weeks that the time has just flown and they are very sorry that they didn’t spend more time with the student. This is indicative of the quandary in which many lawyers find themselves. As members of a profession, all lawyers have a duty to assist new practitioners. They are ethically bound to assist in the education of the new generation. Just opening their doors and allowing a student to sit at one of their desks for six weeks is not enough. Supervisors must take an active role in ensuring that the Placement student is learning through the experience.

One attitude which the observer might take to this discussion is that the student needs to learn that this is what practice is actually like and in reality there is no time for discussion. The work needs to be done, the calls must be returned and the bills must be sent out. Indeed, when I first started in my position as Director of Practical Legal Training at Flinders University, having come from a commercial legal background, I was keen for students to understand that working in legal practice is a pressurised situation. My philosophy behind my teaching was to instil in students the importance of coping with working under pressure, dealing with difficult people and meeting tight deadlines.

Now, eight years on, I acknowledge that these factors are critical, but I also believe that there are aspects of the legal profession that should be changed, and that the best change can come not only from within, but from the ground up – from the new generations. Organisational change does not have to happen from the top. PLT students have the power to create change – an important factor to note given that they are the supervisors of the future. Their educational background has usually been vastly different from that experienced by their supervisors. Taking the time to listen to them and answer their questions may yield surprising results. Students must be encouraged to articulate their needs: feedback, reassurance and acknowledgement where it is due.

Students should note that the supervisor is often acutely aware of what the student is doing and is actually watching, even when the student thinks the supervisor is too busy to notice. Many supervisors expect Placement students to be reasonably autonomous and expect that they will ask questions only if they need to. On the other hand, as pointed out by one student, supervisors *just need to be aware that it can be quite stressful going into a new work environment especially for only six weeks so[they need] to be very clear in communicating with students.*¹¹ Also, Placement students may need to constantly ask questions, especially in relation to procedural or administrative matters, so there should always be someone available to answer those questions which may involve trivial administrative details but can hold up a whole job if the student doesn’t know the answer.

AN IMPORTANT SEGUE INTO LEGAL PRACTICE

There is no doubt that the work experience Placement is an important segue into legal practice from what might be described as the cushioned environment of the student. Many students would not see their student experience as cushioned. After all, they have had to do a lot of hard work to get this far. But students who have come to expect constructive criticism and feedback on their

¹¹ Survey response, 2001

work are often perplexed and confused by the apparent lack of feedback provided by supervisors who are generally untrained in this important aspect of any educational experience.

Some senior lawyers are born teachers who share their expertise with a generosity of spirit which is usually reflected in the respect they earn from their peers. The student who is placed with such a supervisor is indeed fortunate. I am always thrilled to hear from students who have loved their Placement experience, particularly because of the time they spent with their supervisor who talked to them, helped them, advised them, and offered constructive feedback on their work. I hasten to add that such an experience is the majority experience.

In a survey conducted in 2001, students were asked to comment on whether their supervisor provided adequate supervision. Many students were very satisfied with the supervision received:

Yes. I was given numerous opportunities to work with any of the solicitors in my section and they were mindful of the tasks required of me.

Yes. There was a weekly review each Friday.

Yes, took time to help me understand.

On the other hand, the “sink or swim” experience is a common one for many PLT students embarking on their first foray into the legal profession. Whilst some thrive on this challenge, others are at best intimidated and at worst, put off joining the profession completely. For most students, it is not the actual work which they find the most challenging, but rather dealing with the different personalities in the office and approaching the supervisor to ask a question.

Some students did not feel that their supervision was adequate. For example:

Did not provide any feedback, only gave me things to do.

In the last two weeks the supervisor had no time to discuss questions/matters/problems.

I think the supervisor ignoring a PLT student is very bad practice.

Minimal supervision/help. Greater explanation of what to / not to bill would have been helpful.

Yes, talked about cases, gave me exercises to do ‘for the experience’; didn’t however receive a lot of feedback from my supervisor but was told by the others that no news was good news. That said, I couldn’t have been perfect and so more feedback would have been good, but given time constraints, stress of being a partner I understand.

One wonders what sort of a role model is presented in this latter case. Are we teaching our new lawyers that this is the way it always will be? When this student becomes a partner, will s/he treat Placement students this way? We should be encouraging change to this culture. “My supervisor was too busy to give me feedback” should not be acceptable.

A common response to this article by those in the legal profession to students dissatisfied with their Placement experience is that they are “biting the hand that feeds them.” I would urge those who react in this way to think again. South Australian students are not only unpaid for six weeks of work, but they are actually paying to be there. The Placement is a compulsory part of a topic for which in 2006, Flinders University students paid \$1,361 to be enrolled.¹² The topic consists of five days of tuition and placement preparation, a six week placement (forty-five days) and a one day seminar on Risk Management. This equates to a total of fifty-one days. This costs each student \$26.69 per day, or \$133 per week. The six week Placement costs just over \$800. Students have the right to enquire as to whether or not they are getting value for money.

¹² Usually deferred and paid through the taxation system. Those who are able to pay up-front receive a 20% discount.

BREAKING THE MOULD

The “I’m a partner; I’m far too busy to talk to you” attitude is demonstrated not by all supervisors, but by many of them. How do we break the mould and escape from this attitude? The argument that “this is my office and I’ll do things my way” is a strong one. It takes a brave student to counter it. A student who has no desire to be offered employment in the Placement office might feel comfortable in challenging a supervisor with reactionary ideas, but many students are eager to be offered employment anywhere, and so are open to exploitation because they do not want to offend their prospective future boss.

Students are acutely aware of Placements leading to employment. One student said that supervisors should *formalise the induction of students on Placement so that those who successfully complete Placement may be considered for employment, as induction would ensure that student/employee can be best utilized by employer/firm. Therefore Placement should not be considered as a temporary measure.* This may be relevant in a large commercial form, but not in a community legal centre or sole practitioner’s office, but it demonstrates student awareness of their role in the bigger picture.

Knowing how to provide constructive criticism is not an innate quality. Supervisors need to learn this important skill. They also need to know how to give feedback in order to get the best out of their Placement student. They need to know how adults learn. Some instruction in the profile of the “average” law student would also be useful. Placement preparation, ideally, should include preparing the supervisor as well, but time and resources are the enemy. How many senior lawyers would give up an afternoon to come to a seminar on “How to get the most out of your Placement student?” or “Ten Tips for Managing the Student on Placement”. Probably not many.

But they should at the very least be provided with a written guide about making the student feel welcome, giving feedback, giving constructive criticism and spending short periods of time each day in discussion. Just popping one’s head around the student’s door to say “How is it going?” should be simple enough for anyone and would be a good start.

What do Supervisors expect in a Placement student?

Supervisors in law firms are still predominantly entrenched in the misguided notion that law students are straight out of school (and therefore in their early twenties by the time they do a Placement), study full time and are supported in some way other than having to earn their own living. The reality is that many law students already work full time or part-time. Some have been working in legal offices for several years before they complete their Placement. Many have children to support; others have dependents like elderly parents or disabled siblings. Many are in their thirties, forties and fifties, and have already held senior positions in other jobs before a career change. Many are sole parents with school-aged or pre-school aged children who are living in poverty during their studies in the hope of providing a better life for themselves and their children. I have one student who is a sole parent with three children who studies and sleeps in the kitchen of their two bedroom house. The notion of the carefree full time student who existed in the sixties, seventies and eighties barely exists any more, yet some Placement supervisors seem to be blithely unaware of this.

In addition, the notion of becoming a lawyer is still overwhelmingly driven by the idea that this means working in private legal practice. This is a goal to which some PLT students aspire, but not all. Many are keen to pursue careers in government, in community legal practice or in international organizations such as Red Cross International, Amnesty International or the United Nations. They should be encouraged to “shop around” and gain experience in as many different legal office environments as possible, and not be ignored simply because their ultimate career aspirations do not encompass the Placement office.

I have been collecting feedback about Placements from students since 1999. It is my experience that the overwhelming majority of students relish their time on Placement and are full of

enthusiasm about it when they finish. A common reaction to the end of the Placement is that the student is very eager to actually start working. Most are full of praise for their supervisors; many enthuse that the Placement was the highlight of their studies to date. The most common sentiment expressed is extreme satisfaction with observing how all the theory that they have learned works in reality. For some students though, the Placement can be a stressful time for various reasons. Some do not enjoy it. Some discover that they do not wish to practice law, or that there are certain areas of law in which they do not wish to practice.

For those students who report a less than positive attitude about their Placement, the major reason for their lack of satisfaction is usually the same in each case. The most common complaint, from year to year, is lack of feedback from supervisors. Conversely, those students who had a very positive experience attribute good communication and feedback from the supervisor as a major reason for enjoying their Placement.

In the 2001 survey, students were asked: **Did you feel comfortable approaching your supervisor with any problems/issues/needs?** The answers were varied:

Yes. My supervisor was very approachable and able to steer me in the right direction.

Approachable but very busy. I often felt as though I was imposing.

No. Never easy to organize meeting with my supervisor (talked to other practitioners instead).

Not enough feedback for what I have done.

I had several problems. They were not resolved. PLT students are really isolated. It is difficult to ask for help dealing with difficult people when you are an outsider.

No – I only received positive feedback on my performance and constructive criticism.

He wasn't intimidating, only busy. I tried not to bother him too much, although if I felt it necessary I had no problems in asking for clarification on matters. Easy to talk to and I gather is a good teacher.

I gather? One wonders what teaching methods might be used or indeed when?

The Role of the Supervisor: Teacher or Overseer?

The survey responses beg the question: What is the role of the supervisor? Is it acceptable that the supervisor is there only in case of emergency and to “sign off” at the end? Should it be essential that the supervisor really observes the student? It would be naïve indeed to suggest that supervisors should abandon their fee-earning time in favour of devoting many hours a day to a newcomer who is not yet generating any fees at all (or very few). Another very important consideration is the fact that proper supervision of a student is a costly exercise, as it takes the supervisor away from tasks that would be producing income.

I pose two questions:

1. If the competency standards insist that students be immersed in legal practice amongst practitioners who have no teaching qualifications and no educational training at all, are we in effect just perpetuating bad habits?
2. If the admission authorities insist on students completing a Placement as part of their training, have they asked the supervisors what they think about this?

We all know that great lawyers do not necessarily make great teachers. We have all sat through enough boring “guest lectures” from a baby boomer “senior practitioner” to be excruciatingly aware that some lawyers are at their best behind a desk. In order to properly train our future partners and senior members of the profession, shouldn't the teachers have some training in how to teach them? Generation X and Y graduates are not satisfied with the world the baby boomers

are offering to them. We read regularly how graduates are not prepared to work longer and longer hours, give up their weekend sport and have no social life in exchange for the promise of partnership in ten years time. They want quality of life now. Similarly, they want an acknowledgement of their presence now. Whereas their supervisors might have accepted being hidden away in a back room somewhere and speaking only when they were spoken to during the glory days of their Articles, today's new lawyers are having none of that. They have grown up on a diet of feedback and constructive criticism. They have learnt since pre-school to say "Stop it; I don't like it", to ask for help and to be demonstrative about their feelings. They are not about to stop questioning their world when they have been trained to do just that. They want attention. They want to be noticed. They work very hard – probably much harder than their supervisors ever did – but they want acknowledgement and recognition for it. Most of them probably did much better at school than their supervisors did. These are smart, articulate, ambitious, multi-skilled people and they want feedback! I support their demands.

Advice to supervisors

The students themselves are best placed to provide advice to senior practitioners who supervise student Placements. Over the years, I have collected such advice as recommended by students. This is a sample of what some students have said:

Be patient.

Have areas and priorities established in advance and have someone available to support the person on Placement on a day to day basis (admin staff if no solicitors available).

Spend some time with the students – give feedback. Be aware of feelings of inadequacy – it can be intimidating when doing some work on a matter and not knowing that it is useful.

Remember that the theoretical is vastly different to the practical – encourage students to try as many practical things as possible.

A good, thorough induction – no more than about 1 hour going through the firm's protocols and machinery would really help for orientation. Feedback wherever possible and fewer big tasks is better than lots of little things if you've already done the little thing before. Filling in time sheets is a good idea.

It would be beneficial to receive a copy of the firm's office policy/procedure manual on the first day, so as to ensure we don't feel unsure of ourselves regarding admin processes. Feedback should be given on work done, to ensure improvement.

Be approachable. Understand that we don't know much in relation to many tasks that we have to do so you have to provide adequate guidance and spend time with the student to teach them properly.

Remember that some students have conflicting responsibilities and work commitments.

Supervisors should be given information regarding the level of experience a particular student has in a law office. This would then presumably influence the types of tasks provided and the level of supervision required.

Utilise the students. Give them responsibility. Brag, boast and share knowledge with others. Students learn by example.

I recommend that the firm should make sure the practitioner is really willing to teach the student. If the practitioner takes the time to teach a student but is really ignoring the student, it is a disaster. The student will feel lost.

Supervisors should remember what it was like to be a junior and take just a little time to show you your mistakes and how things could be done better.

Don't try to ignore them as they have not much experience. They need help and understanding.

Involve students in your work as much as possible. Don't limit their contact with your work to the required tasks. Explain how you go about doing your job to them, so they can see where their tasks fit.

I think supervisors should not presume that we know how to do everything.

Have specific tasks set aside prior to Placement, so if you are busy and can't think of anything, there are tasks you can just give the student to complete. Also, continual reassurance makes the students feel as if they can ask questions and that we are doing the right thing. Remember to take them to as many court proceedings as possible and to interviews with clients or negotiations with opposing counsel.

Expose students to as much as possible and the supervisors should always remember it's about the students gaining experience.

Students need adequate feedback. Sit down with student for at least an hour a week to discuss any issues. My supervisor was very approachable and made time to sit down and speak with me. This was very positive for me.

Develop a formal structure for Placements. Ensure that students are doing the work required. Give the handbook to the supervisor, so that the supervisor can give the student the required tasks. The supervisor should be required to ensure that tasks are completed. Take a greater interest in the student, they are not there to serve you, they are there to learn from you!!!

Stress to supervisors the importance of the Placements and remind them that we are there to learn not to provide them with FREE labour!!!

More feedback and guidance.

It is a good idea to "buddy" the student with a recently 'out' solicitor as I found they are probably more in tune with where you are at. E.g. they know instinctively many of the questions you have and are very keen to put you at ease (that was my experience). They are close enough to the uni days to know what you don't know which is good.

Engage the students in real tasks i.e. use their work other than their research, like their draft letter, affidavit etc. It may mean more supervision but the students learn more and also find it more fulfilling. Expose students to the various precedents, court procedures, and allow them to be your "shadow" the few weeks they are there.

Give feedback. Make sure student feels comfortable approaching other employees.

Remember that we are new/juniors and some basic things to practicing solicitors just aren't known to us or can't be taught at uni. Conversely we are capable of being given responsibility and need a little testing. (Not juts photocopying like some students get!).

Perhaps to make sure they don't get bogged down with too much file work from different partners! This was one problem I experienced; that different people gave me different tasks to do for them, with no indication of their urgency and no apparent communication between them!

From time to time, I have also surveyed supervisors in relation to their perspective of hosting a Placement student. One question I asked was: Did you feel that you had the time to provide adequate supervision/help? It is interesting to note that very few supervisors ever respond to these surveys! However, some of the answers have been:

Yes. The help given balanced the time lost to supervision.

Yes, although in a busy legal office you can always do with more time.

Generally it was fine, but occasionally work pressures prevent spending as much time as would be ideal.

Yes, although it was difficult at times.

Yes. I expect other practitioners in the firm to assist in this regard, particularly if they are assigning specific tasks to the Placement student.

Advice to future students

Students have come to expect that the Placement may be challenging. Even though they might prefer more feedback sometimes, they are quick to develop coping strategies. In response to the question, What advice would you give to future PLT students about Placement? students often write comments like: 'Do not be shy to solicit work and ask for feedback'.

One student suggested that future Placement students:

Enjoy and don't be afraid to launch into the unknown. You must be a bit of a go-getter and show initiative and interest and request work/more difficult things to do or you'll probably only get a lot of photocopying practice!

And another:

Take the initiative and ask to be part of what is going on.

I have also asked supervisors what advice they would give to students:

Make enquiries before committing to a particular firm.

Choose an office doing work which interests you. Not a great many practitioners would have wanted to come here. My student had a psychology degree as well and her interests dovetailed beautifully with my work (Office of the Public Advocate).

Use it as an opportunity to get good practical experience and treat it seriously, but have fun doing it. Most lawyers are human and have thawed out a lot compared with some of the pompous, stuffy individuals I encountered when I started out in '69 – '70.

Indicate your main interests at the outset.

Think, talk and act in a professional manner. The Placement is a great opportunity to impress a prospective employer.

Enjoy it!

RECOMMENDATIONS FOR THE FUTURE

As a consequence of collating data and listening to many students talk about their Placement experiences over the past seven years, I have reached two major conclusions:

1. Placement preparation for students is critical and must include guidance and training in how to ask for feedback.
2. Supervisors need Placement preparation as well as the students. Ideally this would be in the form of attending a seminar on giving feedback, managing student expectations, and being approachable and sharing their expertise. If attending such a seminar is impractical, at the very least a short brochure covering these issues should be made available.
3. It is important to conduct focus groups with Placement students each year and to solicit feedback from them in order to continually improve the Placement program.

Prospective teachers' knowledge: Concept of division

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The purpose of this study was to determine prospective teachers' knowledge about the concept of division. One focus of interest was whether the prospective teachers were able to represent division of fractions. The participants were introduced to an alternative model for representation of fractions based on a rate or ratio model of division involving whole numbers. A second focus of interest was whether the prospective teachers would be able to apply this model to problems of division of fractions. The findings revealed that the prospective teachers' successfully represented division of whole numbers using models of fair sharing and, to a lesser extent, repeated subtraction. However, they had difficulty in successfully representing division of fractions. Some improvement was observed in participants' performance in attempts to represent division of fractions after introduction of the rate/ratio model. However the prospective teachers often used the rate or ratio model mistakenly where the situations were not appropriate for the model, which appeared to be associated with difficulty in multiplicative thinking.

Concept of division, multiplicative thinking, conceptual knowledge of mathematics, pedagogical content knowledge of mathematics

INTRODUCTION

Teachers' classroom practice and students' learning are highly affected by the knowledge which teachers possess (Haswesh, 1986; Shulman, 1987; Fennema & Franke, 1992; Dooren, Verschaffel & Onghena, 2002). Disappointingly, many mathematics teachers possess low levels of the content and pedagogical content knowledge required to teach the subject effectively (e.g. Tirosh, 2000; Ball, 1990; Brown, Cooney and Jones, 1990). The concept of division is one of the subject areas in mathematics where prospective and practising primary level teachers often seem to have insufficient knowledge. Though they are usually able to represent division problems involving whole numbers, they often cannot extend the representations to make sense of division of fractions such as $\frac{3}{4} \div \frac{1}{2}$ (Payne, 1976; Fischbein, Deri, Nello & Marino, 1985; Fendel, 1987; Ball, 1990; Tirosh, 2000; Flores, 2002; and Squire & Bryant, 2002). In the wake of this, division of fractions has been a concept isolated from the general concept of division in teachers' and students' representations of knowledge (Greer, 1992; Siebert, 2002). The concept is usually taught mechanically in elementary schools, with many teachers and students merely using an algorithm (like invert and multiply) and being unaware of the relationships between division algorithms and underlying concepts. Greer (1992) argued that though people were usually able to solve division sums involving fractions written mathematically, they were not able to use the concept to represent real life situations. He also suggested that for the teaching of concepts of multiplication and division beyond the domain of whole numbers there is a need to reorganise and

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reconceptualize the content of the curriculum to help students shift their thinking from additive to multiplicative thinking.

Use of models to teach the concept of division

One of the causes of the problem with division lies in the models which teachers use for teaching of division. Two models are commonly used. One model considers division as “fair sharing”, and in this model a common representation of the expression $48 \div 4$ might run as follows: *Share 48 lollies between 4 girls. How many lollies does each get?* (McSeveny, Conway & Wilke, 2000). The lollies are being divided or shared fairly among the girls. The fair sharing, or partitive model is a traditional teaching model for division of whole numbers, but it can act as a barrier in the representation of division of fractions. For example $48 \div \frac{1}{4}$ cannot be represented by the same model of fair sharing because it is senseless to share 48 lollies among a quarter of a girl.

Another model represents division as repeated subtraction. Using this model we would translate $48 \div 4$ as: *How many times can 4 be subtracted from 48?* This model helps the learners to represent some division of fraction problems, but it also appears to be difficult for students to use this model to represent division situations when the divisor is bigger than the dividend. For example in representation of $\frac{1}{3} \div \frac{1}{2}$ it is confusing to ask how many times one half can be subtracted from one third, perplexing for the students of elementary classes who are not used to subtracting a bigger number from a smaller number. Many in the present generation of teachers seem to develop the understanding of the concept of division on the basis of either or both of the above models and find it difficult to extend their thinking about division beyond positive integers.

Connections between division and rate or ratio

Some prospective teachers are not able to connect the division of fractions with the concept of rate and ratio. They do not identify proportional relationships between the divisors and the dividends, and do not recognise the multiplicative relationship among the divisors, the dividends and the quotients that are important for representing the division of fractions effectively. That is why, in spite of solving division and multiplication problems successfully in middle school, many teachers and students still use additive reasoning (repeated addition or repeated subtraction) rather than multiplicative reasoning in which division is seen as a multiplicative comparison of two quantities, that is, a ratio (Flores 2002, p.243).

It is hypothesised that no matter what model of division learners use, to make progress with division of fraction problems they need to connect the concept of division with the concept of ratio/rate by understanding the multiplicative relationship between the divisor, the dividend and the quotient. Once this relationship is established, the learners should be able to make sense of the mathematical expressions involving division of fractions, to make sense of the algorithms used to solve the mathematical expressions involving division of fractions, and to translate real life situations into a form of division of fractions. This study is designed to provide information that can be used to examine these predictions.

Generally, in division and multiplication problems, multiplicative relationships between two sets of quantities are set up. In the information part of the problem statement, one instance of the relationship is given, and in the question part of the problem another instance of the same relationship is asked for. For example, $12 \div 4$ can be interpreted as the value of the first quantity is 12 when the value of the second quantity is 4. This is the first instance of a relationship between the quantities that is given in the information part of the problem. To solve the problem means to establish another instance of the relationship where the value of the first quantity is to be found out if the value of the second quantity is 1. In each division question, a number has to be found out for “each one” or “every one”. For teaching purposes there is a need to establish a verbal analogy in a conditional, if – then, form:

If 12 is for 4 (Information part)
 Then how many is for 1? (Question part of the problem)

Vergnaud (1988) and Marshel, Barthuli, Brewer, and Rose, (1989) proposed schematic diagrams based on the ratio and rate concept of division for representation of different types of division problems. Table 1 shows how these problems can be represented using schematic diagrams. For instance in the first question in Table 1, one quantity is the number of children and other quantity is the number of oranges. So the name of each quantity is written in one of the columns of the schematic diagram. Then the first statement indicates that the value of one quantity is 12 when the value of the other quantity is 3. On the following line of the table a question in the second statement of the sum is generated, keeping the same multiplicative relationship between the quantities in the first line (as equal distribution is mentioned in the question). In the next step attention focuses on the first column, posing the question that if the value of one quantity changes from 3 to 1 (as it asks about each child), then what change will occur in the value of other quantity. That is why 1 is written under 3 and a question mark is put under 12.

Table 1: Schematic diagram of division representations

Division (sharing)	
Twelve oranges are being distributed equally among 3 children. How many oranges will each child receive?	
Children	Oranges
3	12
1	?
Division (repeated subtraction)	
Twelve oranges are being distributed equally among children. If each child receives four oranges, how many children are there?	
Children	Oranges
?	12
1	4

The rate or ratio model of division is based on establishing a multiplicative relationship between two similar quantities (ratio), or different quantities (rate). It considers the dividend and divisor as one pair of numbers from a set of infinite pairs of numbers that are related in the same proportion. If one of the quantities is unknown, knowing the multiplicative relationship between a pair of known quantities allows students to determine the unknown quantity.

Previous research has provided information about models of division and their limitations on representation of division problems (e.g. Bell, Swan & Taylor, 1981; Bell, Fischbein & Greer; 1984; Fischbein, Deri, Nello, & Marino, 1985). Tirosh (2000) reported that prospective teachers are often not aware of the difficulties caused by the models they use for representing division problems. It has been pointed out (Vergnaud, 1983) that the rate/ratio model is one of the models which can be used to understand and solve all types of division problems, especially in understanding and solving problems of division of fractions.

Sellke, Behr & Voelker (1991) showed that Year 7 students could improve performance using the Vergnaud system of representation. Use of the model with teachers has not been reported. We designed the current study to investigate the usefulness of the rate/ratio representation of division in a group of prospective primary level teachers who might be expected to show evidence of difficulty in understanding and representing situations involving the division of fractions. We were interested, first, to examine the prospective teachers' understanding of division and of division in terms of rate/ratio. Then, if this group showed difficulty in representation of division, we were interested to see if their level of understanding could be improved through use of the Vergnaud approach. The following were the specific research questions:

- What procedural and conceptual understanding about the concept of division do prospective teachers possess?

- Do prospective teachers have the multiplicative understanding required to use the Vergnaud schematic diagram successfully?
- What changes occur in prospective teachers' understanding about the general concept of division in term of representing, solving and posing problems of division of fraction after being introduced with Vergnaud's schematic diagram based on the rate / ratio model of division?.

METHOD

Participants

Seventeen volunteer students from a cohort of primary/lower secondary Bachelor of Education (BEd) students at an Australian university participated in the study. There were three male participants. All the participants, except one who completed her schooling in Singapore, had their elementary and secondary education in Australia. For most of the students the study of mathematics had not been an area of strength in secondary school. All participants had completed compulsory mathematics courses in Year 11. Only four had also studied Applied Mathematics 1 in Year 11 and one had also studied Applied Mathematics 1 and 2 in Years 11 and 12 respectively. None of the students had studied Mathematics at university level. On a scale with a maximum of 7.0, the mean university GPA for the group was 5.24, with a standard deviation of 0.39. All participants had completed mathematics Curriculum Studies courses in their BEd.

Procedure

Phase 1 of the study addressed the first research question. Participants' existing knowledge of division was examined by asking them solve the problems on worksheet A (Appendix 1). The purpose of this phase was to identify the models being used to represent division and the difficulties they faced in representing the problems. In Phase 2 the prospective teachers' proportional reasoning was assessed on a set of ratio or rate problems along with their ability to represent rate and ratio problems as division problems given on worksheet B (Appendix 2).

In Phase 3 each participant individually went through a teaching session focused on the representation of division expressions in terms of rate and ratio between dividend and divisor. Participants were introduced to use of Vergnaud's schematic diagram for solving division problems with whole numbers other than zero. The teaching was designed to help participants develop a connection between the concept of ratio/rate and the concept of division with whole numbers, to focus their attention on the multiplicative relationships among the divisors, the dividends and the quotients, and to see division expressions in terms of rate and ratio between the dividends and the divisors. In the overall teaching session, seven different division problems involving whole numbers were solved. First, the researcher solved two questions aloud giving detailed explanation at each step. One question was of a fair sharing type and the other was of repeated subtraction. The script for the teaching session has been fully reported in Rizvi (2004). After the teaching session the participants were again asked to solve problems on Worksheet A and Worksheet B and were asked to describe the changes which they would make in the schematic diagram to solve those problems which could not be solved by using the schematic diagram, and to provide reasons for these changes. The purpose of this phase was to collect evidence about how successfully the participants would be able to transfer the application of the schematic diagram to new problems

All the responses, explanations and "thinking aloud" which participants produced in each phase, were audio-taped and records of their working on paper were kept. Instructions provided for thinking aloud emphasised the need for participants to keep talking so that a full a report of processing activity was available (Ericsson & Simon, 1993). When participants were using pen

and paper to solve the questions, the researcher asked probing questions to reveal their thinking behind their problem-solving moves.

Scoring procedures

In phase 1 the criteria on which participants' responses on each question would be evaluated were specified. The model used for each problem was identified using the criteria and agreed through discussion and consensus of the two researchers.

The focus of the analysis in Phase 2 was whether prospective teachers could identify which of the problems dealt with the additively related quantities (e.g. the age of one person related to the age of another person) and which problems involved multiplicatively related quantities (e.g. time and distance covered by a moving body). Additional points of interest were whether the participants recognised which problems involved directly proportional quantities (e.g. time and distance) and which problems involved inversely proportional quantities (e.g. time taken and speed of a moving body) and how they solved these problems. The participant's responses on each of the questions on worksheet B were assessed against steps of thinking that underlie the use of the ratio model shown in Table 2.

Table 2: Analysis Framework for Phase Two

Identification of types of variable quantities

- The same types (ratio), for example weight of sugar and flour in the recipe for making a cake.
- Different (rate), for example distance and time.

Identification of values associated with the variable quantities

- What values of the quantity are known and what are unknown.
- Whether a number describes the quantity or a unit of measurements is associated with numbers.
- Whether change of units was carried out.

Finding a relationship between quantities

- Recognition that by increasing one quantity another quantity increases or decreases?
- Recognition of additive or multiplicative relationships.

Generation of a correct solution.

Participants' performance against each criterion was scored on a 0 - 1 scale and the different types of difficulties which the participants faced in solving the problem were identified and categorised.

In Phase 3 participants solved the problems involving fractions given in Question 1 of worksheet A (Q1 ii, iii, iv, vi) using the rate and ratio model and to pose word problems for each of the expressions. Also of interest was whether they could solve word problems using the schematic diagram. They attempted Questions 2 - 5 of Worksheet A using the rate and ratio model and were asked to write mathematical expressions for each of the problems. Additionally, they were asked to identify the problems in Worksheet B that could be solved by the rate or ratio model and to describe the changes they would need to make in the rate or ratio model to solve those problems that could not be solved by the model.

RESULTS

Phase one

Representations for mathematical expressions involving division

We developed an account of the participants' conceptual knowledge in terms of three forms of representation by which the participants translated the mathematical expressions given in worksheet A:

- a) Translation into words, which is labeled as semantic representation;
- b) Translation into diagrams or actions, which is referred to as iconic representation; and

c) Representation of an expression as a word problem.

Generally the performance of the participants was quite satisfactory for the division expressions involving whole numbers. As shown in Table 3, the sharing model was predominant in their representation. The participants used repeated subtraction model for semantic representation and to some extent to for iconic representation. However, all the word problems that they posed were based on use of a fair sharing model.

Table 3: Representation of division involving whole numbers

Model	Percentage of total representations
Fair sharing	72.4
Repeated subtraction	24
other	3.4

Performance deteriorated on problems involving fractions. Eleven participants managed to represent division expressions where the divisor was a whole number and only the dividend was a fraction, since they could use a sharing model satisfactorily for this expression. Performance was poor for the mathematical expressions where the divisor was a fraction but the dividend was whole number and where the dividend and the divisor both were fractions. Five participants swapped to use of repeated subtraction model to represent the expressions where the divisors were fractions.

It appears that the participants' failure to represent expressions when the divisor was a fraction was associated with lack of familiarity with the repeated subtraction model. A correlation of $r = 0.89$ was found between use of the repeated subtraction model in division of whole numbers and successful representation of expressions having a fraction as a divisor and whole number as a dividend. Where the divisors were fractions the participants were not able to represent the expression in the form of word problems. This observation supported the findings of several researchers (e.g. Fischbein, Deri, Nello, & Marino, 1985) relating to the limitations of students' intuitive models for division of fractions.

Five participants were able to develop semantic and iconic representations for the mathematical expression where both the divisors and the dividends were fractions such as $\frac{1}{2} \div \frac{1}{4}$, using the repeated subtraction model. The problems $\frac{1}{4} \div \frac{1}{2}$ and $\frac{1}{5} \div \frac{1}{2}$ were the most difficult, with only five participants being able represent these expressions semantically and none being able to extend their representation beyond this point. Table 4 shows the group means score for the representation of division expressions on 3 – point scale.

Table 4: Group means score for the representation of division expressions (3 point scale)

Whole number	Dividend was fraction	Divisor was fraction	Fractions with dividend bigger than divisor	Fractions with divisor bigger than dividend
3	1.94	0.53	0.59	0.29

No participants were able to pose any sort of word problems for the expressions where the divisors were fractions. Participants posed only sharing type word problems for the expressions where the divisor was a whole number. Ten participants used the invert and multiply algorithms for the expressions involving division of fractions. Apart from this no other algorithm was used. No participants could explain the thinking that lies behind this algorithm, though four of them, who represented the expression pictorially, justified their answers by referring to the answer obtained by pictorial representations.

Participants' ability to solve word problems and to translate them into mathematical expressions

Performance in solving word problems and in translating these into mathematical expressions was assessed. No participants wrote division expressions for Q.2a, whereas they wrote a division expression for Q.2b. This observation reaffirmed Tirosh's (2000) views that people intuitively

thought that division made things smaller. For the question where they knew that the answer would be bigger, participants did not select division as a correct operation for the problem.

The participants did not write division expressions for the problems based on the concept of ratio and proportion (Q.3). This suggests that participants were unable to identify or activate the connections between the concept of rate and ratio and the concept of division and could not think that similar proportional relations existed between divisor - dividend pairs. For the repeated subtraction type word problem (Q.7), only seven participants wrote division expressions. However, two did not figure out which number should appear as divisor and which as dividend in the mathematical expression. No participants made mistakes in writing division expression for a sharing type word problem (Q. 8).

The result of Phase 1 shows that to a great extent the participants relied on a fair sharing model of division to represent division expressions. They were able to represent division of a whole number by a whole number and division of a fraction by a whole number with the help of the model. A few used a repeated subtraction model at the level of semantic, and to a lesser extent iconic, forms to represent division of a whole number by a fraction, but none were able to pose word problems for the expressions. The participants' inability to pose word problems for such expressions indicates that they were not able to relate symbolic mathematical forms of knowledge to everyday life situations. Performance was very poor in representing division of a fraction by a fraction.

Phase Two

The participants' performance in Phase 1 reaffirmed that these prospective teachers did indeed face difficulties in developing successful representations of division of fractions, mainly because of their total reliance on sharing and repeated subtraction models. This suggested that it would be important to investigate how the participants could be assisted to develop a more adequate understanding of division, using the alternative rate and ratio model. As discussed above, the rate/ratio model could be understood only if the prospective teachers had a sound multiplicative understanding.

The prospective teachers' multiplicative understanding

The overall performance of the participants for each question of the Worksheet B is summarised in Table 5. The fourth column shows that for Question 4 only two participants identified the variable quantities involved in the problem. Similarly, two participants were able to identify the relations between variable quantities and were also able to solve the problem. The other 15 participants made mistakes. Ten of these considered that the variable quantities involved in the problem involved a directly proportional relationship. The other five did not realise that the quantities were related multiplicatively: rather they considered an additive relationship between them.

No participants solved all seven questions correctly. However, three participants solved six questions. On the other hand, there were three participants who could not solve more than two problems.

Participants who made errors in Question 2 failed to understand that the relationship between the ages of two persons could not be multiplicative. Another frequent error was made in Question 4 where the participants had to establish a relationship between the number of people who shared equally a certain amount of food and the number of days the food lasted. Fifteen participants failed to see the appropriate relationship. However, the frequency of considering the relationship as directly proportional was highest in this question, as ten of the fifteen participants solved the problem by establishing direct proportionality between the quantities.

Table 5: Summary of participants' overall performance for Worksheet B

	Criterion 1		Criterion 2		Criterion 3		Difficulties faced by participants
	Yes	No	Yes	No	Yes	No	
Q1	17	0	17	0	11	6	6 made computational errors.
Q2	17	0	7	10	7	10	10 considered additive relationships b/w as multiplicative.
Q3	7	10	7	10	7	10	4 did not identify directly proportional relationship. 6 were confused in using a trial and error method. 10 considered inversely proportional relationships as directly proportional relationships.
Q4	2	15	2	15	2	15	2 considered multiplicative relationship variable quantities as additive relationship 3 used trial and error method
Q5	17	0	17	0	17	0	No difficulty
Q6	11	6	11	6	11	6	6 considered multiplicative relationships as additive.
Q7	12	5	12	5	12	5	5 considered the additive relationship as multiplicative.

The results obtained from this phase suggest that the group of prospective teachers who were involved in this research made mistakes in recognising the particular relationship by which the quantities involved in a problem were linked with each other. That is why it was envisaged that the participants might have used the rate and ratio model for division inappropriately for those questions where quantities were linked additively, or where the quantities are linked in an inversely proportional relationship. To confirm this hypothesis, in the third and last phase, the participants, after having been introduced to the rate/ratio model of division, were asked to use this model to reconsider the questions used in Phase 1 and 2.

Phase Three

At the end of the teaching session, all the participants were able to represent and solve mathematical expressions and word problems involving division of whole numbers by setting up the rectangular array using the schematic diagram. They also found each of three relationships between the sets of the dividends and the divisors as described by the researcher in Question 1 of the teaching session. After the teaching session the participants were asked to solve problems on Worksheet A and Worksheet B again.

Ability to solve division of mathematical expressions using the rate and ratio model

In this phase all the participants were able to represent the mathematical expressions in the form of the rectangular array in Vergnaud's schematic diagram. For example the participants' representation for the expression $4 \div \frac{1}{3}$ is shown below.

$$\begin{array}{r} 4 \\ ? \end{array} \quad \begin{array}{r} \frac{1}{3} \\ 1 \end{array}$$

They all acknowledged that solving the expressions meant to find out 'a number' which would have the same multiplicative relationship with '1' as the multiplicative relationship present between the dividends and the divisors.

For the expression $4 \div \frac{1}{3}$, nine participants found it difficult to find the unknown number because it was hard to figure out how many times four was bigger than $\frac{1}{3}$, or how many times $\frac{1}{3}$ is smaller than 4. However, they were successful in getting a correct answer by recognising other relationships in the rectangular array, such as 1 was three times $\frac{1}{3}$ and could establish the same relationship in the other column. One participant reasoned as follows:

So four divided by a third, the relationship between a third and one would be increasing by a factor of three, so it would be four times three, which is 12. (Participant D).

The remaining eight participants had developed another representation to cope with this situation. For example, one of the participants drew four circles and cut each circle into three equal parts. Then by counting all the parts, he figured out that there were twelve one-third portions in 4, so he said that 4 was 12 times bigger than one third. The same eight participants also successfully represented the expressions in Phase 1 with the use of a repeated subtraction model. So it is assumed that these eight participants had been able to extend their mental representation of division as repeated subtraction to the rate and ratio model of division. These participants also checked the multiplicative relationship between the numbers written in the columns of the array to verify the answer. All 17 participants also looked at the third relationship among the numbers in the rectangular array because they checked the answers by performing cross multiplication between numbers in the array.

Some participants were able to find the relationship between the invert and multiply algorithm and the rate of ratio model of division.

Participant: So you see, we do the same thing like it's similar to four multiplied three-over-one. Now I'm thinking about the factor that it's changing to increase to that, to one, to the whole number. As most of the time, you did division by converting into multiplication, then three over one. But you did not have any proper reason for this. But now you have a reason

Investigator: What is the reason?

Participant: It's increasing by a factor of three, so it's looking at increasing the divisor by a factor of three to get to one whole. So another number will also increase by three times.

Ability to pose word problems for the mathematical expressions

Participants were asked to pose word problems for the expressions where the divisors were fractions such as $4 \div \frac{1}{3}$, $\frac{1}{3} \div \frac{1}{5}$, and $\frac{1}{4} \div \frac{1}{2}$. In Phase 1 none of the participants could pose word problems for these expressions, one noting "*For us they are symbols – just Maths symbols. We don't associate it with everyday life*".

However, after going through the instructional intervention all participants managed to pose word problems for at least one problem. Eleven participants successfully posed problems for all the expressions, five posed problems for two, and one posed problems for one of the expressions.

Representation of rate/ratio type word problems in terms of division expression

Participants were asked to again solve Questions 2, 3, 4, and 5 of worksheet A using the rate and ratio model and to write mathematical expressions for each of the problems. For Question 3, nine participants used proportional reasoning before instruction. They had considered that in the situation the amount of flour would always remain double that of the sugar, so they multiplied the quantities by 2, as in $\frac{1}{2} \times 2 = 1$ and $\frac{1}{4} \times 2 = \frac{1}{2}$. However, they did not think of this as a division question. After instruction they were able to see a connection between their representations of the problem and the concept of division. So, all 17 participants wrote an expression $\frac{1}{4} \div \frac{1}{2}$.

One participant noted:

Because we want to find out what amount of sugar goes with 1 kg of flour, so we would write amount of flour as a divisor which is $\frac{1}{2}$ in the question (Participant G)

Other participants expressed that they had initially multiplied $\frac{1}{4} \times 2$ without realising that it could also be considered $\frac{1}{4} \div \frac{1}{2}$.

..Now I understand why I multiplied it [amount of sugar] by 2. Because I was making this double [amount of flour], so I was making this double [amount of sugar]. Yep, it is like a quarter kg of sugar with for a half kg of flour.

Identifying where Vergnaud's schematic diagram could be used

Participants were asked to solve Questions 2, 3, 4 and 6 of Worksheet B a second time using Vergnaud's schematic diagram. A significant change was noticed from Phase 2 to Phase 3 in the problem solving approach of some of the participants. In Phase 2 more participants performed operations on the numbers associated with word problems, without realising what the numbers stood for, and either misunderstood or did not try to recognise the relationship between the quantities. In Phase 3, some participants considered that the numbers were representing a particular relationship between two different quantities and were successful in identifying the correct relationships. The mean scores for performance on Questions 2 - 6 of Worksheet B are shown in Table 6.

Table 6: Performance for Q 2, 3, 4 and 6 of Worksheet B

	Mean	Standard deviation
Phase 2	1.59	1.23
Phase 3	2.35	0.93

A paired-samples t-test indicated that difference in group means was statistically significant ($t_{(16)} = 7.67$, $p < 0.001$). The effect size for this comparison was 0.62, a moderately strong effect. This effect provides another form of evidence suggesting that the Phase 3 training effect was of practical significance. Other evidence of the benefit associated with this training is discussed below.

In Phase 2, 10 participants could not understand the relationship between the quantities in Q2 of worksheet A. However, in Phase 3, when they were asked to solve the question seven participants changed their understanding about the problem. One participant looked at the relationship as follows:

But it's not reduced in the same way, because when you have two people aging, it's just a number, it's not the actual products they're increasing by.

However, as shown in Table 7, three participants were persistent in their misunderstanding about the question and they established a directly proportional relationship between the age of one person and the age of the other.

Table 7: Performance in the problem where the quantities had additive relationships

Recognised the relationship between quantities in Q2 in Phase 2	Recognised the relationship between quantities in Q2 in Phase 3	Frequency
Yes	No	0
No	Yes	7
Yes	Yes	7
No	No	3

In Phase 2, seven participants solved Question 3 of Worksheet B which was related to the number of triangles and number of sides in a pattern of adjoining triangles. These students discovered a formula to connect the two variables. In Phase 3, the same seven participants correctly argued that the problem could not be solved with the help of Vergnaud's schematic diagram. Six participants who used only a trial and error method in Phase 2 later established a directly proportional relationship between the number of triangles and number of sides of the triangle in the given pattern in Phase 3. As indicated in Table 8, the remaining four participants established a directly proportional relationship in both phases.

Table 8: Performance in the problem where one quantity was a function of the other but not directly proportional

Recognised the relationship between quantities in Q3 in Phase 2	Recognised the relationship between quantities in Q3 in Phase 3	Frequency
Yes	No	0
No	Yes	0
Yes	Yes	7
No	No	10

Table 9 shows the results for Question 4 of Worksheet B. Only two participants gave appropriate representations on both occasions, noting in Phase 3 that the rate or ratio model could be modified by increasing one number and decreasing the other number by the same factor. Eleven participants used Vergnaud's schematic diagram without considering the relationship between the quantities. On this problem the use of the new representation produced a benefit for only four students.

Table 9: Performance in the problem where the quantities were inversely proportional

Recognised the relationship between quantities in Q4 in Phase 2	Recognised the relationship between quantities in 4 in Phase 2	Frequency
Yes	No	0
No	Yes	4
Yes	Yes	2
No	No	11

As indicated in Table 10, all participants used the rate and ratio model successfully for Question 6 of Worksheet B, including those six who made mistakes in solving the problem in Phase 2. However, we cannot be sure whether the participants understood that the quantities involved in the problem had a directly proportional relationship between them, since, it was possible that their use of the rate or ratio model could reflect a set effect (Anderson, 2000). As they had represented and solved several problems by using schematic diagrams they might have stuck with this model without actually realising whether it was appropriate or not.

Table 10: Performance in the problem where quantities were directly proportional

Recognised the relationship between quantities in Q3 in Phase 2	Recognised the relationship between quantities in Q3 in Phase 3	Frequency
Yes	No	0
No	Yes	6
Yes	Yes	11
No	No	0

DISCUSSION

After examining the participants' overall performance, it is clear that these prospective teachers needed to develop a better understanding of division of fractions. Their existing knowledge related to the topic was not adequate to allow them to either work on division problems for themselves, or to assist students to understand and solve such problems. The main reason for this low level of performance was reliance on the fair sharing and the repeated subtraction models. In the wake of the dependence on these models, the participants could not place division of fractions in their schema of the concept of division. The participants did not give any clue that showed that they found any relationship between the concept of division and the concept of rate or ratio. Although they satisfactorily used proportional reasoning to represent word problems based on the concept of rate or ratio, they did not represent those problems in a form of mathematical expression containing the sign of division. They translated a word problem based on fair sharing into a division expression, but could not do so with the word problem based on repeated subtraction.

The results of the teaching intervention in Phase 3 indicate that the schematic diagram is a promising scaffold that can help prospective teachers to develop more coherent schemas for the

concept of division. The findings provide evidence of a practically significant improvement in the participants' performance to represent, solve, and pose problems related to division of fraction when they used the rate/ ratio model.

However, we cannot claim that the participants have embedded a strong, new representation of fractions in long term memory, one that they will transfer to future problem solving with division of fractions. Although the participants showed improvement in posing problems, the problems they posed and the problems which were used by the researcher in the teaching phase belonged to the same context. Mostly the participants used different numbers in the same situations. There is therefore a need to test other students' capability to use the rate or ratio model on several occasions across time in future research.

On several occasions during the research, the participants showed insufficient, partial and inaccurate knowledge of fractions. For such type of knowledge Perkins and Simmons (1988) used the term garbled knowledge. For instance, the participants sometimes did not assign correct names to the fractions. They had problems in deciding which fraction was bigger than the other. Often when they could not use a fair sharing model, they 'repaired the situation' (in Perkins and Simmons' words) by thinking of division as multiplication. On several occasions the participants handled problem of division by a fraction, such as $\frac{1}{4} \div \frac{1}{2}$, as if it was division by whole number such as $\frac{1}{4} \div 2$. Similar prospective teachers' behaviour was noticed by Ball (1990). These prospective teachers mentioned that they had learnt the topic of fractions and division a long time ago. Their mathematics content knowledge was not adequate to enable them to deal with the topics mathematics curriculum of upper primary school.

Since the participants made frequent errors in recognising relationship between variable quantities, it is inferred that the participants' multiplicative thinking was not sufficient to use the rate/ratio model effectively in their teaching. Previous researchers have also reported similar flaws in students' and teachers' multiplicative thinking. Dooren, Bock, Verschaffel and Janssens (2003) reported that their students had a tendency to incorrectly solve nonproportional problems in a proportional way. Thompson and Bush (2003) also found that teachers frequently used proportional reasoning in additive situations.

If teachers have limited understanding of multiplicative thinking, the risk will remain that the teachers or their students might use the rate or ratio model inappropriately. So before students can use the rate or ratio model there is a need to develop their multiplicative thinking. The results of the current study suggest that Vergnaud's schematics diagram could be a tool to develop multiplicative reasoning as well as to establish connections between concepts of multiplication and division to the concept of rate and ratio. The understanding of division which students would develop by recognising multiplicative relationship between the divisors, the dividends and quotient would help them to comprehend the situation of division of fractions and to justify mathematical expressions involving fractions.

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APPENDIX 1

Work Sheet A

Q1 (a) In how many ways can you interpret the following expressions? Write down your interpretations.

(i) $108 \div 4$ (ii) $\frac{1}{2} \div 3$ (iii) $\frac{1}{2} \div \frac{1}{4}$ (iv) $\frac{1}{3} \div \frac{1}{5}$ (v) $4 \div \frac{1}{3}$

(vi) $5 \div 7$ (vii) $\frac{1}{4} \div \frac{1}{2}$ (viii) $\frac{1}{5} \div \frac{1}{2}$

(b) Draw or describe diagrams to represent each of the division situations Q1a (i) to Q1 (viii).

(c) Solve Q1a (i) to Q1a(viii).

(d) Try to write down a word problem for each expression in Q 1(i) to Q1 (viii).

Q2 (a) If a person's income in half a month is \$ 400 how much can he earn in a month?

(b) A man earns \$ 240 in 3 weeks. How much is his weekly salary?

Q3 (a) Jessica and Shane had a recipe to make a cake. In this recipe $\frac{1}{2}$ kg of flour is mixed with $\frac{1}{4}$ kg of sugar. Shane wants to use 1 kg of flour. How much sugar should he use to have the same taste?

(b) Jessica also used the same recipe in which $\frac{1}{2}$ kg of flour is mixed with $\frac{1}{4}$ kg of sugar. Because she bought 1kg of sugar she wants to use all the sugar. How much flour should she use?

Q4 (a) A girl walks $\frac{1}{2}$ km in $\frac{1}{3}$ of an hour. How much distance can she cover in one hour if she keeps her speed constant?

(b) A girl walks $\frac{1}{2}$ km in $\frac{1}{3}$ of an hour. How much time is required to travel a distance of 1 km if she walks with the same speed?

Q5 (a) $8\frac{1}{4}$ cm is approximately equal to $3\frac{1}{2}$ inches. About how many cms are in an inch?

(b) $8\frac{1}{4}$ cm is approximately equal to $3\frac{1}{2}$ inches. What part of an inch is equal to one cm?

Q6 (a) A boat moved 4 metres in a second with constant speed. How much time will it take to move to 12 metres?

(b) A boat moves at a constant speed of 4 metres per second. How far does it move in 3 seconds?

(c) A boat moved 12 metres in 3 seconds at a constant speed. How far can it move in a second?

- Q7 It takes $\frac{3}{8}$ of a bottle of milk to fill a large glass. How many of these glasses can be filled with 40 bottles of milk.
- Q 8 An ant moved exactly the same distance each day. After five days it had moved a distance of $\frac{3}{4}$ km. How much did it move each day?

APPENDIX 2

Work Sheet B

- Q 1: A machine caps bottles at a speed of one bottle every 2 seconds. How many bottles does the machine cap in 4 hours?
- Q 2: A boy is 4 years old and his sister is three times as old as he is. When the boy was 1 year old, how old would his sister be?
- Q 3: Look at the following patterns made up of match sticks

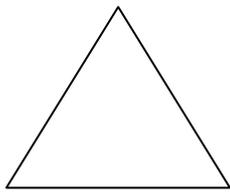


Fig 1

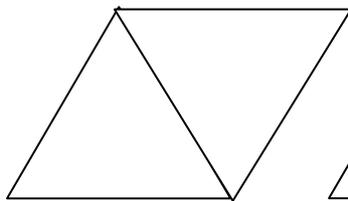


Fig 2

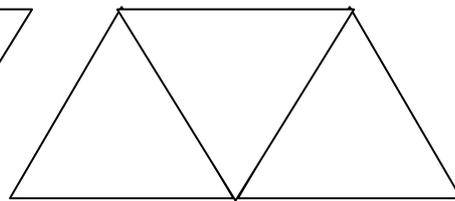
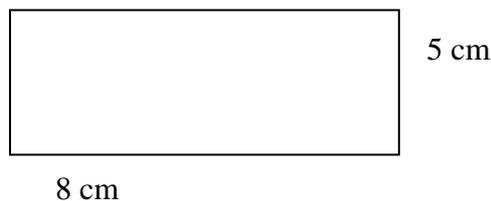


Fig3

Figure 3 has three triangles and seven sides. How many sides would a similar shape consisting of 30 triangles have?

- Q 4: In a camp a certain amount of food lasts 32 people for 15 days. How many days would the same amount of food last if there were only 8 people. (Each person eats an equal amount of food.)
- Q5: Ruth is 5 years old and John is 20 years. What will be the age of John when Ruth will be 10 years old?
- Q6: There is a rectangle with sides 5 cm to 8 cm.



If you enlarge the rectangle so that its 5cm sides become 10 cm, what will be the length of the sides which were previously 8 cm?

- Q7: Two men start walking on a track with the same speed but one after the other. Man A completes his 5 rounds when Man B completes 3 rounds. How many rounds will Man A have completed when Man B is finished his 6 rounds?
- Q8: Jim is reading a book. He plans to read 5 pages per day to complete his reading in 13 days. If he wants to reduce his reading speed to 1 page per day, how many days will he take to complete his reading of the book?

Influence of the democratic climate of classrooms on student civic learning in North Sulawesi, Indonesia

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This study is intended to examine the influence of the democratic climate of classrooms on student engagement and learning outcomes in order to find out a more adequate model of learning in Civic Education classrooms. A model is developed for testing with data obtained from a sample of 930 students from schools in North Sulawesi. Prior to the analysis, scales are analysed using Confirmatory Factor Analysis (CFA) and are calibrated using Rasch Measurement Model Analysis (RMMA). The analysis shows that the trimmed model (Model B) is slightly more coherent and simpler than the hypothesised model (Model A). However, both models indicate that the democratic climate of Civic Education classrooms has significant effects on student engagement, student civic knowledge and interpretation skill, and student concepts of citizenship.

Civic education, democratic climate, classrooms, student engagement, citizenship

Johnson and McClure (2004) define the classroom learning environment as a social atmosphere in which learning takes place that is sometimes called the educational environment. Kubow and Kinney (2000) argue that educational environment is related to how teaching is conducted in the classroom setting. More specifically, Moos (1979) conceptualises educational environment as a system that have four variables, namely physical environment, organisational aspects, teacher characteristics and pupil characteristics in which classroom climate is viewed as the mediator between these variables that operated through interactions among class members, teachers and students. This process is influenced by the orientation, the quality and the quantity of interactions and intercommunications between the classroom members (Allodi, 2002). These, in turn, affect student satisfaction, self-concept and the learning processes that influence learning outcomes.

Research into classroom environments has been carried out over many years. Different studies have been undertaken to investigate a variety of aspects of classroom environment. These studies have ranged from investigating factors influencing learning environments to the students' perceptions of their classrooms, and the relationship between student perceptions of their classrooms and their learning outcomes. These studies have been extended to cover schools and families (Parsons, 2002). In addition, the researchers have conducted studies about the effects of the classroom environment on the learning of different subject matter in different parts of the world. Aikin (1942) studied the effects of democratic processes in the classrooms and the schools in the Eight Year Study in the United States (reported in Morgenstern & Keeves, 1997). Kim, Fisher and Fraser (1999) investigated science classroom environments; Waldrip and Fisher (2003) investigated the differences between urban and country student perceptions of their learning environment (reported in Dorman, 2003); and Guthrie and Cox (2001) investigated the school and classroom context that would make students want to engage in reading longer.

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Researchers in this field have divided engagement in classroom learning into three categories, namely behavioural, cognitive, and emotional engagement. Behavioural engagement consists of actions like following the rules, adhering to the classroom norms, and the absence of disruptive behaviours such as skipping school or getting into trouble, participating in classroom learning and academic tasks, persistence, effort, attention, asking questions, and participating in school-related activities. Emotional engagement includes student positive and negative affective reactions in the classroom, students' emotional reactions to the school and the teacher, feeling of being important to the school, and valuing success in school-related outcomes. Cognitive engagement is conceptualised in terms of a psychological investment in learning, a desire to go beyond the requirements of school, and a preference for challenge by being strategic or self-regulating (Fredricks, et al., 2003, 2004).

Studies have been undertaken to identify the correlation between behavioural engagement and learning outcomes for elementary and high school students (e.g. Alvermann et al., 1987; Ames, 1992; Finn et al., 1995; Guthrie & Cox, 2001; Miller & Meece, 1999). Other studies have focused on the correlation between discipline problems, behavioural disengagement and achievement across grade levels (e.g. Aikins et al., 2005; Barker & Gump, 1964; Bates et al., 2003; Finn & Pannozzo, 2004; Fredricks & Eccles, 2002). The finding is that behavioural engagement has long-term effects on student performance. Students who show engagement and interest in their early grade levels are found to be performing better in their later years (Fredricks et al., 2003).

Brown (1997), and Turner and Scott (1995) emphasise that social discourse in learning communities is intrinsically motivating. Furthermore, Wentzel (1991, 1997, 2002, 2003), Urdan and Maehr (1995) demonstrate that student possession of pro-social goals lead to their constructive social behaviours in the classroom. Fredricks, Blumenfeld, Field and Paris (2002) found that there was a unique relation of a challenging and a structured work environment involving student affect, behaviour and cognition. Skinner and Belmont (1993) also found that there was a reciprocal relationship between teacher behaviour and student engagement in the classroom. Teachers' interactions with students predicted student behavioural and emotional engagement in the classroom, both directly and indirectly through their effects on student perceptions of their interactions with teachers. In addition, Kindermann (1993) and Wentzel (2002) argue that there is an association between children peer groups and the amount of engagement the children's showed in the classroom. Palincsar (1998) in the analysis of the theory of constructivism claims, that the growing interest in social constructivist perspectives is propelled by recent educational reform efforts encouraging students to assume a more active role in their learning, to explain their ideas to one another, to discuss disagreements, and to cooperate in the solution of complex problems, while teachers participate in the design of these contexts and the facilitation of this kind of activity. However, to make an effective context for learning, discourse must be communicative. These findings confirm the importance of learning environment in fostering student learning (Clark et al., 2003; Belenky, 1997; Greeno 1998; Randolph, 2000; Roeser, Midgley & Urdan, 1996; Ryan & Partick, 2001; Turner et al., 1998; Wentzel, 2002).

Torney-Purta et al. in their cross-national studies on Civic Education reports that a democratic climate of classrooms has a positive effect on student civic knowledge (1975; 2001).

Based on these research studies, it is argued that it is important to encourage students engagement to learning activities in democratic Civic Education classrooms in order to provide them with opportunities to obtain deeper understanding of the civic values transmitted through meaningful classroom experiences in order to enable them to implement their civic values critically and responsibly in their social interactions.

METHOD

Instruments

In order to measure the constructs of the model of this study, instruments were developed by operationalising the concepts into items with categories of meaning that were measurable.

Scale for Democratic Climate of Civic Education Classroom (DCCEC) was constructed basically based on a concept developed by Kubow and Kinney (2000) augmented by concepts suggested by Radz (1983) and Bickmore (1993). Scale for Student Engagement in Civic Education Classroom (SECEC) was constructed by adapting and modifying a scale previously developed by Fredricks et al. (2002, 2003, 2004). Scales for Civic Knowledge and Interpretation Skill (CKIS), Student Concepts of Democracy (SCD) and Student Concepts of Citizenship (SCC) were developed by adapting scales previously used by Torney-Purta, et al. (1975, 2001) in IEA study, MCEETYA (2004) and Mellor (2004), and modifying them based on Indonesian Civic Education curriculum and text books (i.e. DIKNAS, 2003, 2004; Dwiyono et al., 2003). The number of items prepared for these scales were 33, 19, 58, 24 and 27 respectively. A sample is provided in Table 1. All items were delivered to students in Bahasa Indonesia.

Table 1. Sample of Scales and Items

Scale	Dimensions	Descriptions	Item samples
Democratic Climate of Civic Education Classroom (DCCEC)			
Democratic climate of Civic Education Classroom	Active participation	Sharing ideas and among peers and facilitators; teachers do not take a stand as an authority on civic subjects; teachers share impressions on class activities with students.	We feel free to share ideas in class.
Student Engagement in Civic Education Classroom (SECEC)			
Student engagement in Civic Education Classroom	Behavioural engagement	Positive conducts (adhering to classroom norms), absence of disruptive behaviour such as skipping classrooms and getting in trouble; involvement in learning such as effort, persistence, concentration, attention, asking questions; and contribution to class discussions, participation in classroom activities.	I pay attention in the Citizenship Education class.
Student Civic Knowledge & Interpretation Skill (SCKIS)			
Civic knowledge	Key features of Indonesian democracy.	Understand that Indonesian citizens use secret ballots to elect representatives to govern on their behalf.	In Indonesian democracy, how do citizens elect representatives for the People's Representative Council?
Student Concepts of Democracy (SCD)			
Concepts of Democracy	Freedom	Students' beliefs about what is good or bad for democracy with respect to freedom.	When everyone has the right to express their opinions freely that is ...
Student Concepts of Citizenship (SCC)			
Concepts of citizenship	Effective participation in democratic decision-making	A belief that in a democratic society people are entitled to hold and express their views on civic and political matters, within the law, and in turn must respect the others to do the same.	An adult who is a good citizen would participate in a peaceful protest against a law believed to be unjust.

As shown in Table 2, a four point Likert scale using a 0, 1, 2 and 3 scoring scheme was used for Democratic Climate of Civic Education Classroom (DCCEC), Student Engagement in Civic Education Classroom (SECEC), Student Concept of Democracy (SCD) and Student Concepts of Citizenship (SCC) scales. For the Civic Knowledge and Interpretation Skill (CKIS) scale, a four-alternative multiple choice scheme was used.

Complexity of the sample structure entailed the two stages of sample selection, namely, the school level stage using the Probability Proportionate to the Size (PPS) procedure and the student

level stage using a Simple Random Sampling (SRS) procedure (Rosier & Ross, 1992). PPS and SRS procedures gave students the same opportunity to be in the sample at the school level and student level. In selecting students from each school, an intact class was used because the main focus of the study was a classroom environment.

Table 2. Category meanings

Constructs	Category meanings			
	0	1	2	3
Democratic Climate of Civic Education Classroom & Student Engagement	<i>never</i>	<i>rarely</i>	<i>sometimes</i>	<i>often</i>
Student Concepts of Democracy	<i>very bad for democracy</i>	<i>somewhat bad for democracy</i>	<i>somewhat good for democracy</i>	<i>very good for democracy</i>
Student Concepts of Citizenship	<i>not important</i>	<i>somewhat unimportant</i>	<i>somewhat important</i>	<i>very important</i>
Student Civic Knowledge & Interpretation Skill	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>

The sample in this study was stratified into three categories, namely government schools in urban areas, government schools in rural areas and private schools. Eleven schools were selected from each stratum with the cluster size of 30 students for each school. As a result, the effective sample size of this study was 980 students.

Sample

The data used in this study were collected using survey instrument and involved 100 items and 1030 ninth grade students in North Sulawesi, Indonesia. Because the responses obtained from 100 cases were found to be unsatisfactory, with substantial missing data (more than 20 %), only 930 cases were included in this analysis.

Instrument Validation

In order to validate the instrument developed, a pilot testing had been undertaken in June 2005 in which 200 hundred ninth grade students were involved. Principal Component Analysis (PCA) and Rasch Measurement Model Analysis (RMMA) led to the omission of several items that did not fit the Rasch Measurement Model. Infit mean square values in the range of 0.78 to 1.30 were used (Bond & Fox, 2001). Values less than 0.78 indicated significant overfit, and values greater than 1.30 indicated significant underfit. Both underfitting and overfitting items were considered misfitting. However, in order to solve item shortage, five items with infit mean square (IMS) less than 0.78 were included in the final instrument. From this pilot testing and analysis, 17, 15, 34, 13 and 21 items for Democratic Climate of Civic Education Classroom (DCCEC), Student Engagement in Civic Education Classroom (SECEC), Student Civic Knowledge and Interpretation Skill (SCKIS), Student Concepts of Democracy (SCD) and Student Concepts of Citizenship (SCC) scales respectively were selected to be used in the study.

After handling the missing data using multiple imputation with NORM software (Darmawan, 2002; Schafer, 1999), two analysis procedures were conducted, namely Confirmatory Factor Analysis using Mplus version 2.1 (Muthen & Muthen, 1998) and Rasch Measurement Model Analysis (RMMA) using Quest (Adams & Khoo, 1993). CFA was used to assess the multidimensionality of the scales and to compare their factorial models, whereas RMMA was used to recheck the unidimensionality of the scales (Bond & Fox, 2001).

In the Confirmatory Factor Analysis (CFA), factorial models (i.e. one factor and multiple factors including uncorrelated, hierarchical and nested models) were compared for each scale. This model comparison was carried out using several statistical fits, namely Chi-Square, Chi-Square divided by Degree of Freedom, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and RSMEA. This analysis resulted in the formation of factors as observed variables (manifest variables) underlying five unobserved variables (latent variables). Out of four models compared for each scale, a hierarchical model showed superiority over other models except for Student Concepts of Democracy (SCD) scale where the one factor model was more adequate than others. This CFA results provided the factor structure shown in Table 3.

Table 3. Factor structure in CFA result

Latent Variables	Manifest Variables
1. Democratic Climate of Civic Education Classroom (DCCEC)	1. Classroom participation (PRT) 2. Controversial issues (CONT) 3. Reflective thinking (RFT) 4. Relevant issues (RLV)
2. Student Engagement in Civic Education Classroom (SECEC)	1. Behavioural engagement (BHV) 2. Emotional engagement (EMT) 3. Cognitive engagement (CGN)
3. Student Civic Knowledge & Interpretation Skill (SCKIS)	1. Civic knowledge (KNW) 2. Civic interpretation Skill (INTRSKL)
4. Student Concepts of Democracy (SCD)	Unity Concepts of Democracy (DEM)
5. Student Concepts of Citizenship (SCC)	1. Understanding several ways to participate in civic life (PRTW) 2. Understanding civic aspects to be respected (RESPT) 3. Understanding the nature of laws (LW) 4. Student prudence in responding to different aspects of civic life (PRD)

Items that had loadings less than 0.20 were excluded from the factors of each latent variable. In order to assure the unidimensionality of each construct or variable used, the selected items were then analysed using Rasch Measurement Model Analysis (RMMA) involving only fitting cases and the cases that completed all items or did not have zero or perfect scores. Items that initially fitted the Rasch model were selected to be the start values for estimating measures for each manifest variable in the second RMMA. In this second RMMA run, cases that were excluded initially were pulled back to be re-estimated using the anchoring method. The scores obtained from this estimation were then used as input data for further analysis in the study.

Modelling

Based on the literature reviewed in this study, a hypothesised model for the influence of democratic climate of civic education classroom on student engagement and on the civic learning outcomes was advanced (see Figure 1). It was hypothesised that democratic climate of a civic education classroom could influence student engagement in civic education and the civic education learning outcomes.

Figure 1 represents the structure of the hypothesised model of the study so called Model A. This model consisted of 14 manifest variables (MVs) and 5 latent variables (LVs) that were produced through the previous Confirmatory Factor Analysis (CFA) and Rasch Measurement Model Analysis (RMMA). Democratic Climate of Civic Education Classroom (DCEC) scale, the independent variable (exogenous variable) in the model was formed as an inward or formative mode, whereas all other endogenous variables were constructed in the outward or reflective modes. It is worthy of note that Student Concepts of Democracy (SCD) had just one manifest

variable. The Partial Least Square (PLS) loading or weight for such a variable is always equal to unity regardless of its specification as inward or outward mode.

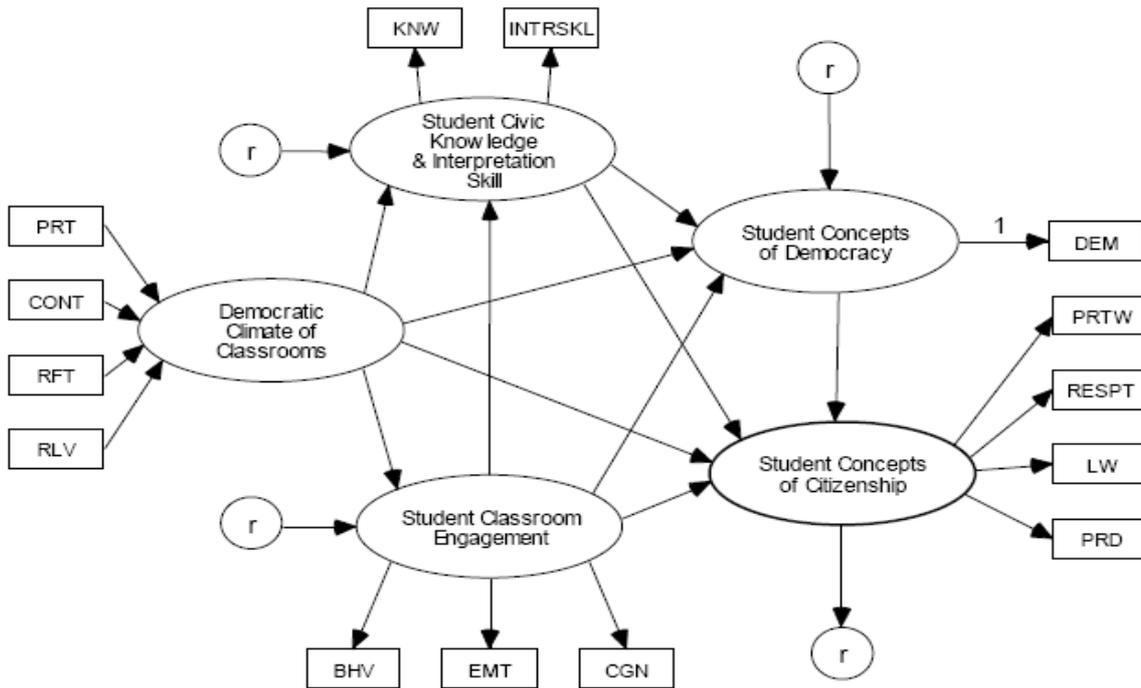


Figure 1. Model A: Structure of the Hypothesised Model

From Figure 1, it could be seen that the inner model structure of Model A formally comprised a recursive path model that in terms of direct effects had four restrictions. These restrictions were about direct effects of other variables on the variable of Student Concepts of Citizenship (SCC) which reflected outcomes, namely student understanding of ways to participate in civic life, aspects of civic life to be respected, nature of laws and student prudence in responding to different aspects of civic life. As shown in Figure 1, Democratic Climate of Civic Education Classroom (DCCEC), Student Engagement in Civic Education Classroom (SECEC), Student Civic Knowledge and Interpretation Skill (SCKIS) and Student Concepts of Democracy (SCD) were assumed to have direct effects on Student Concepts of Citizenship (SCC). Apart from these direct effects, DCCEC and SECEC were assumed to have indirect effects on SCC that operated through SCKIS and SCD. In addition, SCKIS had also an indirect effect on SCC that operated through SCD.

This specification can be justified on the basis of an assumption that those students who are in a democratic civic education classroom will be inspired to engage and learn more actively. Through the democratic climate of the civic education classroom, they do not only have opportunities to learn actively but also to develop their social skills enabling them to participate effectively and responsibly in their civic education classrooms. Hence, a democratic climate does not only influence their cognitive development but also their social skill development. In addition, through engagement in the civic education classroom, they show their positive or negative attitudes towards civic education classrooms. Positive attitudes will result in a better approach to the Civic Education subject that will help them increase their civic knowledge and understanding. Furthermore, since a better approach means deeper exploration and more collaboration, this learning experience will also facilitate the development of their concepts about democracy and citizenship.

The model of this study involved latent variables measured indirectly by different indicators. In order to handle this model, the data were analysed by employing Partial Least Square (PLS) method that was developed by Wold using statistical software called PLSPATH 3.01 (Sellin,

1990). This technique provides explicit estimation of latent variable scores by means of least square methods without requiring stringent distributional assumption (Sellin, 1995).

For exploratory analysis purpose, Model A as a hypothesized model was compared with Model B. As a comparison of the inner model results could not be performed in this kind of analysis, a comparison was only made for the outer model statistics. The descriptive redundancies and the associated jackknife redundancies for each endogenous manifest variable (MV) along with the block total and model total were compared between Model A and Model B. This procedure gave the overall fit of the hypothesized model and the refined model (Sellin, 1995). This fit indicated the predictive power of each model. In addition, the residual path for each latent variable was also calculated using the following expression:

$$r = \sqrt{1 - R^2}$$

where r is a residual path and indicates the effects associated with unexplained variance in a certain latent variable and R^2 is the explained variance associated with latent variable. Furthermore, weights and loadings in the outer model and path coefficients, fit indices and model effects in the inner model obtained from data analysis were used in interpretation and testing of the model.

RESULTS

In order to assess how the measured variables might be linked to each other, how well the data fitted the model proposed and how the democratic climate of civic education classrooms might influence student engagement, civic knowledge and interpretation skill, concepts of democracy and citizenship, the initial model called 'Model A' was assessed and trimmed to produce a more adequate model in its predictive power and coherence called 'Model B'.

Tables 4 and 5 present the PLS results obtained based on the proposed model (i.e. Model A) and the refined model (i.e. Model B).

Table 4. Weights and Loadings of Models A and B

Variable (<i>n</i> =930)	Model			
	A		B	
	Weight	Load	Weight	Load
Democratic Climate				
Participation	0.76	0.85	0.73	0.88
Controversial	-0.36	-0.20	-0.27	-0.04
Reflective thinking	0.48	0.59	0.52	0.69
Relevance	-0.21	-0.01	-0.10	0.16
Student Classroom Engagement				
Behavioural Engagement	0.41	0.78	0.42	0.78
Emotional Engagement	0.48	0.78	0.46	0.77
Cognitive Engagement	0.40	0.77	0.41	0.78
Civic Knowledge & Interpretation Skill				
Knowledge	0.80	0.92	0.79	0.92
Intrepretation Skill	0.40	0.65	0.41	0.66
Student Concepts of Democracy				
Concepts of Democracy	1.00	1.00	1.00	1.00
Student Concepts of Citizenship				
Participation Ways	0.32	0.82	0.32	0.82
Respect	0.26	0.77	0.26	0.77
Law	0.39	0.84	0.39	0.84
Prudence	0.28	0.78	0.29	0.78

Table 4 shows the PLS weights and loadings for each block. Table 5 displays the estimated direct inner model effects, the corresponding jackknife standard errors and the R-square and Q-square values for each inner model equation. All manifest variables were standardised prior to the PLS estimation. Therefore, the loadings and weights displayed in Table 4 are zero-order correlations between manifest variables (MVs) and their corresponding latent variables (LVs). In addition, the inner model coefficients in Table 5 are standardised path coefficients because the LVs are always standardised to unit variance (Sellin, 1995).

Table 5. Estimated Direct Effects. Jackknife Standard Errors in Parenthesis

Predicted	Predictor	Model			
		A		B	
Student Engagement in Civic Education Classroom (SECEC)	Democratic Climate of Civic Ed. Classroom (DCCEC)	0.43	(0.03)	0.44	(0.03)
	R^2	0.18		0.19	
	Q^2	0.18		0.19	
Student Civic Knowledge & Interpretation Skill (SCKIS)	Democratic Climate of Civic Ed. Classroom (DCCEC)	0.14	(0.04)	0.18	(0.03)
	Student Engagement in Civic Ed. Classroom (SECEC)	0.07	(0.03)		
	R^2	0.03		0.03	
	Q^2	0.03		0.03	
Student Concepts of Democracy (SCD)	Democratic Climate of Civic Ed. Classroom (DCCEC)	0.09	(0.05)		
	Student Engagement in Civic Ed. Classroom (SECEC)	0.11	(0.04)	0.15	(0.03)
	Student Civic Knowledge & Interpretation Skill (SCKIS)	0.24	(0.03)	0.26	(0.03)
	R^2	0.10		0.10	
	Q^2	0.09		0.09	
Student Concepts of Citizenship (SCC)	Democratic Climate of Civic Ed. Classroom (DCCEC)	0.22	(0.03)	0.23	(0.03)
	Student Engagement in Civic Ed. Classroom (SECEC)	0.25	(0.03)	0.24	(0.04)
	Student Civic Knowledge & Interpretation Skill (SCKIS)	0.16	(0.03)	0.15	(0.03)
	Student Concepts of Democracy (SCD)	0.16	(0.03)	0.17	(0.03)
	R^2	0.26		0.26	
	Q^2	0.25		0.26	

Table 5 indicates that two direct effects in the model were found to be virtually zero because they did not meet the rule of thumb that weights and loadings must have twice the estimated standard errors (Keeves, Darmawan & Njora, 2003). This resulted into the deletion of the two corresponding paths in Model B. These paths were Student Engagement in Civic Education Classroom (SECEC) on Student Civic Knowledge and Interpretation Skill (SCKIS) and Democratic Climate of Civic Education Classroom (DCCEC) on Student Concepts of Democracy (SCD).

With respect to the inner model, a comparison can be made between Model A and Model B if the weights are numerically the same. However, they are usually different because the weights depend on the specified inner model. Therefore, path coefficients, R^2 and Q^2 in the inner model cannot be compared. What are compared in this analysis are the inner path estimates in terms of relative effect sizes (Sellin, 1995) as shown in Table 6.

Table 5 shows that after the deletion of two paths (SECEC on SCKIS and DCCEC on SCD) from the model, there were changes in path coefficients. The effect of Democratic Climate of Civic Education Classroom (DCCEC) on Student Civic Knowledge and Interpretation Skill (SCKIS), the effect of Student Engagement in Civic Education Classroom (SECEC) on Student Concepts of Democracy (SCD) and the effect of Student Concepts of Democracy (SCD) on Student Concepts

of Citizenship (SCC) increased from 0.14 (0.04) to 0.18 (0.03), 0.11 (0.04) to 0.15 (0.03) and from 0.16 (0.03) to 0.17 (0.03) respectively. In addition to the direct effects, Table 6 shows indirect effects in both models. DCCEC had indirect effects on SCKIS through SECEC in Model A (0.03), on SCD through SCKIS in Model A and B (0.09) and through SECEC in Model B (0.11) and on SCC through SCKIS, SECEC and SCD in Model A (0.16) and through SCKIS in Model B (0.15). SECEC also had indirect effects on SCD through SCKIS in Model A (0.06) and on SCC through SCKIS and SCD in Model A (0.03) and through SCD in model B (0.02). Furthermore, SCKIS had an indirect effect on SCC through SCD in both models (0.38 and 0.04) respectively.

Table 6. Direct and Indirect Effects of the Predictors on the Predicted

Predictor LV	Predicted LV (n=930)	Model					
		A			B		
		Effects		Total	Effects		Total
Direct	Indirect	Direct	Indirect				
Democratic Climate	Student Engagement	0.43	-	0.43	0.44	-	0.44
	Civic Knowledge & Interpretation Skill	0.14	0.03	0.17	0.18	-	0.18
	Concepts of Democracy	0.09	0.09	0.18	-	0.11	0.11
	Concepts of Citizenship	0.22	0.16	0.38	0.23	0.15	0.38
Student Engagement	Civic Knowledge & Interpretation Skill	0.07	-	.07			
	Concepts of Democracy	0.11	0.02	0.13	0.15	-	0.15
	Concepts of Citizenship	0.25	0.03	0.28	0.24	0.02	0.26
Civic Knowledge & Interpretation Skill	Concepts of Democracy	0.24	-	0.24	0.26	-	0.26
	Concepts of Citizenship	0.16	0.04	0.20	0.15	0.04	0.19
Concepts of Democracy	Concepts of Citizenship	0.16	-	0.16	0.17	-	0.17

Even though the inner models could not be compared, it is possible to compare their outer model statistics using descriptive redundancies and the corresponding jackknife redundancies for each endogenous manifest variables along with block total and model total (Sellin, 1995). As shown in Table 7, the modifications had been made for Model A and Model B yielded only small changes in terms of predictive power because the difference in overall jackknife estimates between the two models was not significant, namely 0.112 to 0.115. However, this small difference to some extent indicates the superiority of Model B over Model A. Therefore, model modification done on Model A had increased its predictive power slightly (Sellin, 1995).

The PLS results presented above suggest that Model B would be preferred to Model A. Apart from its parsimony, Model B was slightly more powerful to Model A in terms of prediction. However, this does not mean that Model B was so-called ‘true’ model because it was just one of many possible alternative models available.

With respect to the direct effects, it could be seen from Table 5 that while Democratic Climate of Civic Education Classroom (DCCEC), Student Engagement in Civic Education Classroom (SECEC), Student Civic Knowledge and Interpretation Skill (SCKIS) and Student Concepts of Democracy (SCD) were found to be the most powerful predictors of Student Concepts of Citizenship (SCC), DCCEC turned out to be the most powerful predictor of Student Engagement in Civic Education Classroom (SECEC) and Student Civic Knowledge and Interpretation Skill

(SCKIS). On the other hand, SCKIS became the most powerful predictor of Student Concepts of Democracy (SCD). It should be noted that SCKIS was found to be weakly predicted by SECEC. On the contrary, SDC was weakly predicted by DCCEC.

Table 7. Descriptive (R_j) and Jackknife (R_d) Estimates of Redundancies for Comparing Predictive Power of Model A and B

Variable (<i>n</i> =930)	Model			
	A		B	
	R_d	R_j	R_d	R_j
Student Engagement				
Behavioural Engagement	0.111	0.108	0.118	0.115
Emotional Engagement	0.113	0.110	0.116	0.113
Cognitive Engagement	0.110	0.107	0.117	0.115
Block Total	0.334	0.325	0.351	0.343
Civic Knowledge & Interpretation Skill				
Knowledge	0.028	0.023	0.027	0.023
Intpretation Skill	0.014	0.011	0.014	0.012
Block Total	0.042	0.034	0.041	0.035
Student Concepts of Democracy				
Concepts of Democracy	0.103	0.093	0.095	0.089
Block Total	0.103	0.093	0.095	0.089
Student Concepts of Citizenship				
Participation Ways	0.175	0.169	0.176	0.170
Respect	0.156	0.150	0.157	0.152
Law	0.183	0.176	0.184	0.178
Prudence	0.160	0.154	0.161	0.156
Block Total	0.674	0.649	0.678	0.656
Model total	0.117	0.112	0.119	0.115

With regard to the indirect effects, it should be seen from Table 6 that DCCEC had indirect effects on SCKIS, SCD and SCC. On the other hand, SECEC had an indirect effect on SCC. In addition, SCKIS had an indirect effect on SCC. Regardless of the effect types (i.e. direct or indirect), all predictors had significant effects on the Student Concepts of Citizenship (SCC) as an outcome in the model (see Figure 2).

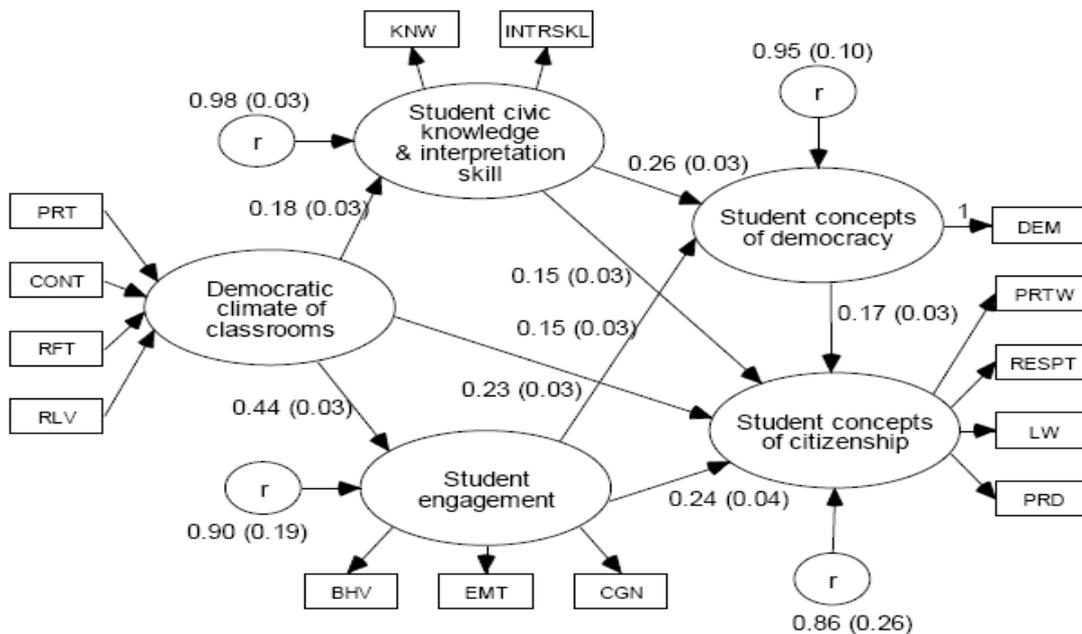


Figure 2. Model B: Structure of Refined Model from PLS Analysis

DISCUSSION

PLS analysis was run to examine the predictive power of the proposed model so called Model A. The analysis showed that this model was slightly less coherent than the refined model so called Model B. This slight difference indicates that Model B has superiority on Model A in its parsimony and slightly more coherent in its theoretical adequacy.

In general, all variables that were predicted to influence student concepts of citizenship were found to have significant path coefficients. This indicates that democratic climate of Civic Education classrooms, student engagement in Civic Education classrooms, student civic knowledge and interpretation skill and student concepts of democracy are four important factors that should be considered by teachers in classrooms in order to produce good citizens.

In details, the democratic climate of Civic Education classrooms played an important role in fostering student civic knowledge and interpretation skill, student engagement and student concepts of citizenship in North Sulawesi. However, democratic climate was found not to contribute significantly to the level of student concepts of democracy. This implies the importance of developing a Civic Education classroom that is characterised with democratic climate where students are provided with chances to practice more reflective thinking. Such a classroom is more likely to facilitate students to obtain civic knowledge and interpretation skill, to make them engaged in Civic Education classrooms and to help them to develop concepts of citizenship properly. These results in general support the importance of social and cognitive environment of classrooms as it is suggested by previous researchers, such as Allodi (2002), Aikin as reported by Morgenstern and Keeves (1997) and Fredricks et al. (2004). The finding that democratic climate does not play statistically a significant role in developing student concepts of democracy in North Sulawesi is not easy to explain because other research (e.g. cross-national studies of Civic Education in 1975 and 2001 by Torney-Purta et al.) has suggested that democratic climate played important roles in developing the student understanding of democracy.

In contrast to the democratic climate that was found to influence student civic knowledge and interpretation skill, student engagement was found to have a significant effect on student concepts of democracy, but not on student civic knowledge and interpretation skill. This result was unexpected because the review of literature indicated that student engagement could help students to develop their knowledge (e.g. Fredricks et al., 2002, 2004). Similar to this, democratic climate was strongly suggested to have an effect on student concepts of democracy (e.g. Torney-Purta, 2001). This issue might be associated with the nature of student classroom engagement in North Sulawesi where engagement was shaped not to be compatible with the development of student civic knowledge. The engaging condition of classrooms created by classroom members, teachers and students, could not help students to practice cognitive engagement that was more likely to be associated with knowledge development (Anderson, 2000). In addition, democratic climate developed in Civic Education classrooms was more likely to be designed in a way that did not support the development of student concepts of democracy.

It is understood from the review of literature that discussing controversial and relevant issues (Torney-Purta et al., 2001) are two important elements that are suggested to have significant effects on the student concepts of democracy in Civic Education classrooms. The presence of two manifest variables involving Controversial Issues and Relevance, that contributed negatively to the Democratic Climate of Civic Education Classroom (DCCEC) latent variable, on the one side, and the two other manifest variables involving Participation and Reflective Thinking that made positive contributions to it, on the other side, was an unexpected result. The previous research has suggested that raising controversial and relevant issues in Civic Education classrooms were the most important elements of the democratic climate scale (Kubow & Kinney, 2000; Torney-Purta et al., 2001). Bearing on mind the possible limitation existing in the instrument battery, this might imply that controversial and relevant issues were discussed in Civic Education classrooms by using a method that did not support the shaping of democratic classrooms. For example, teachers

raised controversial issues in classrooms and put themselves as the ultimate resources of final opinions in front of their students. Such a practice might make students incapable to understand and to practice democracy in their classrooms. Another possibility was that teachers, in general, rarely raised controversial and relevant issues in classrooms so that students could not work out properly items addressing both sub-concepts in the instrument.

It is also possible that what makes democratic climate and student engagement behave differently on student civic knowledge and interpretation skill, and on student concepts of democracy is the existing difference in their nature. Democratic climate represents both cognitive and attitudinal elements of learning condition simultaneously, whereas student engagement incorporates cognitive, behavioural and emotional engagement. It was shown in Table 4 that within democratic concept, participation and reflective thinking contributed more to the scale compared to relevant and controversial issues that had negative signs. It was also shown that within engagement concept, emotional engagement became the most dominant element in the scale compared to the behavioural and cognitive elements of sub-scales. As a result, it is assumed that the development of student civic knowledge and interpretation skill is more likely to be associated with the democratic climate compared to the student engagement due to its cognitive nature. In contrast, the development of student concepts of democracy is more likely to correspond to student engagement due to its attitudinal nature. Furthermore, the development of student concepts of citizenship was found to be affected by both democratic climate and engagement because concepts of citizenship are mix of emotional, attitudinal and cognitive representations of knowledge. This explanation is based on the notion of multiple intelligences (Anderson, 2000) that leads to the assumption that each kind of specific knowledge requires different conditions to be nurtured.

Student civic knowledge and interpretation skill that were found to have significant effects both on student concepts of democracy and citizenship indicated that in order to produce a democratic and responsible citizens, students should be provided with a better understanding of civic knowledge and skill. Previous cross-national studies led by Torney-Purta in 1975, 1999 and 2001 strongly suggest that civic knowledge and interpretation skill are important to help students to have a better understanding of democracy and citizenship.

Finally, student concepts of democracy that were also found to have a significant effect on student concepts of citizenship indicated that in order to produce good citizens, to some extent, a good understanding of democracy was required.

CONCLUSIONS

The refined model so called Model B in this study was proved to be more parsimonious and slightly more coherent in its theoretical adequacy. In addition, all variables that were predicted to influence student concepts of citizenship, namely democratic climate of Civic Education classrooms, student engagement in Civic Education classrooms, student civic knowledge and interpretation skill and student concepts of democracy were found to have significant path coefficients in the model tested. Democratic climate of Civic Education classrooms played an important role in fostering student civic knowledge and interpretation skill, student engagement and student concepts of citizenship in North Sulawesi. However, democratic climate was found not to contribute significantly to the level of student concepts of democracy.

Unlike democratic climate, student engagement was found to have a significant effect on student concepts of democracy, but not on student civic knowledge and interpretation skill. In addition, student civic knowledge and interpretation skill were found to have significant effects both on student concepts of democracy and citizenship. Furthermore, student concepts of democracy were also found to have a significant effect on student concepts of citizenship. Finally, this finding should initially be tested and replicated in further studies before acceptance. If the evidence supports the finding emerging from this study, then greater thought should be given to the making

of a democratic and engaging classroom climate and to what is involved in building such a classroom environment.

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Variation in learning styles in a group of Chinese English as a foreign language learners

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In this study, the Felder learning styles inventory was administered to students who were non-English majors in a Chinese University. Descriptive statistics identified that participants do vary in their preference for particular learning styles with a great variety of learning style preferences distributed unevenly among the sample population. A large number of the participants showed mild preference to Global, Visual and Sensing learning styles. The present study extended Felder's work to a group of Chinese English as a Foreign Language learners. Implications for English as a Foreign Language teachers in Chinese Universities are that it is important to be aware of varied needs of learners from different majors and to respond flexibly by employing a broad range of teaching techniques to better reach students of different learning preferences.

Learner, learning style, dimension, preference, difference, Chinese English, foreign language learner

INTRODUCTION

Many English as a Foreign Language (EFL) learners encounter the frustration that their teachers' teaching does not appeal to their own learning preferences because most teachers teach the way they learn (Sitt-Gohdes, 2001). The unfavourable learning condition consequently undermines students' motivation and diminishes their learning potential (Miller, 2001; Sitt-Gohdes, 2003). Teachers of English in Chinese universities share the same embarrassment that there are always some students who show a tendency to be inattentive in class and get bored with English learning even though teachers have made great efforts preparing for the class. This inefficient situation can be attributed to problems involving both teachers and students. Some researchers attributed the reasons for such a problem to a lack of motivation and self-efficacy from the students (Graham, 2006) and others to individual difference (Snow, 1986).

It is well accepted that when teachers are able to analyse their own teaching techniques and analyse the difference and needs of their students, the educational process is likely to become optimised for both students and teachers (Fairhurst & Fairhurst, 1995). Learning style is one of the concepts that are postulated by researchers to depict learners' differences and varied needs. Therefore, the present study aims to depict learning style difference among a group of Chinese university students and further to inform English learning and teaching practice in China.

RESEARCH QUESTIONS

This study aims to explore the following questions:

1. Do English as a Foreign Language learners in Chinese Universities vary in their preference for particular learning styles?

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2. If they do vary in their preference for particular learning styles, what are the characteristics of the variation?
3. How can the variation of learning styles inform teaching of English as a Foreign Language in Chinese universities?

DEFINITION AND CLASSIFICATION OF LEARNING STYLES

Definition

Learning Style took its name in the 1970s. The origin of this concept has been attributed differently by scholars to individual differences, to the idea of “life styles” and to personality types (Zhang & Sternberg, 2005).

With the development of constructivist views of learning, many researchers began to be interested in depicting individual differences in the way people process information and gain understanding from different constructs (Chalmers & Fuller, 1996). Therefore learning styles, together with other constructs such as decision making and problem-solving style, mind style, perceptual style and thinking styles, with each addressing different aspects and features of human cognition, were postulated to depict the variances among individuals (Zhang & Sternberg, 2005). An earlier term that denotes an individual’s consistent preference for particular ways of gathering, processing and storing information and experiences is Cognitive Style. Cognitive Style is associated with Learning Styles in that these two terms appear to address very similar issues of individual differences (Cuthbert, 2005) and share common origins (Sadler-Smith, 2001). Sadler-Smith suggested that both the two terms derived from four areas of psychology. These areas are perception, cognitive controls and cognitive processors, mental imagery, and personality constructs, both having cognitive, affective and sociological features.

The term Learning Style, as is used by Kolb (1984) and Honey and Mumford (1986), describes an individual’s preferred or habitual ways of processing knowledge and transforming the knowledge into personal knowledge. According to Kolb (1984), individual differences derive from the psychological attributes that determine the strategies a person chooses while processing information. In the learning literature, theorists interpret the concept of Learning Style in different ways. Gregorc (1982) emphasised learners’ mental qualities in his definition. He combined mental perception and ordering qualities to form Concrete Sequential, Concrete Random, Abstract Sequential and Abstract Random - four learning styles. Kirby and his colleagues (Kirby, Moore, & Shofield, 1988) defined learning style as the preferred way to learn and the way a person learns best. Keefe (1979) presented the notion of learning style as characteristic, cognitive, affective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment. Incorporating the many features of learning style, the author holds that learning style is the habitual preference learners demonstrate in their learning activities; formed from the interaction of factors such as individual experience, cognition, personality and environment; and having the characteristics of individuality, consistency and stability.

Features of Learning Styles

The first integrative model that depicted the traits of learning styles is the three-layer “onion” model developed by Curry (1983). The innermost layer of the model is composed of measures of personality dimensions. The middle layer comprises style measures of information processing, and the outermost layer is composed of measures addressing each individual’s instructional preferences. Curry hypothesised that the styles at the innermost layer, the personality dimensions, are the most stable ones and the styles at the outermost layers, the individual instructional preferences, are the dimensions that are most likely to be modified. In this sense, Curry’s model suggests that learning styles are on a continuum with trait and state being the two poles; the

dimensions at the innermost layer are more trait-like and the ones at the outermost layer are more state-like.

There are two important points in understanding learning styles. The first is that learning styles do not suggest one's learning ability (Riding, 1997). The second is that different learning styles should not be judged as being better or worse; they are simply different (Zhang & Sternberg, 2005).

Classification of Learning Styles

Different theorists defined learning styles differently and therefore they belong to different classification systems. The learning style model developed by Felder and Henriques (1995) is adopted in this paper because this model was particularly designed for foreign and second language learners. In this work, learners are categorised as falling into five dichotomous learning style dimensions, namely Sensing or Intuitive learners, Visual or Verbal learners, Active or Reflective learners, Global or Sequential learners, Inductive or Deductive learners.

According to Felder and Henriques (1995), learners are classified with respect to perceptual behaviour as sensing or intuitive learners. Sensing learners are concrete and methodical; they are good at memorising facts and doing hands-on work and are more comfortable with following rules and standard procedures. Intuitive learners tend to be abstract and imaginative; they like innovation and dislike repetition.

Considering the ways in which learners prefer input information to be presented, they are categorised as visual or verbal learners. Visual learners are those who prefer information to be presented in their thinking or memory in the form of pictures, diagrams, films and demonstrations. Verbal learners, on the contrary, prefer information presented in the form of words.

With regard to the ways of knowledge processing, learners are thought to fall into two categories: Active learners or Reflective learners. An active learner, as suggested by the name, is someone who prefers to be actively involved in examining and employing knowledge with others, such as in group discussion. Reflective learners tend to examine and employ knowledge introspectively. Active learners benefit the most in dialogue, role-play and team work learning activities. Reflective learners are more inclined to ponder on perceived information.

Learners are classified as Global learners or Sequential learners in the ways they achieve understanding. Compared with Sequential learners, who tend to process and organize knowledge in a piecemeal fashion, Global learners are good at dealing with seemingly unconnected fragments of information and achieve understanding in a holistic way. In language learning practice, Global learners prefer holistic understanding of the broad context of knowledge and ignore trivial details, while sequential learners feel comfortable when the teacher divides passages and sentences into parts dealing with lexicon, grammar and structure, respectively.

Judging from the ways learners organise their learning, learners are classified as Inductive or Deductive learners. Inducing new material by linking it to one's observed material or prior knowledge is favoured by inductive learners (Glaser, 1984). Deductive learners prefer to be presented with a general concept that is then followed by supporting examples.

Learning styles were found to affect learners' learning behaviors. Learners having different learning style preferences would behave differently in the way they perceive, interact, and respond to the learning environment (Junko, 1998). Since learners differ in their preferences to certain learning styles, it will be important for teachers to examine the variations in their students on the features of their learning styles, because the information about learner's preference can help teachers become more sensitive to the differences students bring to the classroom (Felder & Spurlin, 2005). Adjustments can then be made to accommodate the students' varied needs. This

study, therefore, aims at depicting the variation of learners' learning style preference in the Chinese English as a Foreign Language learning community to bridge teachers' knowledge gap about learners' needs and improve their teaching practice.

RESEARCH METHODS

Participants

The participants in this study were 152 first-year college students enrolled nationwide at Qingdao Technological University. Most students were 18 or 19 years of age. The students majored in eight disciplines including Civil Engineering (n=29), Architecture (n=27), Engineering Equipment (n=22), Engineering Material (n=11), Engineering Topography (n=13), Environmental Engineering (n=10), Environmental Art (n=24) and Mathematics (n=16). Among the participants, 78 were males and 74 were females. The study was conducted during the second semester of their first academic year.

Research Design and Instrument

The instrument used in this study to assess learners' learning style preference was the Index of Learning Styles questionnaire devised by Felder and Soloman (Felder & Soloman, nd). The reason that this study employed the Index of Learning Styles as a measuring instrument was because most of the participants were engineering majors and the original goal of devising the instrument, according to Felder, was to offer some insights about teaching and learning based on his experience in engineering teaching (Felder & Silverman, 1988).

Though Felder and Silverman (1988) proposed five learning style categories in his work, no question in this questionnaire assesses the Inductive-Deductive learning style category. According to Felder, university students are predicted most likely to choose deductive as their favoured teaching condition because they do not want the trouble of making collections of observations and facts and making sense of the heaped up stuff; and this preference on the part of the students may make some teachers feel that it is justifiable to keep using the deductive paradigm in their teaching practice, which seems the most convenient way to organise instructional materials for them.

The forty-four multiple choice questions in the questionnaire reflect the psychological and behavioural characteristics of four dichotomous dimensions of learning styles described above. Questions in this questionnaire were written in English. Two choices in each question reflect the two dichotomous learning styles. For example, in the question "*When I get directions to a new place, I prefer (A) a map, (B) written instructions*", this question is trying to distinguish whether the learner is more a visual learner or a verbal learner. Participants were required to indicate their preference to either of these two answers with compliance to their normal practice. Participants who choose answer *A* are regarded as more of a visual learner while those who choose *B* are considered as more of a verbal learner in this case. An uneven number of questions evaluating each dichotomous dimension of learning styles guarantees that there is no chance a learner can get an even number of answers for two poles of the learning style continuum. The following example is to illustrate how to evaluate a learner's learning style preference based upon his or her answers to the questionnaire. Among the eleven questions designed to evaluate a learner as a visual or verbal learner, a selection of "*A*" indicates a preference for a visual learning style and a selection of "*B*" indicates preference for a verbal learning style. If a participant chooses *A* six times and *B* five times, he or she is regarded as more of a visual learner. And because the frequency of choice *A* minus the frequency of choice *B* ($6 - 5$) is within the scale of one to three, the participant is regarded as having mild preference for visual learning style and could easily achieve balance or adjustment between visual and verbal learning environment. If the value lies between five and seven, the participant is thought to habitually prefer the learning style which outnumbers another style and is more comfortable learning in such a classroom environment.

When the absolute subtraction value fits into the range from nine to eleven, the participant is classified as purely a single style learner and would struggle and suffer in the learning environment featured by another style of the dichotomous pair.

This questionnaire, used in the present study, has been installed on the World Wide Web since 1996. The instrument has been translated into Spanish, Portuguese, Italian, German and several other languages and later researchers have testified to the validity and reliability of the instrument (Cook, 2005; Cook & Smith, 2006; Felder & Spurlin, 2005; Litzinger, Lee, Wise, & Felder, 2005; Zywno, 2003). Test-retest correlation coefficients for the four learning style dimensions ranged from 0.7 to 0.9 for one month interval and from 0.5 to 0.8 for seven and eight months interval. Cronbach alpha coefficients were all greater than the criterion value 0.5 for attitude survey test.

FINDINGS AND DISCUSSIONS

Preference Percentage Difference

Participants were asked to voluntarily take part in the survey and fill out the Index of Learning Styles questionnaire according to their usual practice. They were told to seek help from the researcher in case they had problems with understanding the wording of the questions. It took the participants an average of around 50 minutes to complete the questionnaire.

Figure 1 shows that the percentages of participants displaying mild preference to Sensing-Intuitive, Visual-Verbal, Active-Reflective, Global-Sequential, the four groups of dichotomous learning style dimensions, were 67 per cent (39% to Sensing learning style, 28% to Intuitive learning style), 65 per cent (40% to Visual learning style, 25% to Verbal learning style), 66 per cent (28% to Active learning style, 38% to Reflective learning style) and 73 per cent (41% to Global learning style, 32% to Sequential learning style), respectively.

Among the participants who were identified as having mild preference to these learning styles, a large number of them (41%) displayed mild preference to Global learning style, Visual learning style (40%) and to Sensing learning style (39%).

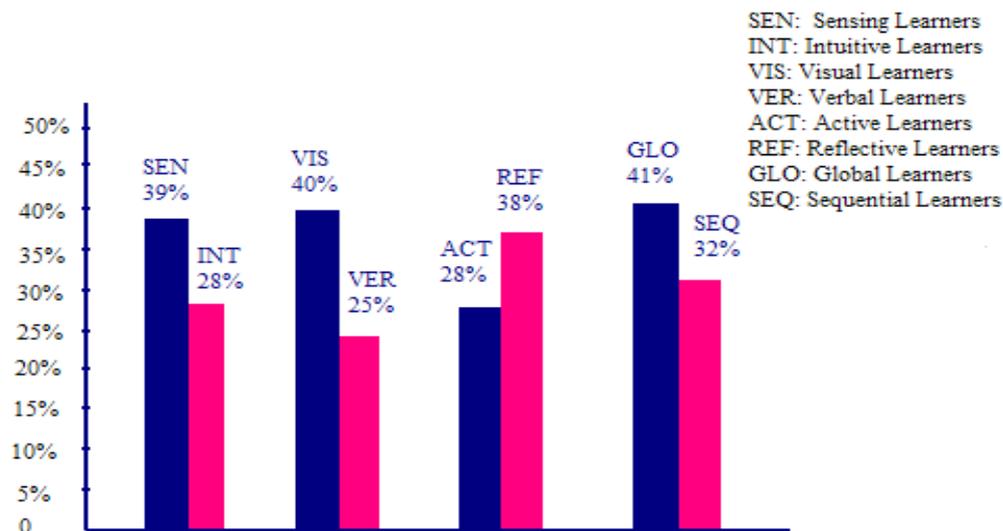


Figure 1. Mild Preference Percentage

In Figure 2, moderate preferences to the four groups of learning style dimensions were 30 per cent (18% to Sensing learning style, 12% to Intuitive learning style) for Sensing-Intuitive learners, 27 per cent (22% to Visual learning style, 5% to Verbal learning style) for Visual-Verbal learners, 29 per cent (12% to Active learning style, 17% to Reflective learning style) for Active-Reflective learners and 25 per cent (20% to Global learning style, 5% to Sequential learning style) for Global- Sequential learners, respectively.

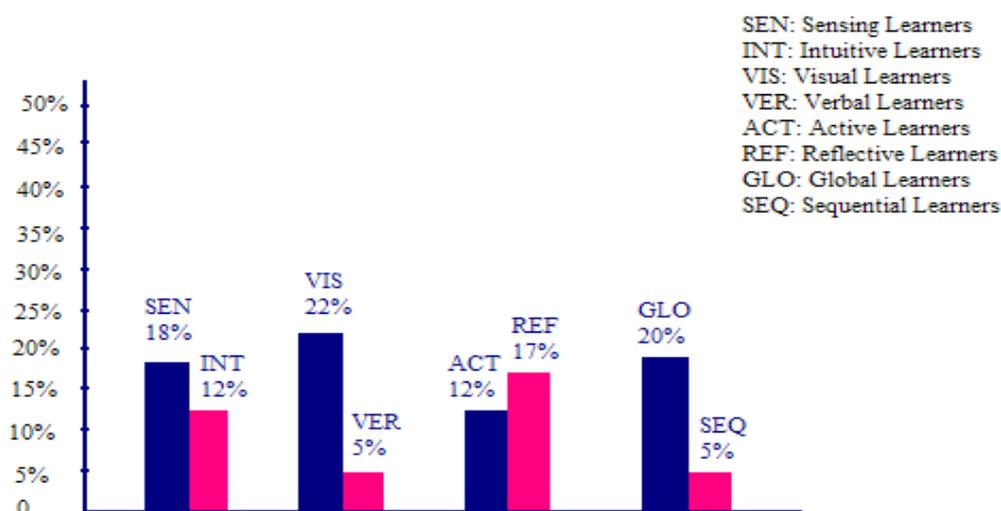


Figure 2. Moderate Preference Percentage

Figure 3 shows the percentages of participants displaying strong preference to the four groups of dichotomous learning style dimensions as 3 per cent (2% to Sensing learning style, 1% to Intuitive learning style) for Sensing-Intuitive learners, 8 per cent for Visual learners, 5 per cent (2% to Active learning style, 3% to Reflective learning style) for Active-Reflective learners and 2 per cent for Sequential learners. No learners were identified as having strong preference to Verbal and Global learning styles.

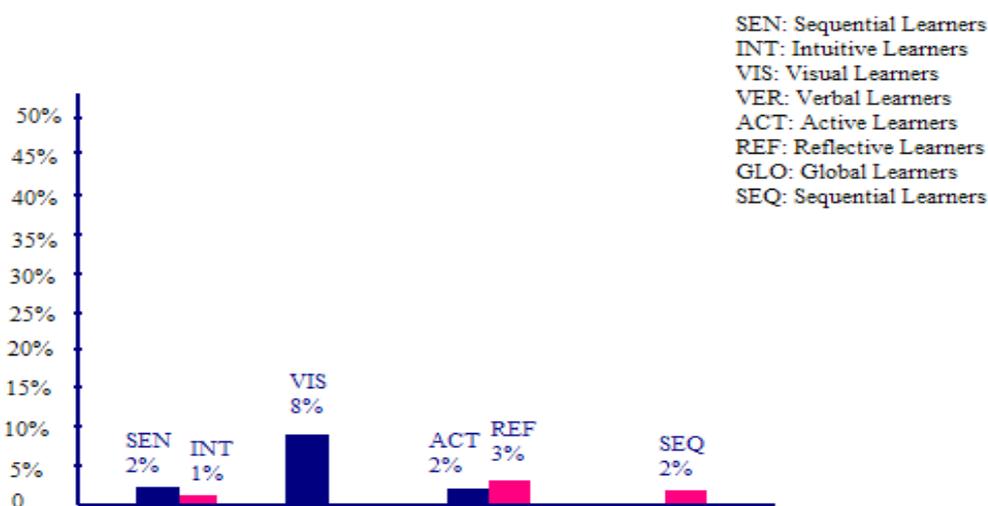


Figure 3. Strong Preference Percentage

As is indicated by the above three figures, mild preference percentages to the four dimensions of learning styles represent the majority of the participants. A large number of the students shared mild preference to the four dimensions of learning styles with a significant 41 per cent, 40 per cent and 39 per cent showing mild preferences to Global, Visual and Sensing learning styles, which indicates that this portion of the participants cannot be strictly classified as having preference for a single learning style; they shared a great variety of learning style preferences and were well balanced in the environment featuring both styles of a dimension.

Figure 3 shows that the number of participants displaying strong preference for Visual learning style occupied the highest 8 per cent; students showing strong preferences to Intuitive, Active, Reflective and Sequential learning styles occupied 1 per cent, 2 per cent, 3 per cent and 2 per cent, respectively. None of the participants showed strong preference for Verbal and Global learning styles. The finding that only a small number of participants showed strong preference to

Intuitive, Active, Reflective and Sequential learning styles suggested that these participants would find it hard to fit into a learning environment that has an emphasis on Intuitive, Active, Reflective and Sequential learning styles. In other words, they were comfortable only with one learning style pole of a dimension and could achieve optimal learning results if only the opposite learning environment is provided.

Preference Difference across Subject Majors

Because research conducted recently found that learners' learning style preference differs across majors (Felder & Silverman, 1988; Litzinger, Lee, Wise & Felder, 2005) and many English as a Foreign Language learners in Chinese universities, including the participants in this study, take English classes together with their peers from other majors, the present study performed a learning style analysis with the participants being divided into different major groups. As data in this study were skewed and sample sizes from different majors were unequal, the most appropriate statistical test was the nonparametric Mann-Whitney test and $p < 0.05$ was considered statistically significant (Dancey & Reidy, 2004). The pooled standard deviation " d " (Rosnow & Rosenthal, 1996) indicating effect size was also employed to show, in each paired comparison, the degree of non-overlap for the two comparing majors score distributions (Cohen, 1988). To compute scores, answers categorised as favouring Sensing, Visual, Active and Sequential learning styles were assigned value 1 and answers categorised as favouring Intuitive, Verbal, Reflective and Global learning styles were assigned value 2. Statistics in Table 1 show that statistically significant differences in learning style preference across majors were found to be in Sensing-Intuitive ($p=0.002$) and Visual-Verbal ($p < 0.0005$) learning style dimensions.

Table 1. Test Statistics (Kruskal Wallis Test, Grouping Variable: Major_2)

	Sensing-Intuitive	Visual-Verbal	Active-Reflective	Global-Sequential
Chi-Square	22.275	26.674	13.490	9.498
Df	7	7	7	7
Asymp. Sig.	0.002	0.000	0.061	0.219

With respect to preference difference in the Sensing-Intuitive learning style dimension, as is shown in Table 2, separate paired analyses showed that participants majoring in Architecture differed significantly from those majoring in Engineering Material with a large effect size ($p=0.003$, $d=0.84$), Engineering Topography with a medium effect size ($p=0.021$, $d=0.52$), Environmental Engineering with a medium effect size ($p=0.028$, $d=0.39$), Environmental Art with a medium effect size ($p=0.024$, $d=0.47$), Mathematics with a medium effect size ($p=0.047$, $d=0.49$) and significantly from those majoring in Civil Engineering with a large effect size ($p < 0.0005$, $d=0.87$) and Engineering Equipment with a large effect size ($p < 0.0005$, $d=0.82$). Architecture students, as shown by the figures, tended to be more Intuitive learners in each paired comparison. Table 2 showed the mean ranks for Architecture students ranged from the lowest 21.35 compared to Environmental Engineering students to the highest 37.59 compared to Civil Engineering students; The mean ranks of the comparing majors range from the lowest 11.32 for Engineering Material students to the highest 21.08 for Environmental Art students.

Table 2. Mann-Whitney Test Mean rank and effect size comparison across majors for Sensing-Intuitive learning style

Major Pair: Architecture with	N	Mean Rank	Effect Size	Asymp.Sig. (2-tailed)
Sensing--				
Intuitive				
—Civil Engineering	27/29	37.59 – 20.03	0.87	0.000
—Engineering Equipment	27/22	31.39 – 17.16	0.82	0.000
—Engineering Material	27/11	22.83 -- 11.32	0.84	0.003
—Engineering Topography	27/13	23.43 – 14.42	0.52	0.021
—Environmental Engineering	27/10	21.35 – 12.65	0.39	0.028
—Environmental Art	27/24	30.37 – 21.08	0.47	0.024
—Mathematics	27/16	24.89 – 17.13	0.49	0.047

Based on the above figures, a conclusion can be drawn that Architecture participants in this study, on the whole, tended to favour the Intuitive learning style more than any other majors.

With respect to preference difference to Visual-Verbal learning style dimension, as is shown in Figure 3, separate paired analyses suggested that participants majoring in Environmental Art differed significantly from those majoring in Engineering Material with a large effect size ($p=0.036$, $d=0.62$), Engineering Topography with a large effect size ($p=0.003$, $d=0.68$), Environmental Engineering also with a large effect size ($p=0.006$, $d=0.86$), Engineering Equipment with a medium effect size ($p=0.005$, $d=0.56$) and very significantly from those majoring in Architecture ($p=0.001$, $d=0.75$), Mathematics ($p<0.0005$, $d=1.07$) and Civil Engineering ($p<0.0005$, $d=0.94$) with large effect size in each case. Environmental Art students tended to be more Verbal learners in each paired comparison.

As shown in Table 3, the mean ranks for Environmental Art students ranged from the lowest 20.46 and Engineering Material students to the highest 36.65 when compared with Civil Engineering students.

Table 3. Mann-Whitney Test mean rank and effect size comparison across majors for Visual-Verbal learning style

Major pair:	Environmental Art with	N	Mean Rank	Effect Size	Asymp.Sig. (2-tailed)
Visual	—Engineering Material	24/11	20.46 – 12.64	0.62	0.036
--	—Engineering Topography	24/13	22.77 – 12.04	0.68	0.003
Verbal	—Environmental Engineering	24/10	20.46 – 10.40	0.86	0.006
	—Engineering Equipment	24/22	28.75 – 17.77	0.56	0.005
	—Architecture	24/27	33.50 – 19.33	0.75	0.001
	—Mathematics	24/16	26.42 – 11.63	1.07	0.000
	—Civil Engineering	24/29	36.65 – 19.02	0.94	0.000

The finding that, when compared with Environmental Engineering students, Environmental Art students turned out to favour Verbal learning style more than other majors did not go with the author's expectation that these students should be more habitually Visual Learners. The author suspected that the result could be attributed to the fact that two thirds of them were females.

Engineering Topography students also differed significantly from Civil Engineering students with a medium effect size ($p=0.046$, $d=0.51$) and Mathematics students again with a medium effect size ($p=0.045$, $d=0.61$) in their preference for Visual-Verbal learning style dimension. According to the Mean Rank comparison, Engineering Topography students were found to be more Verbal Learners than Civil Engineering students and Mathematics students.

Preference Difference between Gender

An Independent Samples T-Test did not show any significant difference between gender. However, the author suspected that there might be gender difference within each major. A recent study found that female engineering students were more sequential, more sensing and less visual than male engineering students (Litzinger et al., 2005).

PEDAGOGICAL IMPLICATIONS

Findings from the study indicate that the participants did vary in their preference for particular learning styles. A great variety of learning style preferences were distributed unevenly among the sample population with Global, Visual, and Sensing learning styles mildly preferred by a large number of them.

The varied and uneven distribution of learning styles among learners implies that, as English as a Foreign Language teachers in Chinese Universities, it is important to be aware of the feature of learning style preference among learners and to respond flexibly by employing a broad range of teaching strategies to better reach students of different learning preferences. The optimal

condition is that teachers can help students acquire the ability to use their less preferred style modalities when appropriate and make those learners with strong preference to certain learning styles move toward a position of greater balance (Felder & Spurlin, 2005).

Teachers cannot expect to become all things to all students, however they can increase their ability to appreciate and understand learners' varied needs. Unfortunately, most Chinese English as a Foreign Language teachers show consistently favourable attitudes towards teacher-directed classroom activities in their teaching and they seldom develop a sense of appreciating and understanding learners' needs, which results in students' boredom and undermines their potentiality for achievement in learning.

To improve the situation, teachers can assign different tasks to different groups of students identified as sharing similar learning styles, that is style-alike groups, or provide classroom activities that cater for the learning style preference favoured by the majority of the learners. For example, for the sample population in this study, with a large number showing mild preference for Global, Visual and Sensing learning styles, the teacher can maximise his or her teaching efficiency by guiding learners through phases of guessing at words and searching for holistic understanding of the main ideas; presenting multi-media materials; and presenting knowledge in the way that learners can see how it connects to their prior knowledge or reflects the real world (Felder & Henriques, 1995). Because individual's instructional preferences are at the outermost layer of the "onion" model and are the dimensions that are most likely to be modified (Curry, 1983), teachers can encourage changes in learners' behaviour and foster guided style-stretching in a slow and consistent manner. For example, sequential learners can benefit from consistent activities that involve global understanding.

The possible limitation of this study lies in that the learning style preference tendencies identified for the sample population may not be applicable to English as a Foreign Language learners of other Chinese universities.

To conclude, a better understanding for English as a Foreign Language learning and teaching in Chinese universities is that different learners need different things. Teachers can appreciate and tolerate differences and maximise learners' potentiality by varying teaching strategies to cater for learners' preferences for different learning styles.

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Students' pedagogical knowledge about teachers' use of questions

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High quality pedagogical knowledge is crucial for students, especially for teacher-education students, because it can assist them in their current learning and in helping their own future students' learning. This study of teacher-education students used a combination of qualitative and quantitative research methods to investigate three main research questions: (1) What pedagogical knowledge (SPK) do students have about teachers' use of questions? (2) How well-developed is this SPK? (3) Do students use this SPK in planning for teaching? The findings showed that students did have SPK about teachers' use of questions that involved a wide range of motivational, cognitive and metacognitive activities in teaching and learning. There was evidence that students did use their SPK in a simulated teaching situation. However, the extent of knowledge used depended on the situations students were involved in, on the types and the quality of the SPK, and on the availability of external probing.

Student pedagogical knowledge; teachers' use of questions; teacher-education students; knowledge of teaching; knowledge of learning

INTRODUCTION

The prior knowledge that students bring to the performance of any study task includes not only knowledge in subject-matter domains, but also knowledge in the domain of teaching and learning (Askell-Williams, 2004; Boulton-Lewis, 1992, 1994, 1998; Lawson & Askell-Williams, 2002). When students are involved in problem-solving tasks involving, say biology, they must use their knowledge of biology and their knowledge of how to acquire and manipulate that knowledge in order to solve the problems they are working on. If they are in a classroom their pedagogical knowledge will include knowledge of how to make effective use of what the teacher is saying or doing. Since instruction is an interactive process, students' knowledge of teaching and learning can play the role of mediator between the teachers' intentions, plans and actions and students' intentions, plans and actions (Askell-Williams, 2004). Because students need to manage their own learning much of the time, whether they are in a classroom or are undertaking independent study, they need to have knowledge of how to direct their own learning. In short they need to be able to teach themselves and so must call upon their own pedagogical knowledge. We refer to this knowledge as student pedagogical knowledge (SPK).

The recognition of students' knowledge of teaching and learning has been reported in studies on students' conceptions of teaching and learning (Meyer, Tabachnick, Hewson, Lemberger, & Park, 1999; Saljo, 1979), students' approach to learning (Biggs, 1987a, 1993; Marton & Saljo, 1976a, 1976b; Marton & Saljo, 1997), students' perceptions of teaching and learning (Entwistle, Skinner, Entwistle, & Orr, 2000; Elen & Lowyck, 1999; Winne and Marx, 1980, 1982) and on self-

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regulation and metacognition (Pressley, Van Etten, Yokoi, Freebern, & Van Meter, 1998; Winne & Hadwin, 1998; Zimmerman, 1995). More recently, more direct investigations of knowledge of teaching and learning has been discussed in the work of Elen and Lowyck (1999) and Lawson and his colleagues (Askell-Williams, 2004; Lawson & Askell-Williams, 2001; Lawson, Askell-Williams, & Murray-Harvey, 2002, 2003). These studies have found that knowledge of teaching and learning can vary widely between students.

In relation to students' knowledge about teachers' use of questions, Tran and Lawson (2003) found that this knowledge is quite similar in nature to teachers' pedagogical knowledge identified by Shulman (1987) in his analysis of the varieties of teachers' knowledge. In the Tran and Lawson study, participants' SPK was found to include a wide range of knowledge of motivational, cognitive and metacognitive activities of both teachers and students, with the most frequently accessed SPK being about cognitive activity.

Studies of student knowledge of teaching and learning have not only been concerned with the recognition of that knowledge, but also with the quality of that knowledge. Elen and Lowyck (1999) expressed their concern about the quality of their students' metacognitive instructional knowledge, as did Woolfolk-Hoy and Tschannen-Moran (1999, p.280-281) in a report on teacher education students in the United States:

[prospective teachers] lack understanding of the connections between teaching strategies and students' learning ... our students have great difficulty explaining the mechanism of learning and how teaching influences these processes ...

Although there has been relatively little examination of the quality of SPK, there has been research on ways to think about knowledge quality. Different dimensions of quality of knowledge structures were identified by Mayer (1975) and White (1979). Descriptions of knowledge quality have been advanced in work by Biggs and Collis (1982), McKeown and Beck (1990), Hogan and colleagues (e.g Hogan, Nastasi, & Pressley, 1999) and Askell-Williams (2004). The Structure of Observed Learning Outcomes (SOLO) taxonomy developed by Biggs and Collis (1982) identified four dimensions of quality in learning outcomes: 1) capacity, which referred to working memory; 2) relating operation, which referred to the way in which an instructional cue and the student's response were interrelated; 3) consistency and closure in relating data and conclusions; and 4) structure, which represents the relations between cue, data and response(s). The SOLO taxonomy was used to assess quality of SPK in this project.

Although SPK has been described in some detail, the use of this knowledge has received less attention. The use of SPK has been explored in studies on the relationship between students' conceptions of teaching and learning and their classroom behaviours (Lemberger, Hewson & Park, 1999; Mellado, 1998; Meyer et al., 1999; and Wilson, Konopak & Readence, 1994), and between students' task perceptions and their planned and executed learning activities (Luyten, Lowyck & Tuerlinckx, 2001). A closer view to the use of knowledge of teaching and learning has been reported in Lonka, Joram and Bryson's (1996) study, in which students were expected to define the concept "learning" and to apply their definition to specify "the best way to enhance students' ability to learn", and explain their specification. Such research has not focussed on the use of knowledge held about teaching and its use.

The use of students' knowledge about teaching and learning is an issue of transfer of knowledge. Student teachers should be expected to use their knowledge of teaching and learning when they are doing their own learning and when they are teaching. It also seems reasonable to predict that the use of SPK would be related, in some degree, to the quality of that knowledge. Therefore, in the following studies we were interested to identify the range of student pedagogical knowledge accessed by the student-teacher participants and then to examine the extent of use of that knowledge and the relationship between knowledge quality and knowledge use.

METHOD: PARTICIPANTS AND PROCEDURE

Nineteen final year teacher-education students in an Australian university participated voluntarily in the study and were engaged individually in five sets of activities as summarized in Table 1. The group included students enrolled in junior primary/primary, middle school and secondary school programs. Upon acceptance of their participation, each student was advised of the time for their meeting with the researcher and was asked to bring to this meeting a sample of teaching materials involving a comprehension exercise that was typical of materials that would be used in their teaching practice situations. Reading passages used for the comprehension task in this interview were selected so that the material would be appropriate to the teaching field and interest of each participant. They were asked to ensure that the passage had at least five ideas that would form the subject of a lesson activity for a typical class that they would teach. Participants attended the research session individually and completed a questionnaire about teachers' use of questions and took part in two interviews.

Table 1: Procedures of the study

Sections	Participant activities
1. Introduction	Introduction Signing of consent form Check for comprehension task materials
2. Questionnaire	Completing the questionnaire
3. Training for think-aloud method	Reading the introduction, Listening to taped demonstration, Completion of practice tasks
4. Interview 1	Designing questions for teaching, using think aloud method
5. Interview 2	Choosing the most important question and explaining reasons for the choice

The questionnaire included an introduction section and six items. Each item was in the format of a free-response question, and consisted of a stem and two alternatives and space underneath for students to write their response. The introduction asked students to consider the two alternatives for each item and to select the one that they thought "would be the best for the teacher to do to help the student develop a good understanding" and then to explain the reason for their selection. Out of six questionnaire items, two were related to motivational functions, two to cognitive functions and the other two to metacognitive functions. The alternatives used in the questionnaire were adapted from recent inventories of motivational, cognitive and metacognitive aspects of teaching and learning such as R-SPQ-2F (Biggs 1987b; Biggs, Kember & Leung 2001), MSLQ (Pintrich, Smith, Garcia & McKeachie, 1991), MSLQ-CV (Rao, Moely & Sachs, 2000), LASSI (Weinstein, 1987), and MAI (Schraw & Dennison, 1994).

Following completion of the questionnaire students were trained in the use of a think-aloud procedure, using procedures adapted from Ericsson and Simon (1993). Each student then participated in two interviews focussed on the teaching materials that he/she had selected for this activity. In Interview 1 students were asked to think aloud as they designed questions for their comprehension teaching task, questions that would assist their students to comprehend the ideas in the passage. Following completion of this activity, in Interview 2, students were asked to select one of their designed questions that they thought the most important to ask in terms of helping students understand the comprehension task material. They were asked to explain the reason for their selection. Probing questions were asked to help them expand, clarify and interpret their ideas. The students' responses in both interviews were recorded and transcribed for analysis.

Student responses to the questionnaire and the talks in two interviews were analyzed in similar ways. They were read and reread to detect relevant issues, which were then classified into six categories of knowledge: Motivational knowledge in teaching, Motivational knowledge in learning, Cognitive knowledge in teaching, Cognitive knowledge in learning, Metacognitive knowledge in teaching and Metacognitive knowledge in learning. The number of relevant issues was counted for each knowledge category and for each situation. The results of this descriptive analysis are reported first in the Results section.

The main purpose of the following analyses was to investigate the relationships between the SPK accessed by students in the questionnaire and the subsequent use of that knowledge in the interview sessions that involved a simulation of planning for teaching. In order to do that, students' responses to the Questionnaire and talks in Interview 1 and Interview 2 were analyzed using four dimensions proposed for assessing the quality of SPK: the extent of knowledge; the specificity of knowledge, which is a measure of the technical vocabulary associated with teaching and learning processes; the degree of elaboration of within-schema connections; and the quality of between-schema connections, as measured by the capacity and relating operation dimensions of the SOLO taxonomy (Biggs & Collis, 1982).

Correspondingly, four measures of students' SPK accessed in the interview were developed: (1) Issues, which indicated the number of issues mentioned that were relevant to teaching and learning; (2) Specificity, indicated by the number of general terms used (Spec 1) and the number of more specific terms used (Spec 2); (3) Elaboration (Elab), as indicated by the degree of the expansion students made about a relevant issue; and (4) SOLO ratings of the extent to which separate issues relevant to teaching and learning were inter-related. In the following section, each of these measures is accompanied with a subscript of "h" which refers to the fact that they are measures of knowledge *held* by students, as indicated by questionnaire responses.

Knowledge *used* by students in the interview sessions was assessed in terms of SOLO score and number of issues mentioned. Therefore, there are two measures of knowledge use for each interview situation: SOLO score in Interview 1 (Solo1); number of issues in Interview 1 (Issue1), SOLO score in Interview 2 (Solo2) and number of issues in Interview 2 (Issue2). Each of these four measures is accompanied with the subscript "u" referring to measures of knowledge used by students as they developed questions for use in teaching in the interviews. The reliability and validity of these measures were examined and measurement methods gave evidence that both were acceptable (see Tran, 2006).

RESULTS

Knowledge accessed in Questionnaire, Interview 1 and Interview 2

This first set of findings focuses on the number of issues that students, as a group, reported on the three different tasks they undertook in the study. Table 2 is a summary of the frequency of knowledge issues reported by the group of students in each of the six knowledge categories, and the number of students who represented that category in each situation.

Table 2: The number of issues and students (n) represented in each situation

	Questionnaire		Interview 1		Interview 2	
	Issue	n	Issue	n	Issue	n
Motivational knowledge in teaching	7	8	4	4	9	11
Motivational knowledge in learning	13	14	7	7	7	8
Total for motivational knowledge	20	18	11	9	16	13
%	31.7		22.9		28.6	
Cognitive knowledge in teaching	8	13	8	6	8	16
Cognitive knowledge in learning	22	19	22	19	23	19
Total for cognitive knowledge	30	19	30	19	31	19
%	47.6		62.6		55.3	
Metacognitive knowledge in teaching	5	17	5	12	5	13
Metacognitive knowledge in learning	8	12	2	3	4	8
Total for metacognitive knowledge	13	18	7	12	9	15
%	20.6		14.5		16.1	
Total issues on each occasion	63		48		56	

As can be seen from the table, the profiles of knowledge use of students as a group were different in the three situations. They used relatively more knowledge in general in the Questionnaire and Interview 2 situations than in Interview 1, and used more motivational knowledge and metacognitive knowledge in the Questionnaire than in Interview 1 or Interview 2. Cognitive

knowledge in learning was the dominant focus of students' knowledge about teachers' use of questions in each situation: ($\chi^2_{Q(2)} = 6.95, p < 0.05$; $\chi^2_{I1(2)} = 18.88, p < 0.001$; $\chi^2_{I2(2)} = 13.54, p < 0.01$) and this focus was strongest when students worked on their own without receiving any cues or external probing in the Interview 1 situation.

Although nearly all students reported some use of motivational, cognitive and metacognitive knowledge in the Questionnaire situation, some students did not use any motivational and metacognitive knowledge in Interview 1 and Interview 2 situations. In Interview 1, eleven of the 19 students did not report any use of motivational knowledge, and six did not report motivational knowledge in Interview 2. Five students did not use metacognitive knowledge in Interview 1, and four did not use metacognitive knowledge in Interview 2. Furthermore, the number of issues individual students reported for motivational and metacognitive issues was lower than the number of cognitive issues, especially in Interview 1 as shown in Table 3.

Table 3: Mean and range of the number of issues in knowledge categories in three situations

	N	Range	Mean	SD
Questionnaire situation				
Motivational knowledge	19	0-6	2.68	1.70
Cognitive knowledge	19	1-7	3.84	1.95
Metacognitive knowledge	19	1-4	2.47	1.12
Interview 1 situation				
Motivational knowledge	19	0-4	0.84	1.21
Cognitive knowledge	19	1-8	3.84	1.89
Metacognitive knowledge	19	0-5	1.21	1.23
Interview 2 situation				
Motivational knowledge	19	0-4	1.58	1.43
Cognitive knowledge	19	3-11	6.63	2.14
Metacognitive knowledge	19	0-6	2.26	1.76

In comparing the number of motivational, cognitive and metacognitive issues mentioned by each student in the three situations, as shown in Table 4, paired sample t-tests showed that students used significantly more motivational knowledge in the Questionnaire than in Interview 1 and Interview 2 situation. This result might be associated with the cues provided for motivational knowledge in the Questionnaire situation. With regard to metacognitive knowledge, students used it more in the Questionnaire situation than in Interview 1, but the means for Questionnaire and Interview 2 were not significantly different. External prompts in the Interview 2 situation could have enhanced the accessibility and use of metacognitive knowledge in that situation. However, the effects of external prompts could be seen more clearly in the case of the use of cognitive knowledge when students used more of this knowledge in Interview 2 than in the Questionnaire and Interview 1 situations.

Table 4: Results of paired sample t-tests for knowledge categories across the three situations

		t	df	Sig. (2-tailed)
Pair 1	Q motivation - Int1 motivation	4.53	18	0.00
Pair 2	Int1 motivation - Int2 motivation	-1.71	18	0.11
Pair 3	Q motivation - Int2 motivation	2.45	18	0.03
Pair 4	Q cognitive - Int1 cognitive	0.00	18	1.00
Pair 5	Int1 cognitive - Int2 cognitive	-4.85	18	0.00
Pair 6	Q cognitive - Int2 cognitive	-5.73	18	0.00
Pair 7	Q metacognitive - Int1 metacognitive	2.76	18	0.01
Pair 8	Int1 metacognitive - Int2 metacognitive	-2.11	18	0.049
Pair 9	Q metacognitive - Int2 metacognitive	0.40	18	0.69

Note: Q = Questionnaire; Int1 = Interview 1; Int2 = Interview 2

When knowledge use across situations was examined, only 11 of the total 85 issues reported in the study were used across all three situations, most of these issues (7/11) referring to cognitive activity. This pattern of knowledge use was evident in the responses of 13/19 students. Students not only used less knowledge related to motivational and metacognitive issues, but also did not

mention the learner's role in generating motivational and metacognitive activities, nor the effect those activities have on teachers or teaching. Regardless of the type of knowledge, most issues reported across all three situations were related to general rather than specific activities. For example, students reported such general activities as thinking, remembering, applying, evaluating but did not mention specific strategies for learning from teacher questions. The use of specific strategies might indicate a higher level of quality of student knowledge. The lack of specific strategies in this group suggests a low level of quality of the used knowledge.

Being used consistently across the three situations, this knowledge appears to be most accessible for students and could be argued to be the strongest or most activated knowledge. Therefore, the limited range and amount of such knowledge is of concern. Since teacher questioning is a frequent teaching activity, students, and teacher-education students in particular, are expected to use their knowledge about teachers' use of questions frequently. However, as indicated in the results, their knowledge about teachers' use of questions seems to be not strong enough to be accessed and used whenever it is needed. Moreover, while the accessibility and usage of this knowledge is very much dependent on the situation, in reality students are expected to use the knowledge in many situations that do not facilitate such use, because they are often teaching on their own. Consequently, it is likely to be difficult for such teacher education students to make use of their knowledge in such a situation.

By way of contrast there was a greater frequency of issues that were reported in only one of the study situations. For example 52/85 issues were reported by students only in the Questionnaire and this pattern of use involved all 19 students. Again, most (42.3%) of these issues referred to cognitive activity, with lower frequencies for motivational (34.6%) and metacognitive (23.1%) activity.

The profile of knowledge used in the Questionnaire and Interview 1 was very similar to that associated with consistent knowledge use in all three situations. The number of issues reported in these two situations was relatively small (9/85) with this pattern being evident in 8/19 students. With regard to the content of knowledge in this group, more than half of the issues in this group were related to the cognitive category of knowledge, and was general rather than specific.

These results indicate that the knowledge activated by the Questionnaire and used spontaneously for designing questions for teaching was quite limited. It was not only limited in amount but also in the range of content. The knowledge content focused on cognitive knowledge in learning and did not involve the active role of students in motivational and metacognitive activities. As this knowledge is argued to be representative of that which would be accessed and used in the actual teaching situation, the limited extent and range of knowledge content of this knowledge use in this study suggests that these students might not use much of their SPK about teachers' use of questions in their planning for teaching.

The number of issues reported in both the Questionnaire and Interview 2 situations was larger. Twenty six issues were reported in both situations, with 16 students showing this pattern. The issues covered all six categories of knowledge and included more specific procedures than that in the previous pattern. Cognitive knowledge was the most frequent (57.7%) and students referred to more specific cognitive procedures, such as analysing, linking parts in a lesson, and reflection.

The difference in knowledge accessed in the Questionnaire and reported in the two Interview situations can be argued to be associated with the difference in the conditions of these situations. The requirement for explanation in response to the interviewer's probing questions in Interview 2 seemed to facilitate the accessing of knowledge, especially knowledge about motivational and metacognitive activities. Therefore, it might be predicted that students would use more such knowledge in planning for teaching if they received some external prompts. The report of more specific learning activities in Interview 2, may indicate that more specific learning activities are more likely to be accessed and used in situations with external prompts rather than without them.

The remaining pattern of knowledge use involved issues that were reported only in the two interview situations. Although 22/85 issues were reported in these situations, with 14 of the students showing such a pattern of knowledge use, the issues reported were predominantly to do with cognitive activity (81.9%). Only one issue belonged to motivational knowledge and three issues to metacognitive knowledge. The descriptions of cognitive activities included more specific procedures such as imagining, highlighting, visualizing, analyzing, comparing, explaining and linking to issues outside of lesson content. The knowledge accessed in these situations was activated by the process of designing questions and reasoning about the best designed question. So the teaching task and the content of the reading material could have facilitated knowledge activation and the requirement to explain the most important question and the interview probing questions could maintain it. Knowledge in this group is of interest because as it was activated spontaneously in Interview 1 (without probes) and used again in the Interview 2 situation, and so appears to be relatively highly accessible for students in teaching situations.

It appears that when specific cues for motivational and metacognitive knowledge were not provided, as in Interview 1 and Interview 2 situations, cognitive knowledge was accessible for students, but motivational and metacognitive knowledge was less accessible. The result again suggests that in order to facilitate the activation and use of motivational and metacognitive knowledge in actual teaching situations, specific cues for those kinds of knowledge would need to be provided for many students. In situations where specific cues for motivational and metacognitive knowledge are not provided, the student teachers in this study used mainly cognitive knowledge.

Path analysis

In order to examine relationships between indicators of student knowledge held and the measures of the use of that knowledge, path models that represented those relationships were built and tested. Each path model included three latent variables, two of these being explanatory variables from indicators of student knowledge and the other variable being one of the criterion measures of knowledge used by students. An example of a path models is shown in Figure 1.

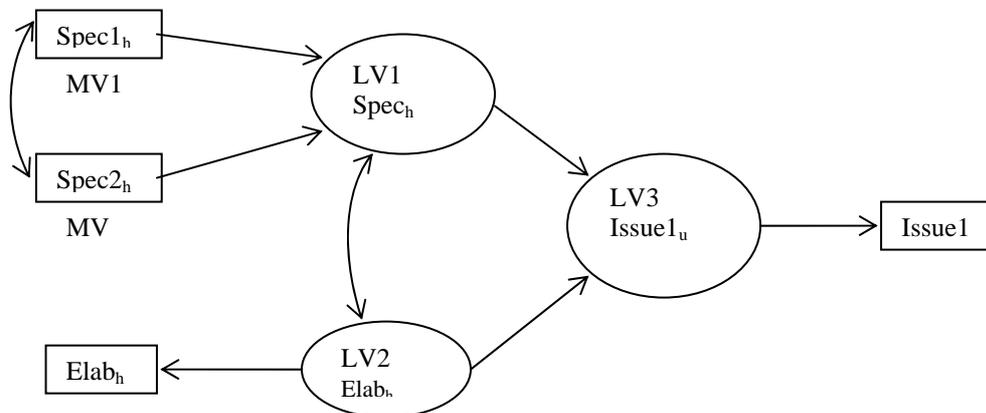


Figure 1: Path model to test Propositions

In this figure, rectangles represent manifest or observed variables while ellipses indicate latent variables. A unidirectional arrow from one variable to another represents a causal relationship from the determining variable to the variable dependent on it. A bidirectional curved arrow indicates a noncausal correlation between variables in the model.

PLSPATH (Sellin, 1989; 1990) (version 3. 01) was used to test the models. Table 5 presents in summary form the regression coefficients between the latent variables that are shown in Figure 1, where Issue1_u is regressed on the two regressors Spec_h and Elab_h.

In the path model, Spec1_h and Spec2_h are combined to form a new latent variable called Specificity (Spec_h). As these two observed variables represent the same component of student

knowledge, the precision of knowledge, and are highly correlated with each other ($r=0.55$), their combination simplifies the analysis and provides a clearer understanding of the relationships under examination. In forming $Spec_h$, $Spec2_h$ contributes more than $Spec1_h$ with the weights being 0.75 and 0.37, respectively. This indicates that the holding of specific terms as assessed by $Spec2_h$, has a greater influence on forming Specificity ($Spec_h$) than $Spec1_h$.

Table 5: Regression coefficients between latent variables

	Issue1 _u	Issue2 _u	Solo1 _u	Solo2 _u
Issue _h	0.13	0.08	-0.04	0.55*
Spec _h	-0.01	0.25	0.28	-0.10
Issue _h	0.66*	0.36	-0.14	-0.03
Elab _h	<i>-0.66*</i>	-0.06	0.37	0.58*
Issue _h	0.60*	-0.15	0.07	-0.18
Solo _h	<i>-0.64*</i>	0.58*	0.14	0.81*
Spec _h	0.65*	0.20	0.16	<i>-0.50*</i>
Elab _h	<i>-0.63*</i>	0.08	0.11	0.98*
Spec _h	0.40†	-0.05	0.22	-0.21
Solo _h	<i>-0.42†</i>	0.49*	0.05	0.81*
Elab _h	0.20	<i>-0.53*</i>	0.31	-0.08
Solo _h	-0.33	0.91*	-0.06	0.74*

†: $\alpha < 0.10$ ($n=19$); *: $\alpha < 0.05$ ($n=19$)

Numbers in bold: Correlations are positive and significant

Number in Italic: Correlations are negative and significant

In all, 24 simple trivariate regression models were analysed, there being six pairs of regressors formed for the four regressor explanatory variables (the held variables) and the four criterion measures (the used variables). A summary of the path coefficients between variables is shown in Table 5. Each row involves two predictor variables and their path coefficients, with one serving as an indicator of knowledge used in either Interview 1 or Interview 2. The discussion of results focuses only on path coefficients that are significant at least at the 10% level.

The relationship between the amount of knowledge held and the amount of knowledge used

This analysis focussed on the quantity of knowledge held in the Questionnaire situation and knowledge used in the interviews. As can be seen from Table 5, when controlled for $Elab_h$ or $Solo_h$, respectively, the path coefficients (standardized regression effects) between the number of issues raised in the Questionnaire ($Issue_h$) and the number of issues raised in Situation 1 ($Issue1_u$) were high, positive and significant (at 5% level) of 0.66 and 0.60 for $Elab_h$ and $Solo_h$. Thus when the effects of the nature of student knowledge, as indicated by the degree of within- or between-schema correlations, were used to statistically control the amount of knowledge held by students, the amount of knowledge held was strongly related to the amount of knowledge students used in the unprompted situation. More simply stated, for those students who had the same level of degree of within- or between-connections, the more knowledge they possessed, the more knowledge they used when they were in the unprompted situation of planning for teaching in Interview 1.

In contrast to Interview 1, there are no similar effects of the amount of knowledge held on the amount of knowledge used, in Interview 2 when controlled for either $Elab_h$, $Solo_h$, or $Spec_h$ the amount of knowledge used by students in the prompted situation was influenced by other factors but not by the amount of knowledge that they held.

The relationship between the amount of knowledge held and the nature of knowledge used

In this analysis the relationships of interest are between the indicator of knowledge reported in the Questionnaire and the SOLO ratings of knowledge used in the two interview situations. As shown in Table 5, $Issue_h$ did not significantly influence $Solo1_u$ when controlled for $Spec_h$, or $Solo_h$, or

Elab_h, but did influence Solo2_u significantly when controlled for Spec_h, with the path coefficient of 0.55. The results indicate that, when controlled for the level of Specificity, the greater the amount of knowledge held the higher the level of between-schema connections in the prompted Interview 2 situation.

The relationships between the nature of knowledge held and the amount of knowledge used

The relationships of interest in this analysis were between the qualitative measures of knowledge held and the amount of knowledge used subsequently in the two interview situations. Similar to Issue_h, Spec_h influenced the number of issues raised in Interview 1 (Issue1_u) strongly when controlled for Elab_h (with beta=0.65, significant at the 5% level) and moderately when controlled for Solo_h (with beta=0.40, significant at the 10% level). The results suggested that after controlling for the degree of elaboration of student knowledge, as indicated by the degree of within- and between-schema connections, the level of precision of that knowledge was related to the amount of knowledge used by students when they planned teaching on their own. In other words, at a constant level of within- or between-schema connections, the higher the level of the precision of knowledge the students possessed, the more knowledge they used when they were in the unprompted situation of planning for teaching.

The effects of Solo_h and Elab_h on the number of issues raised by students in Interview 1 are opposite to the effects of Issue_h and Spec_h as mentioned previously. When controlled for Issue_h or Spec_h, Elab_h and Solo_h are negatively related to Issue1_u. Thus the degree of within- or between-schema connections held by students negatively and significantly influenced the number of issues raised by students when they planned teaching on their own. In situations where students had control of the accessibility of their knowledge, it seems that the activity involved in generating within- or between-schema connections might restrict them from raising more issues. Thus, at the same level of specificity or the same amount of knowledge held, the higher the degree of within- or between-schema connections held, and the less knowledge they accessed and used without assistance.

In comparison with Interview 1, the effects of all three explanatory variables Spec_h, Solo_h and Elab_h on the number of issues raised in Interview 2 were very different. Among them, only Solo_h was positively and significantly related to Issue2_u when controlled for Issue_h, Spec_h or Elab_h. Solo_h strongly influenced Issue2_u with the path coefficient of 0.58 when controlled for Issue_h. This result indicated that after controlling for the number of issues mentioned in the Questionnaire, the degree of between-schema connections held by students strongly influenced the number of issues raised in the situation where they were prompted by the researcher. In other words, for students who held the same amount of knowledge, the higher the level of between-schema connections, the more knowledge they used in the prompted situation. Similarly, Solo_h influenced Issue2_u moderately with a path coefficient of 0.49 when controlled for Spec_h, and very strongly with a path coefficient of 0.91 when controlled for Elab_h. Thus, at the constant level of specificity, or the same level of within-schema connections held, the higher the level of between-schema connections, the more knowledge they used when prompted.

When controlled for Solo_h, Elab_h is negatively related to Issue2_u with a path coefficient of -0.53. Thus the degree of within-schema connections held by students restricts the number of issues raised when students are prompted by the researcher in their planning for teaching. At the same level of between-schema connections held, the higher the degree of within-schema connections held, the less knowledge students used when they were in the prompted situation of planning.

The relationships between the nature of knowledge held and the nature of knowledge used

There are no significant effects of either $Spec_h$, $Solo_h$, or $Elab_h$ on $Solo1_u$ under any conditions of statistical control. The result indicates that in Interview 1 the nature of knowledge students used, as assessed by the between-schema connections, in the situation where they planned teaching on their own did not depend on any of the indicators of quality of knowledge that they held.

In contrast to Interview 1, the nature of knowledge used by students in Interview 2 depended heavily on the nature of knowledge held. The analysis showed high to very high path coefficients between $Spec_h$, $Elab_h$, and $Solo_h$ explanatory variables and the criterion variable $Solo2_u$. More specifically, $Elab_h$ is positively and strongly related to $Solo2_u$ when controlled for $Issue_h$ ($\beta=0.58$) and very strongly related when controlled for $Spec_h$ ($\beta=0.98$). Similarly, $Solo_h$ is positively and strongly related to $Solo2_u$ when controlled for $Issue_h$ ($\beta=0.81$), for $Spec_h$ ($\beta=0.81$), or for $Elab_h$ ($\beta=0.74$). $Spec_h$, in contrast, is strongly but negatively related to $Solo2_u$ when controlled for $Elab_h$ ($\beta=-0.50$). These results indicate that the quality of the knowledge held by students influenced the quality of the knowledge used when they were prompted in planning for teaching. The higher the level of knowledge held, as assessed by the level of within- or between-schema connections, the more developed was the knowledge they used in the prompted situation. However, at a constant level of within-schema connections, the higher the level of the precision of knowledge held, the lower the level of between-schema connections.

Summary of Path Analyses

A summary of the interpretations of the results obtained from the path analysis is given in Table 6. The amount of knowledge held influenced the amount of knowledge used in an unprompted, but not in a prompted situation. The degree of development of knowledge held influenced the amount of knowledge used in both unprompted and prompted situations, except for the effect of the characteristic of the degree of development that was assessed by the specificity of terms held on the amount of knowledge used in the prompted situation. The amount of knowledge held influenced the degree of development of knowledge used in the prompted situation, but not in the unprompted one. And finally, the degree of development of knowledge held influenced the degree of development of knowledge used in the prompted but not in the unprompted situation.

Table 6: Summary of the effects of knowledge held on knowledge used in trivariate regression analysis

	Amount of knowledge used in:		The degree of development of knowledge used in:	
	Situation 1	Situation 2	Situation 1	Situation 2
Amount of knowledge held	Yes	No	No	Yes
The degree of development of knowledge held				
- Precision	Yes	No	No	Yes
- Within-schema connections	Yes	Yes	No	Yes
- Between-schema connections	Yes	Yes	No	Yes

The results obtained from the path analysis show a clear picture about how differently knowledge held influences knowledge used in the unprompted and prompted situations. In the most general view, the amount of knowledge used in the unprompted situation was influenced more by the knowledge students held than was the amount of knowledge used in the prompted situation. Eight out of 12 coefficients that represent the relationships between knowledge held and amount of knowledge used in Interview 1 are significant, while only four coefficients out of 12 that represent the relationships between knowledge held and amount of knowledge used in Interview 2 are significant. Furthermore, the differences are not only in the size of coefficients but also in their sign. For example, when controlled for $Issue_h$, $Solo_h$ negatively influences $Issue1_u$, but is positively related to $Issue2_u$.

The differences between two situations are more obvious in the effects of knowledge held on the degree of development of knowledge used. The path analysis does not show any evidence for the relationship that knowledge held influences significantly the degree of development of knowledge used when students planned for teaching on their own. On the contrary, after controlling for the effects of certain explanatory variables, all characteristics of knowledge held significantly influence the degree of development of knowledge used in the prompted situation.

DISCUSSION

The descriptive analysis of data showed that Australian teacher-education students do have knowledge about teachers' use of questions, as part of their pedagogical knowledge. The knowledge about teachers' use of questions involves motivational, cognitive and metacognitive knowledge of teaching and learning activities. In this general sense, the results obtained from this study coincide with the findings with Vietnamese teacher-education students in Tran and Lawson's work (2003).

Results from the studies showed that students could use their knowledge about teachers' use of questions for explaining the effectiveness of teacher questions in the Questionnaire situation, for designing questions for teaching a comprehension task and for reasoning about the most important question. This knowledge use was associated with the types of knowledge, the quality of knowledge and the conditions of the situations in which students were expected to use it.

The use of student knowledge about teachers' use of questions was, however, focused on cognitive knowledge rather than on motivational or metacognitive knowledge. Students used cognitive knowledge, especially cognitive knowledge in learning, without any kind of external support. It seems that students have more cognitive knowledge than motivational and metacognitive knowledge and their cognitive knowledge is also stronger and more accessible than their motivational and metacognitive knowledge. Therefore, as training courses aim to equip students with knowledge of teaching and learning, they should also focus on motivational and metacognitive knowledge. Despite the emphasis on students' active role in teaching and learning activities in contemporary teaching and learning theories, the student knowledge use about teachers' use of questions shows little evidence of this. The lack of student activity is especially noticeable in the case of motivation. The finding is of particular concern when participants in this study are prospective teachers.

With regard to the relationships between knowledge use and the quality of knowledge, the results from the study showed that the effect of the amount and the degree of development of knowledge held on the amount and the degree of development of knowledge used varied between situations. By showing the effects of the amount of knowledge held by students ($Issue_h$) on the amount and degree of development of knowledge used, the results indicate the important role of the amount of knowledge held by students. Although it is less the focus of educators, it can be an important indicator of teacher- education students' learning when it is shown to contribute to the prediction of the knowledge the students use when planning their lessons.

Moreover, because a high level of precision (Specificity) can enhance the use of more knowledge when students work on their own to plan for teaching, this component is an important requirement of effective planning. However, there is reason to be concerned about the precision of student knowledge. While the results of this study show that more specific terms contributed more to the precision of student knowledge than general terms in the practical situation, students are said to have a lack of a specific or technical vocabulary (Askell-Williams, 2004; Elen & Lowyck, 1999; Lawson & Askell-Williams, 2004). This lack of technical vocabulary, or lack of more specific terms, may constrain students in using large amounts of the knowledge that they hold. Therefore, an increase in the size of the technical vocabulary of these teachers should be an issue of concern in program planning.

With regard to the effects of the context of knowledge use, both descriptive and statistical analysis showed the relationships between knowledge use and the conditions of interview situations in which students were expected to use their knowledge. The variety of the patterns of student knowledge use in the different situations indicates that knowledge use is very situated. Students activated and used more extensive knowledge, including more motivational and metacognitive knowledge in the Questionnaire situation, where they received both external cues and were required to give explanations, than in the Interview situations. Students used more knowledge about more specific activities when they were prompted to activate more knowledge in Interview 2. The situatedness of knowledge use is supported by the observation that not much of the same knowledge is used across the three different situations. In this study some knowledge could be accessed and used in only one situation. Knowledge accessibility and use appear to be associated with the situation students are in and its conditions and features.

The relationships between the knowledge held by students and the knowledge used by them differed when students planned for teaching on their own and when they were prompted by the researcher. When students planned for teaching on their own, the amount of knowledge used strongly depended on their capability to express relevant ideas precisely and the amount of knowledge they held, while the amount of knowledge used was constrained by the students' capability of creating connections within- or between schemas. On the contrary, the degree of development of knowledge used in this situation was independent of the amount and the degree of development of knowledge that the students held. When students planned for teaching with external guidance, both the amount and the degree of development of knowledge used in this situation depended strongly on the indicators of knowledge held by students.

The situatedness of knowledge use seems to link to the situated nature of learning and student knowledge, as argued by representatives of situative theory such as Greeno (1997; 1998). In each situation students have to be attuned to particular constraints and affordances, which require them to activate and use different knowledge. The situated nature of knowledge, on the other hand, constrains transfer to, or the use of knowledge in other situations (Bereiter, 1995; 1997) and this was the reason for the limited amount and type of knowledge that is used across situations. As argued by Bereiter (1997) if students cannot overcome the situatedness of knowledge, their use of knowledge is problematic. When knowledge is strongly bonded to a specific situation, and students cannot break this bond, they can transfer or use it only in that situation or in situations where their constraints and affordances are similar to those of that situation. The results here support Bereiter's analysis. Many students could not break the situatedness of their SPK enough to use their SPK in the three different situations they experienced in this study.

Another possible explanation for the difference of the patterns of student knowledge use obtained from this study is associated with the issue of spontaneous transfer. Students used relatively little of their knowledge about teachers' use of questions spontaneously in the Interview 1 situation. Since the spontaneous use of knowledge is argued to be related to the depth of knowledge (Hiebert & Wearne, 1988), and students' ability (Campione & Brown, 1984), this limited spontaneous use is of concern for teacher educators. It seems that teacher-education students in this study have only a limited amount of knowledge about teachers' use of questions which is strong and accessible enough to be used spontaneously in planning for teaching.

The lack of spontaneous use of knowledge is especially obvious in the case of motivational and metacognitive knowledge and of knowledge about more specific activities. The results indicate the weak points in student knowledge in those types of knowledge and suggest implications for teacher educators. Because spontaneous use of SPK is limited, and external support can facilitate such knowledge use, as shown in the pattern of responses in the Questionnaire and Interview 2 situations, some kinds of prompts may need to be provided to student teachers and novice teachers when they plan for teaching. The external support could be in the form of specific cues, especially for motivational and metacognitive knowledge. Such external supports would encourage students to activate more knowledge about teaching and learning.

As planning for teaching on their own is close to the actual planning situation they face in the future as teachers, the relationships found in this situation are of considerable importance. As the Solo score is an important indicator of the degree of development and quality of knowledge, student teachers in this study were expected to use knowledge at a high SOLO taxonomic level in planning for their teaching. The use of this kind of knowledge at an appropriately high level would help them fulfil their teaching tasks effectively (Biggs & Moore, 1993; Bransford, Brown & Cocking, 1999). Teacher educators often believe that in order to satisfy this expectation, students should equip themselves with knowledge that is rich in ideas and better developed. However, the results in this study reveal that the possession of rich and higher level knowledge is not enough to guarantee its usage for teaching, at least in this sample of teacher-education students. The current results suggest that these novice teachers gained considerable benefit from external prompting in the use of their knowledge. As the participants in this study were student teachers, further research should be conducted to investigate if the results here are applicable to novice teachers in schools. If this pattern of findings were replicated it would point to a need to develop systems of prompting for use of pedagogical knowledge for new teachers. Some form of external guidance should be provided for both student teachers in their teaching practice and for novice teachers in their actual teaching.

Methodologically, the descriptive analysis is important but it is not enough for the researcher to portray how students used their knowledge for planning questions for teaching in unprompted and prompted situations. The causal analysis in this paper gives a clear picture of how different features of the knowledge students held influence the knowledge that they use.

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Learning English outside the classroom: Case study of tuk-tuk drivers in Phranakhon Si Ayutthaya¹

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This study was an investigation of the educational needs of tuk-tuk drivers when using English to communicate with tourists in Phranakhon Si Ayutthaya, an old capital of Thailand. The samples included 30 tuk-tuk drivers at five famous places where tourists require tuk-tuk drivers' services in Phranakhon Si Ayutthaya, for example at the train station, the bus station, a bus stop in front of the Ayutthaya district office, Hua-Ror and the Chao-Phrom market. Six participants were drawn from each place. Simple random sampling was used to select the participants. The instrument was an interview questionnaire constructed by the researchers. The data were analyzed by frequency, percentage and mean. The problem conditions were analyzed in terms of contrast and similarity. Our study has presented the problems and suggested ways to develop English competency to meet the needs of tuk-tuk drivers in order to improve the tourism industry and assist the tuk-tuk drivers themselves who struggle to earn their lives as poor and low educated citizens. This study has supported UNESCO and Thailand's National Education Act 1999, in the pursuit of lifelong learning for all. Non-formal and Informal Education have been promoted as a way for education to meet the needs of tuk-tuk drivers. It has emphasized the necessary cooperation between government educational institutions and local communities if local people are to benefit from meaningful educational opportunities. Such endeavors will assist the development of the tuk-tuk drivers' English communication competency, so necessary in the tourism industry in Thailand.

English language learning, Thailand, case-study

BACKGROUND

In this world of globalization in economics, politics and education, countries co-operate and seek ways to develop peace and understanding, and education is a means to these goals. UNESCO (2002: p.1) has promoted 'Lifelong learning for all'. It also emphasizes the equality of people in access to higher education with the merit of the Universal Declaration on Human Rights which was accepted by all participating nations including Thailand. According to UNESCO, 'no discrimination can be accepted in granting access to higher education on the grounds of race, gender, language, religion or economic, cultural or social distinctions, or physical disabilities'; together with the core missions of higher education: 'to educate, to train, to undertake research and to provide services to the community'. Moreover, the international community document (UNESCO, 2002: p.1) states clearly that 'higher education institutions must preserve their critical

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functions in the interest of democracy'. The search for quality is also stressed in a policy based on merit. But 'quality must be linked in a given context to relevance and to the solution of problems in the community'.

To support UNESCO's policy, Thailand has approved her National Education Act 1999 which promotes 'lifelong learning for all'. The Act stresses equality in education for all Thai people either in school or beyond school, but especially people in the world of work. A knowledge based society is also promoted in the Act. Knowledge can be acquired in many forms including formal learning (in educational institutions), non-formal (learning outside the educational institutions), and informal education (learning by oneself through media or educational resources) (Thailand National Education Act of 1999: p. 7) All knowledge aims to allow people to develop their careers and professions.

Due to the impact of economic globalization, the Thailand government has displayed a wide vision in opening up free trade in services. They have realized the importance of the tourism industry (Annual Report 2001, p. 21), and much is done to encourage the foreign tourist economy. With the 5 year Corporate Plan (2002-2006), the Tourism Authority of Thailand (TAT) aims at 'being a center of excellence in promoting and developing sustainable tourism, upholding the Thai dignity, and creating equilibrium of economy, society and environment' with a mission of 'push' for the policy and a master plan on the development and promotion of tourism, including coordinating, managing and translating the policy and plan into actions of TAT and sharing it with other concerned government and private agencies (TAT, 2002: p.17). Moreover, the policy aims to support the employment of more Thai manpower in the industry.

Phranakhon Si Ayutthaya (Ayutthaya) is a province in Thailand which provides economic benefits in the tourism industry. It was once a capital of Thailand for 417 years and ruled by 33 kings. After being attacked by the Burmese (people of Myanmar) in 1767, it was burnt down, and has been left in ruins. Notwithstanding, Ayutthaya still sustains a beauty with a long, interesting history. In addition, Eco Tourism has been promoted in the area, and many foreign tourists visit Ayutthaya every year (TAT annual report, 2001: p. 110).

The tuk-tuk (a kind of vehicle used for transporting people and tourists in Ayutthaya) and tuk-tuk drivers are very important for the Ayutthaya tourism industry. They play a large part in welcoming foreign tourists. However, they experience problems because of their lack of fluency in English caused by extreme poverty that denied them access to formal education. As a consequence, they speak English well below the vocational proficiency level. Sometimes cultural misunderstandings occur due to the tuk-tuk drivers' inability to explain the issues in hand to the foreigners. Some tuk-tuk drivers believe that with improved English competency, they would live their lives and earn a living, more comfortably.

Furthermore, many tuk-tuk drivers have capacity and talent, and the reason they have only primary education is not that they don't have the 'brains', but rather because they did not have the opportunity. If appropriate means can be found to help this vast number of people find ways to improve their productivity and utilize all the talent that they have, then their contribution to the future development of the country will far outweigh the investment cost required.

Additionally, informal education plays a great role in this study. It enables learners to learn by themselves in accordance with their interests, potentialities, readiness and opportunities available from persons, society, environment, media, or other sources of knowledge. The teaching and learning process should be aimed at allowing learners to develop at their own pace and to the best of their abilities. For this reason, tuk-tuk drivers should have access to the knowledge and skills needed in pursuing their career, particularly the knowledge and skills in using a foreign language to communicate with their customers. Non-formal and/or informal educational approaches are most appropriate for them. Therefore, ARU and NSU in their role as local universities ought to

respond to the national education policies by providing opportunities for poor and limitedly educated people like the tuk-tuk drivers to develop themselves. The ARU (Phranakhon Si Ayutthaya Rajabhat University) and NSU (Nakhon Sawan Rajabhat University) should be resources for learning and promoting both community and individual development.

The findings of this study presented the problems that tuk-tuk drivers encounter when they use English with foreign tourists, and provide examples of problem solving strategies they might employ to compensate. The findings will also offer recommendations to the ARU and the NSU, suggesting an appropriate curriculum for the drivers and identifying the benefits. Successful outcomes will come to the tourism industry and Thailand's economic development as a whole.

Informal Education

Culminating in 'learning to be' (The Faure Report, UNESCO 1972), lifelong learning was said to be the master concept that forms educational systems (UNESCO 1972) with the emerging of three types of learning systems: formal education, non-formal and informal education.

Coombs, Prosser and Ahmed (1974: p.2) define informal education as 'the truly lifelong process whereby every individual acquires attitudes, values, skills and knowledge from daily experience and the educative influences and resources in his or her environment – from family and neighbors, from work and play, from the market place, the library and the mass media'. Comparing the definition of Thailand's National Education Act with that provided by Coombs et al, there would be little difference in the points highlighted.

The differences identified between formal education, non-formal and informal education involve matters of administration, methods, curricula, duration, assessment, and evaluation. We can conclude from all the definitions we read that formal education links with schools, educational, and training institutions; non-formal with individual groups of learners and organizations; and informal with learners learning by themselves from family, friends, society, work colleagues, environment, media or sources of knowledge. There may be some overlap between non-formal and informal education as according to Fordham (1993) people often shape educational events as part of their everyday experience.

Like all adult learners, tuk-tuk drivers have different learning styles. McKay and Tom (1999) state that some adults feel comfortable when learning by watching and listening, while others learn by taking down notes and analyzing rules. Their preferences for learning may occur through a different sense of modalities such as tasting, smelling, hearing, touching, and seeing. In McKay's and Tom's opinion, adults are required to neither attend classes nor take any assessment. They have motivation within them and realize that what they are learning comes from their interest and their realization of the value of the things learned. Therefore their motivation can be enhanced by providing interesting activities, and making clear the value of what is being taught. The lessons should be relevant to their goals.

Second Language Acquisition

Acquiring a second language does not only concern fluency in communication, but also requires cultural understanding. For instance, if you would like to hire a tuk-tuk, and a tuk-tuk driver unintentionally addresses you impolitely, you may be angry and not want to use his service. Therefore, cultural understanding and language competency should go hand-in-hand.

Apart from the ability to communicate in a foreign language, Kramsch (1996: p.1) declares that 'to understand and be understood by others requires the ability to recognize cultural differences. For example, polite behavior in one language may not be the social equivalent in another language'. According to Kramsch's ideas, the acquisition of a language needs to build a cultural politeness. Therefore the contextual syllabus should be deliberate through which tuk-tuk drivers

can progressively acquire the ability to choose spoken discourse determined by personal relationships, social situations, and cultural presuppositions. Since tuk-tuk drivers play host to the tourists who come to Ayutthaya, their politeness and their English fluency will attract the tourists and this, in turn, will help develop Ayutthaya's tourism industry as well as Thailand's tourism industry.

Additionally, instructors at ARU have to be effective. McKay and Tom (1999) suggest that instructors need to inform their teaching by collecting information about their students' first language knowledge, knowledge of the world, previous learning experience, learning styles and preferences, personalities and personal circumstances, as well as their second language skills and goals. These considerations will be essential in developing an effective curriculum for tuk-tuk drivers.

METHOD

This study is a qualitative research piece. The population of this study comprises 30 tuk-tuk drivers at five famous places where foreign tourists require tuk-tuk services in Ayutthaya: the train station, the bus station, a bus stop in front of Ayutthaya district office, Hua-Ror and Chao-Phrom market. The information that was sought was divided into two categories: 1) personal information: gender, age, status, years in job, social class, income per month and education levels, 2) Information related to working and using English in each macro skill area: listening, speaking, reading and writing.

For the questionnaire's validity and reliability, the first draft of the interview questionnaire was prepared in consultation with graduate professors. The draft was then submitted to the research adviser for comments and suggestions. The improved draft was presented to a committee for further comments and suggestions. This instrument was pre-tested with a group of tuk-tuk drivers, similar in stature to those who were to be respondents, but who did not take part in the study itself. Improvements were possible as a result of this pilot study. Informal interviews were also conducted and were helpful as a basis for revision of some of the items in the questionnaire.

After that, the subjects were interviewed and tape-recorded. Six tuk-tuk drivers were drawn from each place by simple random sampling. That is, we approached different drivers at random who were waiting for tourists when we arrived. On a number of occasions some of the tuk-tuk drivers we had initially interviewed recommended we speak to specific drivers who they believed were quite good at English. In this way, our sample group became quite diverse. Each of the tuk-tuk drivers had an equal chance of being selected in the first instance. However, once the interviewing began at each site, specific drivers were nominated from within the group. Before the interview, the researchers asked each tuk-tuk driver's permission, together with providing them with information about the interview. Each tuk-tuk driver was given 50 baht as compensation for the valuable working time he/she would lose through their participation in the study. Each interview lasted about 30 minutes. Consequently, six tuk-tuk drivers were interviewed in a day, and the researchers took five days to interview all the tuk-tuk subjects.

The interview was in the form of a questionnaire. Tuk-tuk drivers were interviewed in Thai and then the questionnaires and the answers were translated into English. For personal profile data, all items were given equal importance. This included details of gender, age, education level, economic and social status, and others. All of the data were used in the analysis of the study and included the written answers and comments from the respondents.

We, the researchers, interviewed all the subjects ourselves. The environment was well arranged with a good atmosphere. The subjects were interviewed in a friendly manner without making them feel stressed. The interviewees were free to express their points of view and consequently found the interviews were enjoyable. They were free to express their concerns and withdraw from

the interview at any stage if they no longer wished to participate. No-one took up this option. However, if they had chosen to withdraw, new participants would have been chosen through the same random process used for the initial group of tuk-tuk drivers.

During the interviews, the data were also written down. The researchers did not guide the interviewees directly or indirectly for answers during the interviews, leaving the interviewees free to answer truthfully. This approach lessened the likelihood of researcher bias. When gathering the data, the researchers took care to both tape record and write the information obtained in the interviews. This was an additional way to ensure reliability and enable accurate interpretation during analysis.

DATA ANALYSIS

The data were collected and those parts related to English proficiency were analyzed according to Hall's rubric (2002). Hall's rubric is based on the work of Celce-Murcia et al (1995). It is a model for measuring communicative competency, entitled; "Rubric for Evaluating Student Performance in Situated and Transformed Practice Activities". A copy of the rubric can be found in Table 1. Those parts of the data that were related to the strategies the tuk-tuk drivers employed to manage any lack of English language proficiency and their suggestions for how ARU and NSU could assist them were coded according to themes.

Table 1: Rubric for evaluating student performance in situated activities

Novice	Intermediate	Competent	Distinguished	Expert
Rubric 1 Skills for Discourse Competence				
Displays a limited understanding of the gist of the interaction. Has difficulty making a coherent contribution.	Has difficulty understanding selecting and arranging utterances to achieve a coherent interaction. Can sustain the interaction only with help.	Is able to sustain interaction through the appropriate interpretation, selection, and sequencing of utterances, although may occasionally need some help, especially if the interaction moves away from the expected or conventional means associated with the activity.	Has a clear understanding of the activity and is able to initiate and sustain the interaction through the appropriate interpretation, selection, and sequencing of utterances until the task or activity is completed.	Can understand and use a variety of linguistic resources to create and sustain a cohesive, coherent interaction. Can lead other, less expert interlocutors in sustaining a coherent interaction, providing assistance where needed.
Rubric 2 Skills for Linguistic Competence				
Displays limited understanding of, and ability to use accurately, vocabulary, grammar, pronunciation, and prosodic knowledge and skills associated with the interaction.	Displays understanding of, and can use some, basic vocabulary and grammar, but it is generally not enough to sustain the interaction beyond a fairly basic level. Relies heavily on nonverbal gestures to communicate. Has difficulty pronouncing words and using appropriate international patterns.	Displays understanding of, and can use the, conventional vocabulary and grammatical structures associated with the activity. Pronunciation and international patterns are adequate, and thus do not impede communication.	Can understand, use, and elaborate on conventional vocabulary and grammatical structures. Pronunciation and international patterns are appropriate and accurate.	Understanding and use of grammar, vocabulary, pronunciation, and intonation patterns are precise. Displays understanding of, and can use a variety of, grammatical structures and vocabulary words to construct similar meaning utterances.

Source: Hall's Rubric (2002 : 156-7), based on Celce – Murcia et al (1999)

RESULTS

Analysis of Personal Profile

Results from the personal profiles revealed that the average age of tuk-tuk drivers was 44.97 years old. The youngest was 29 years old and the oldest was 65. Eighty-six point seven percent were

men and only thirteen point three percent were women. All of them were married. Average time in the job was 12-13 years while the longest time in the job was 40 years and the shortest one was two years. With regard to working status, ten percent of the tuk-tuk drivers worked part time and 90 percent work full time. Their lowest monthly income was 1,500 baht and the highest monthly income was 15,000 baht. On average, they earned 6,250 baht per month. With regard to education, most of them finished only Grade 6.

Analysis of Rating-Scaled Questions

With regard to the quantitative data on the problems tuk-tuk drivers faced in using English to foreign tourists, results show that tuk-tuk drivers' listening and speaking abilities were average, but their reading and writing abilities were none.

Table 2 shows tuk-tuk drivers' points of view regarding problems in using English with foreign tourists. This shows that on the whole, tuk-tuk drivers' listening and speaking ability is average, but their reading and writing abilities are almost non-existent.

Table 2. Descriptive statistics and results from questionnaire for tuk-tuk drivers' points of view towards problems in using English to foreign tourists

Lists	None %	A Little %	Average %	Much %	V.Much %
1. The number of tourists using the service each day	60.0	20.0	13.3	3.3	3.3
2. Over all, what is your ability in communicating with foreign tourists?	6.7	36.7	46.7	6.7	3.3
3. What level is your understanding of tourists' English?	3.3	36.3	53.3	3.3	3.3
4. At what level can you catch the topics or issues from your hearing?	6.7	30.0	50.0	10.0	3.3
5. At what level can you summarize the content you hear?	6.7	20.0	63.3	6.7	3.3
6. At what level can you assume the foreign tourists' requirements?	6.7	20.0	60.0	10.0	3.3
7. Can foreign tourists understand your English accent?	13.3	26.7	50.0	6.7	3.3
8. Can you make statements in English?	16.7	23.3	40.0	16.7	3.3
9. Can you make refusals in English?	13.3	20.0	46.7	20.0	0
10. Can you ask questions in English?	16.7	20.0	46.7	13.3	3.3
11. Can you make polite requests, eg 'Excuse me, would you like to go somewhere in my tuk-tuk?'	13.3	36.3	36.3	10.0	3.3
12. Can you read words in English concerning your career?	43.3	23.3	26.7	3.3	3.3
13. Can you read documents in English given by foreign tourists?	40.0	23.3	20.0	16.7	0
14. Can you read letters or passages in English?	53.3	23.3	16.7	6.7	0
15. Can you read everyday information in English, eg instructions, notices or basic English newspaper?	50.0	20.0	23.3	6.7	0
16. Can you write English in words or sentences?	46.7	26.7	23.3	3.3	0
17. Can you write English with maps and directions?	60.0	20.0	13.3	0	6.7
18. Can you write polite words or sentences?	56.7	20.0	16.7	3.3	3.3
19. Can you write English for notices, asking permission or forbidding people from not doing something?	56.7	16.7	16.7	6.7	3.3
20. Can you write English to make tourists understand you ?	56.7	20.0	13.3	6.7	3.3

Analysis of in-depth interviews and written statements

Overall, the responses given by the tuk-tuk drivers regarding the problems they faced when communicating with foreign tourists were divided into four macro skills: listening, speaking, reading and writing (see Table 3).

To summarize, in listening, most tuk-tuk drivers were unable to keep pace with tourists' normal speed of communicating and problems with glottal sounds. Some of them experienced difficulty when tourists used different words from those anticipated and had difficulty comprehending. In

speaking, most of them had a lack of fluency. Some of them were unable to utter a word and experienced difficulty in communication with tourists due to their Thai accent and intonation.

With regard to reading and writing, in reading, most of them were unable to read English at all. Some of them could read only a few simple sentences in English; a few of them could read only a few words in English. For writing, most tuk-tuk drivers could not write in English. Some of them were able to write a little English. Very few could write if patterns were provided.

Table 3. Summarizing of open-ended questions displaying problems tuk-tuk drivers faced when communicating with foreign tourists

Topic	Answers	Amount
Listening	1. Experience difficulty when tourists use different words from those anticipated.	9
	2. Lack knowledge of tourist vocabulary.	1
	3. Have difficulty comprehending.	8
	4. Unable to keep pace with tourists' normal speed of communicating and problems with glottal sounds.	12
Speaking	1. Unable to utter a word.	9
	2. Have a lack of fluency.	15
	3. Experience difficulty in communication with tourists due to Thai accent and intonation.	6
Reading	1. Cannot read English at all.	16
	2. Can read a few simple sentences in English.	11
	3. Can read a few words in English.	3
Writing	1. Cannot write in English.	22
	2. Can write a little English.	6
	3. Can write if patterns are provided.	2

Descriptions of ways to solve the problems

In accordance with ways in solving the problems tuk-tuk drivers faced when communicating in English; cleverly, most of them found someone to assist with translation when problems in listening occurred (see Table 4). With problems in speaking, nearly all of them (25) used maps and pictures to provide clarification. With problems in reading, most of them sought help with reading information in tourists' brochures. In writing, most of them used maps to accompany explanations, while some others sought help with translation from peers who spoke English.

Table 4. Ways in which tuk-tuk drivers solved the problems they faced when communicating in English

Topic	Answers	Amount
Listening	1. Use maps in accompany explanations.	6
	2. Guides tourists to the sites or target places.	1
	3. Takes tourists to tourist police.	1
	4. Find someone to assist with translation.	11
	5. Have tourists repeat requests slowly.	7
	6. Use body language including gestures.	4
Speaking	1. Use maps and pictures to provide clarification.	25
	2. Unable to solve communication problems.	4
	3. Uses guidebooks as aids.	1
Reading	1. Seek help with reading information in tourist brochures.	24
	2. Use pictures to accompany explanations.	4
	3. Use mime and gestures.	2
Writing	1. Seek help with translation from peers who speak English.	11
	2. Use maps to accompany explanations.	14
	3. Walk away to avoid interaction.	4
	4. Has tourists communicate what they want in writing and then seeks help with translation from peers who speak English.	1

SUGGESTIONS FOR IMPROVING ENGLISH COMPETENCY

Tuk-tuk drivers showed ways to learn English and gave their suggestion to ARU to help them in gaining their English competency (see Table 5). Twelve of them learned English from friends or people who can speak English. Eleven of them learned English from books. Only seven people listened to lessons via tape/cassettes. With regard to ways in improving their English, most of them (20) suggested that ARU provide them with short courses. Five of them suggested providing English lessons via cassettes, and the other five people wanted to learn English via pocket books or stickers containing the specific technical language needed for tourism.

Table 5. Description of ways in which tuk-tuk drivers suggested they might have improved their English competency

Topic	Answers	Amount
Learning English	1. Read books.	11
	2. Listen to tape cassettes.	7
	3. Learn some sentences from friends or people who can speak English, then practice speaking.	12
Ways for improvement	1. Attend short courses.	20
	2. Learn English via tape cassettes.	5
	3. Learn English via pocketbooks or stickers containing the specific technical language needed for tourism.	5

In response to the research questions, all the data were collected without bias, but it must be noted that because most of the tuk-tuk drivers had limited level of education, lots of explanation had to be made in order to get responses. To clarify some responses, we needed to go back and question the tuk-tuk drivers again. The results of this study will lead to the writing of special curricula and syllabuses to help tuk-tuk drivers develop their skills in using English.

DISCUSSION

The study revealed the problems tuk-tuk drivers faced when they spoke English to foreign tourists, the ways they solved the problems, and the means they felt they needed to develop their English competency.

Firstly, the personal profiles revealed that tuk-tuk drivers had a limited level of education and existence is a struggle for them. The followings were their comments:

“I have a wife and three children, and I have to take care of them.”

“My wife has to look after the family. Only I earn for the family.”

“All my children are in schools. I have to work for their food, their clothes, and their tuitions.”

“I am low-educated. Driving tuk-tuk is the only means that I can earn for my family.”

“When I was young, my family was very poor. I could finish only Prathom 4 (Grade 4). The only career that I have been able to do is driving a tuk-tuk.”

English competency is an indicator of good income. From the interviews, the drivers who earned low incomes told us that often, they were unable to serve the foreign tourists because they could not communicate with them while those who spoke quite good English could earn much more money.

Tem commented on how he had been unable to assist the foreign tourists, and had to turn them away:

“I only say, ‘No.....no.....no’, and wave a hand to tell them to use another tuk-tuk.”

Lerd talked of Kriang who got much more income than he did,

“I can serve only Thai passengers because I can’t speak English. On the contrary, Kriang can get much more money from foreign tourists because he can speak English. I think he can’t speak English very well, but he can make the foreigners understand him.”

Lerd’s comment also indicates that even a small amount of English will assist the drivers. Sak showed his intention to improve his English,

“Well, if only I speak English, I will have a better life because I can serve foreign tourists and get more money. If your university provides an English course for us, I will try to attend it so that my English will be improved.”

Most tuk-tuk drivers had finished only the compulsory levels of education (Prathom 6) and this was due to the fact that the tuition was free to this level. Since they were born into poor families, they didn’t have any chance to continue with further education which would have required fee payment.

Lerd told us,

“I finished only Prathom 4 because my parents were very poor. They didn’t have any money to support me for my further education.”

Duan expressed her feeling about the inequality she received from her parents,

“Because I am the eldest daughter in the family, my parents told me to stop my education at only Prathom 4 so that I could help them do the housework and look after my brothers and sisters because they have to work for the family.”

Dam gave a similar account of what he confronted because of his family’s poverty,

“How could I know English? I had to stop my education and help my parents work and earn for the family.”

Secondly, the rating-scaled answers displayed the levels of their English ability which need to be developed in all the four macro skills: listening, speaking, reading, and writing. The results show that the tuk-tuk drivers did not have high level of English listening skills. They were not able to understand the tourists’ English. Equally important, they could not even summarize the gist of what they heard. This affected the number of foreign tourists they served per day. Similarly, for speaking skills, foreign tourists could not understand them when they tried to utter English words; the words they thought were in English. They could not make words into sentences to communicate with the foreigners. Misunderstandings occurred frequently between them and the foreigners. Furthermore, they could not make polite requests, such as, “*Excuse me, would you like to go somewhere in my tuk-tuk?*”...The results also show that the tuk-tuk drivers did not have competence in reading English. They could not read words involving their career. Furthermore, they were not able to read any documents such as passages, brochures, or letters that the tourists showed them. Moreover, they could not read everyday information in English, for example instructions, notices, or basic English newspapers. This became a problem if foreign tourists showed them the names of their destination such as the names of the roads, hotels, guest houses, restaurants or other interesting places. Writing was likewise a great problem for the tuk-tuk drivers. The results show they could not write English in words or sentences. They were unable to write to communicate and develop better understanding.

Thirdly, responses to the open-ended questions show that problems occurred during their English communication in all the four macro skills. Interestingly, the tuk-tuk drivers used many strategies to help solve problems when they talked to foreign tourists. This shows that they are resourceful people with a sense of agency. Their strategies have been developed to ensure that they can earn a

living in the struggle to survive. They know they can make more money if they are able to serve the tourists.

When problems in listening occurred, most of the tuk-tuk drivers looked for someone who was good at English speaking to help them. Tem revealed that:

“One of my friends can speak a little English, so I always ask him to help me.”
(OEQ3.1.2)

Sak declared his resolution:

“I served very few tourists a day, so when a problem happened; I asked a student who was around there. If I couldn’t find anyone for help, I would guess the meaning.”
(OEQ 3.1.2)

Cleverly, some of the tuk-tuk drivers showed the tourists maps of Ayutthaya’s interesting places and made a gesture to invite the tourists to point to the destination where they wanted to go to on the map.

Don told us of his resolution:

“It’s not difficult. I only showed them maps and made a gesture to ask them where they wanted to go.” (OEQ 3.1.2)

Surprisingly, Yord used an impressive visual aid to help him when he did not understand the tourist’s requirements:

“I have a set of postcards of the interesting places in Ayutthaya with pictures and English subscriptions under them. I would ask them where to go and they would point at the pictures so that I understood them by this way.” (OEQ 3.1.2)

Just as with problem resolution in listening, when the tuk-tuk drivers did not know how to speak or explain the interesting places, they used maps and brochures which contained pictures and captions under them instead of speaking. Generally, they could find the maps and the brochures freely at the tourist information centers in Ayutthaya.

Sorn revealed his strategy:

“I only said, “Where?”, open the maps and the brochures and have them point at their destination.” (OEQ 3.1.2)

However, some tuk-tuk drivers did not know how to solve their communication problems. They could not even utter any words and had to refuse the tourists rather impolitely. Tem only said,

“No, no, no. I don’t know.” (OEQ 3.1.2)

Then he would make finger language to tell the tourist to ask another tuk-tuk driver who was better at English.

In addition, reading was a major problem. Most tuk-tuk drivers said that they could read only a few words. They could not understand the meaning in a sentence or in a passage. As a result, when foreigners showed them some documents in English, they could not understand even the gist of the passage. Therefore, they solved the problem by asking another person to help with reading the passage.

Tem made a complaint about his inability to read:

“Well, sometimes they showed me something to read. I could only understand some words.” (OEQ 3.1.3)

On the contrary, Chai could only refuse when he was asked to read:

“Ah! When they offered me to read and I couldn’t. I said, ‘No.....no no’, I didn’t say anything else.” (OEQ 3.1.3)

Lastly, writing is a great problem for these tuk-tuk drivers because of their limited level of education, not only can they not write English well but they cannot write Thai, their mother tongue well either. Fortunately, it is not necessary for them to write in their career because speaking and listening skills are the most important skills requested in their job. However, severe problems always arise when they do have to write. They mainly solved the problems in two ways. Firstly, they asked other people who spoke English for help. Secondly, they used maps in accompaniment with explanations instead of writing. Most of them avoided writing because this skill was very hard for them.

Chai refused completely when we asked about his ability in writing:

“Surely, I have never written. It’s because I can’t I cannot write. I don’t memorize anything. It wastes my time, so I refuse. I always refuse. That’s the way.” (OEQ 3.1.4)

When Dao was asked to write by a foreigner, she also refused:

“I told him I can’t write. I did something else instead of writing. I made things understandable by speaking instead, ‘where will you go? What will you do?’ Sometimes, I could speak. I explained and he understood me.” (OEQ 3.1.4)

In addition, Yord also showed his inability in writing English:

“I have never thought of writing because I don’t have to write when I serve foreign tourists. I only told them to read the explanation that are provided in tourism brochures.” (OEQ 3.1.4)

Although tuk-tuk drivers are poor and generally have limited levels of formal education, they are always looking for ways to improve themselves in English. When they were asked if they had improved their English, most of them said, “Yes.” We asked them how they had improved their English. Most of them said that they had learned some sentences from friends or persons who could speak English, and then practised speaking with them.

Sak is a person who always improved himself in this way:

“Nowadays, I try to learn more English. Um from some books that I can find. If any official places can help me. That will be nice.” (OEQ 3.3.1)

Chai had never tried to improve his English, but when we interviewed him and asked him this question; he showed his interest in developing his English:

“Well! I think I will buy a book and read it. I will practise during my work. When my friend who is better at English is free, I’ll ask him about things that I don’t know in English, for example, ‘Hey! A few minutes ago, a farang (a word that some Thai people use to call foreigners) talk to me like this. What does it mean? I think that next time I can talk to them if they use that sentence again.” (OEQ 3.3.1)

Sorn, however, learned the language from his community:

“For me, I asked everyone who knows English. Sometimes, I studied from tourists, for example, ‘What does this word mean?’, and, ‘How can I use this word?’” (OEQ 3.3.1)

Finally, we asked them what help they would like to have, to help them improve their English. Most of them said that they would like to be provided with short courses. As we have pointed out their time is money; they have to work long hours for their meager existence. Therefore, any course would need to be short, but informative and effective.

Sak showed his ambition to improve his English:

“I would like to have Er How would it be? Once, I attended a course for a week, but it was too short. Er something like that, learning person to person in a small group.” (OEQ 3.3.2)

Dao also showed her need for training:

“I would likeEr a special course. The time Er one week, one day, or twice a week an hour or two hours a day.” (OEQ 3.3.2)

Cleverly, Yord stated that he would like to have some basic skills first:

“What about a basic training first because we should begin with basic skills, right?” (OEQ 3.3.2)

With regard to the time for training, most of them thought that it should be on weekdays, not on weekends, because they have to work on weekends, and that represents the peak period when tourists generally take trips or tours.

Chai indicated a suitable time for them to attend the English courses:

“It should be on weekdays, on Monday, Tuesday or Wednesday. Something likes this ... In the afternoon, about 2 hours.” (OEQ 3.3.2)

Dao agreed with Chai:

“I would like Er to have a special course. The time Er about once or twice a week one or two hours a day It should be on weekdays better than weekend because there are a lot of tourists during the weekend.” (OEQ 3.3.2)

Interestingly, some of the drivers would like to enhance their English competency by being provided with lessons via cassette tapes. Some of them would like to be provided with pocketbooks or stickers with specific words or sentences for tourists.

Tem said,

“Tape cassettes or CDs are better. CDs are for ones who have CD players, but I don't have one. So tape cassettes are better for me.” (OEQ 3.3.2)

Sak indicated his choice,

“Besides attending a course, tape cassettes with lessons should be given out. Do you think it's a good idea? For some of us, our time is money. We have no time to attend the course. We can study from the cassette during working.” (OEQ 3.3.2)

Measuring the tuk-tuk outcomes using Hall's Rubric, tuk-tuk drivers' discourse competence is at the lowest level (Novice) although the results in Table 1 suggest that the tuk-tuk drivers believe they are quite competent in communicating in English. However, this belief may have developed because the drivers thought the foreigners understood what they were saying when in actual fact the foreigners understood the gist of the interaction, not wholly from their speaking, but rather through the classification provided by the maps or pictures. These visual aids were the main medium that explained things, rather than their speech.

When we asked Tem if foreign tourists understood him when he talked to them, he replied,

“I think they did. Sometimes they did. Sometimes they didn't.” (RSQ 2.4.1)

In addition, when we asked him whether he could make a refusal if he needed to refuse a foreigner, he answered,

“Yes, I can. I only said, 'No'.” (RSQ 2.4.3)

Additionally, we asked Tem how he solved a problem if the foreign tourist did not understand him. He said,

“I used finger language for help.” (OEQ 3.2.2)

For Dao, she used special aids to help her:

“I opened a map for help. I always have maps in my tuk-tuk. I asked them where they wanted to go. Supposing, they wanted to go to a restaurant, I would open a map, and say, ‘Restorong (restaurant)?’, something like this.” (OEQ 3.2.2)

In addition, when interpreting Table 2 using Hall’s Rubric, the tuk-tuk drivers’ linguistic competence is also at the lowest level. They cannot write English in words or a sentence. They do not have the ability to write or to explain maps or directions. They are not able to express themselves in words or sentences. Lastly, the foreign tourists are not able to understand them via writing. These outcomes suggest that they need to develop better skills to achieve more effective linguistic competence.

The following accounts from five participants illustrated the tuk-tuk drivers’ difficulty with respect to their linguistic competence:

“I can write a word or words, but not a sentence.” (ChaiOEQ 3.1.4)

“I cannot write in English.” (ChaiOEQ 3.1.4)

“I can read, not much, but I cannot write.” (DaoOEQ 3.1.4)

“I can write very little. Really, I hardly ever mix alphabets into words.” (YordOQ 3.1.4)

“I can write only some words. Most of the time, I can’t spell them. I studied English a little in school. I know very little about verbs, singular or plural. I only know some of them.” (SornOEQ 3.1.4)

Clearly, the findings revealed that to achieve a better income, it is essential that the tuk-tuk drivers develop their discourse and linguistic competence. For discourse competence, successful interaction with the foreign tourists would bring better understanding between the tuk-tuk drivers and the tourists. Good interaction would lead to enhanced tourist comfort and pleasure. Tuk-tuk drivers would not only be able to take the tourists where they would like to go and be able to tell them the fare, they would also be able to make small talk and provide details about the interesting places they visited.

Equally important, linguistic competence plays a great role in successful interaction. Tuk-tuk drivers ought to have a general knowledge of grammar, especially sentence forms, clause patterns, word order, subject-verb agreement, and simple tenses. This would be helpful when they need to fill in application forms which require the use of spoken and written structures in the technical English terms required for tourism. Proficiency in this communication context would greatly improve their career opportunities. Teaching content should be commensurate with the language that they really use on the jobs. Learning and teaching activities should be suited to their needs and their life styles.

In conclusion, for the simple reason that successful interaction requires competent levels in all skill areas, special curricula and instructions should be provided. The teaching and learning should not take place only in the classroom since workload and time availability influence tuk-tuk drivers’ learning. Classroom practices should be changed to accommodate approaches to learning conducted outside the classroom. The tuk-tuk drivers would value opportunities to learn in order to improve their income and livelihood and as such strategies should be integrated into the courses to ensure success in learning. Moreover, the learners’ individual differences should be

acknowledged. The learning process has to be organized involving the provision of substance and activities in accord with the learners' interests and aptitudes. Language training must be arranged so that learners are able to solve various problems that they face in situations in different environments using a cultivated thinking process. Teaching methodology should be adapted to accord with individual potentiality. Learning should not only occur inside the classroom, but also outside the classroom where learners are able to learn and work at the same time.

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The comparison of students' use of metacognitive reading strategies between reading in Bahasa Indonesia and in English

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This article reports an investigation into the students' use of metacognitive reading strategies that involve the use of analytic and pragmatic reading strategies when reading in the two languages: English and Bahasa Indonesia. One-hundred and one students from the English Study Program within the Faculty of Teacher Training and Education of Sriwijaya University in Palembang, South Sumatera, Indonesia, completed the Metacognitive Reading Strategies questionnaire (MRSQ) both in Bahasa Indonesia and in English. The good values of indicators of internal consistency are shown by both the English and the Bahasa versions of the MRSQ. A paired sample t-test shows that some significant differences are found between the students' use of particular metacognitive reading strategies for reading in English and in Bahasa. On average, the students reported using some of the analytic reading strategies more frequently when reading in Bahasa. However, they used the pragmatic reading strategies more frequently when reading in English.

Metacognitive reading strategies, analytic reading strategies, pragmatic reading strategies

INTRODUCTION

In relation to the reading at secondary and college levels, Anderson and Armbruster (1984) pointed out that the purpose was often to learn specific information in order to perform some criterion task. Initially, this type of reading, or studying, involved a number of complex activities such as understanding and remembering task demands, identifying and selectively attending to important information, using appropriate study strategies for remembering that information, monitoring comprehension and learning, and taking corrective action when necessary (Baker & Brown, 1984; Brown, 1980). As Wright (1987, p.25) emphasized, the reading processes for academic purposes also involved concern with metacognitive processes, that was to say, the emphasis was on strategy selection rather than on the micro processes of reading (e.g., word decoding).

During the past two decades, studies on reading strategies have reflected a shift in attention from a focus on the product of reading (e.g., a score on a reading comprehension test) to process-oriented research which emphasized determining the strategies that readers actually used while they were reading. Many studies (e.g., Lengkanawati, 2004; Phakiti, 2003; Yeung & Wong, 2004) have given an emphasis to the metacognitive strategies students use when they read. This paper addresses the issue of the use of the metacognitive reading strategies used by university students in Indonesia when they read academic material in their first language, Bahasa Indonesia, and in English.

METACOGNITIVE READING STRATEGIES

O'Malley, Chamot, Stewner-Mazaneres, Russo, and Kupper (1985, p.506) stated that "metacognitive strategies involve thinking about the learning process, planning for learning, monitoring of comprehension or production while it is taking place, and self-evaluation of

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learning after the language activity is completed". Metacognitive strategies also involved readers' deliberate mental behaviors for directing and controlling their cognitive strategy processing for successful performance (Phakiti, 2003).

Oxford (1990, p.26) listed metacognitive reading strategy as one of the six strategies within the broader context of reading strategies that could be referred to as sub-strategies. Oxford considered metacognitive strategies to be behaviours undertaken by the learners to plan, arrange, and assess their own learning. These strategies included directed attention and self-assessment, organization, setting goals and objectives, and seeking opportunities for practice. In the context of reading, self-monitoring and correction of errors were further examples of these strategies. Additionally, Brown (1980) proposed the significant examples of metacognitive strategies involved in reading comprehension as follows: (a) clarifying the purposes of reading; (b) identifying the important aspects of a message; (c) monitoring ongoing activities to determine whether comprehension was occurring; (d) engaging in self-questioning to determine whether goals were being achieved; and (e) taking corrective action when failures in comprehension were detected.

Taraban, Rynearson, and Kerr (2004) who developed the Metacognitive Reading Strategy Questionnaire (MRSQ), found that the metacognitive reading strategies within the questionnaire comprised an *analytic-cognitive* component aimed at reading comprehension, and a *pragmatic-behavioural* component aimed at studying and academic performance. The analytic-cognitive component particularly assessed students' efforts to comprehend a text. The strategies such as evaluating reading goals and inferring information were the examples of the analytic-cognitive components. The pragmatic-behavioural components involved the physical actions and included strategies such as underlining and highlighting. Taraban et al (2004) pointed out that the analytic-cognitive and pragmatic-behavioural were consistent with the existing literature and research on reading strategies that students read to comprehend and to remember.

STUDIES ON METACOGNITIVE READING STRATEGIES

Studies on reading strategies have focused on metacognition, emphasizing how readers control, monitor, and assess the reading process. Wong, Chang, and Hong (2004), who carried out a study with ESL students, reported that the good and the poor readers did not use metacognitive strategies differently although they differed in terms of their awareness and knowledge of metacognition. In her study, Lengkanawati (2004) found that there was a slight difference, but not significant, in the use of metacognitive strategies by the Indonesian students who studied English as a foreign language (EFL) and the Australian students who studied Bahasa Indonesia as a foreign language (IFL) in which the EFL students' intensity in the use of these strategies was higher than the IFL students'. Phakiti (2003) reported the metacognitive reading strategies used by the EFL students and the results suggested that the students who reported using significantly higher metacognitive strategies showed better reading test performance. Taraban et al (2004) also found that the use of metacognitive analytic reading strategies (e.g., evaluating reading goals and inferring) in reading school-related materials was associated with higher grade expectations, but that the use of metacognitive pragmatic reading strategies (e.g. such as underlining and highlighting) was not.

Importantly, as Phakiti (2003) argued, the different settings in which the study occurred (e.g. English as a Second Language setting or English as a Foreign Language setting) was one of the factors that had to be taken into consideration since it might affect the findings. According to Kelly (1994), the term 'foreign language' serves as the general descriptor for languages other than the mother tongue. In this study, the term 'English as a Foreign Language' (EFL) indicates that it is learned largely in the classroom and is not spoken in the society where the teaching takes place (Palembang, South Sumatera, Indonesia). Additionally, Taraban et al (2004) suggested that future study on the metacognitive reading strategies might be carried out with participants who were more diverse with regard to ethnicity, age, occupation and geographical location. Since there has been very little information in the literature about the use of metacognitive reading strategies by students from Indonesia, considerable interest existed for seeking the answer to the use of the metacognitive reading strategies in Bahasa Indonesia (L1) and in English (as a Foreign Language)

reading. Specifically, this study tries to investigate whether students use the same metacognitive reading strategies when reading in Bahasa Indonesia and in English. In this study, a group of students from the English Study Program within the Faculty of Teacher Training and Education at Sriwijaya University, South Sumatera, Indonesia., are selected to involve in this study. In this English Study Program, English is considered as a foreign language and reading in English is a requirement as it is the students' major subject of study. However, there are also some subjects that use Bahasa Indonesia as the medium of instruction. Thus, the students learn from both English and Bahasa Indonesia academic texts.

METHOD

Participants

One-hundred and one students from the second, the fourth, and the sixth semesters of the English Study Program within the Faculty of Teacher Training and Education of Sriwijaya University, the major state university in Palembang, South Sumatera, Indonesia, participated in this study. The participants were made up of 19 males (18%) and 82 females (82%). The data were gathered during the first and second weeks of the beginning of the second semester, in February 2006. However, there were some students who did not provide their responses to either the English or Bahasa Indonesia versions of the MRSQ or to both of them. There were also a few missing answers for single items found in the reading tests. Therefore, the number of the cases used for the paired t-tests for the analytic reading strategies were between 81 and 83 and the number of the cases used for the paired t-tests for the pragmatic reading strategies were 81.

Measurements

The Metacognitive Reading Strategies Questionnaire

Taraban et al (2004) developed the Metacognitive Reading Strategies Questionnaire (MRSQ) to measure metacognitive reading strategies of English speaking students (see Appendix A). The MRSQ measures two constructs: (a) *analytic cognition* aimed at reading comprehension, and (b) *pragmatic behaviours* aimed at studying and academic performance. The MRSQ consists of 22 items, each of which uses a 5-point Likert scale ranging from 1 ("I never do this") to 5 ("I always do this"). This instrument was also translated by the writer into Bahasa Indonesia for use in this study. As shown in Table 1, within the current data set, the reliability indices for the two subscales of the English version and the Bahasa Indonesia versions of the MRSQ showed good estimates of a scale's internal consistency.

Table 1. Cronbach Alphas for the Analytic and Pragmatic Subscales of the MRSQ for Bahasa Indonesia and English

	Items	Alpha
Analytic - Bahasa	16	0.827
Analytic - English	16	0.875
Pragmatic -Bahasa	6	0.817
Pragmatic English	6	0.783

The Reading Tests

Two reading tests, one in Bahasa Indonesia and one in English, were administered in order to investigate the students' use of the metacognitive reading strategies when reading in Bahasa Indonesia and in English (see Appendix B). Bahasa Indonesia reading test consisted of 12 items with a reliability of 0.63, and the English reading test consisted of 11 items with a reliability of 0.59. Even though these tests had reliabilities below a recommended value of 0.70, the estimated reliabilities were modest and adequate to undertake the calculation of correlations (Nunnally, 1967, p.226)

Procedures

The administration of the reading tests (Bahasa Indonesia and English), and the two versions of the MRSQ (Bahasa Indonesia and English) were done over a period of two weeks: the first week for the English reading test and the English version of the MRSQ and the second week for Bahasa Indonesia reading test and Bahasa Indonesia version of the MRSQ. First of all, the students did the reading tests and they then provided responses to the MRSQ. In giving their responses to the MRSQ, the students were asked to read each statement carefully and circle the number that applied to them, indicating the frequency with which they used the reading strategy implied in the statement.

RESULTS AND DISCUSSIONS

The Average Usage of the Analytic Reading Strategies for Bahasa Indonesia and English

The data collection for Bahasa Indonesia and English that was done at different times caused some missing cases. Therefore, the mean values were reported only for the students who responded for both parts of the Bahasa Indonesia reading test/Bahasa Indonesia version of the MRSQ and the English reading test/English version of the MRSQ. Table 2 shows the average usage of the analytic reading strategies for Bahasa Indonesia and English reading.

Table 2. Mean, Standard Deviation and Standard Error of Mean for All the Analytic Reading Strategies

		Mean English	Mean Bahasa	Std. Error Mean English	Std. Error Mean Bahasa
Pair 1	Evaluate	3.37	3.79	0.093	0.104
Pair 2	Anticipate	3.13	3.22	0.090	0.101
Pair 3	Draw	3.45	3.39	0.093	0.101
Pair 4	Back	3.17	3.55	0.086	0.106
Pair 5	Revise	2.93	3.59	0.098	0.097
Pair 6	Consider	3.11	3.42	0.092	0.106
Pair 7	Distinguish	3.38	3.38	0.105	0.115
Pair 8	Infer	3.27	3.84	0.088	0.079
Pair 9	Reading goals	3.33	3.42	0.094	0.128
Pair 10	Search	3.24	3.73	0.101	0.123
Pair 11	Present later	3.08	3.34	0.100	0.114
Pair 12	Meaning	3.69	3.77	0.098	0.107
Pair 13	Current information	3.05	3.16	0.091	0.118
Pair 14	Strengths	3.42	3.60	0.093	0.117
Pair 15	Visualize descriptions	3.38	3.25	0.089	0.115
Pair 16	Hard	3.11	3.91	0.107	0.093

On average the students used all the 16 analytic reading strategies at least on some occasions for Bahasa Indonesia and also for English. The least frequently used analytic reading strategies for Bahasa Indonesia were *Current information*, *Anticipate* and *Visualize descriptions* with mean values of 3.16, 3.22 and 3.25, respectively, while the most used analytic reading strategies were *Hard* (3.91), *Infer* (3.84) and *Evaluate* (3.79). The strategy in which the students noted how hard or easy a text was to read (*Hard*) appeared to be different when the MRSQ for English reading was involved. The students perceived this analytic reading strategy (*Hard*) as the most frequently used strategy when reading in Bahasa Indonesia, while it was the fifth least often used strategy when reading in English. It was also worth mentioning that although reading strategy *Visualize descriptions* was one of the least frequently used analytic reading strategies for Bahasa Indonesia; it appeared to be the fourth in importance when the reading strategies for English were concerned. This was consistent with the growing body of knowledge that recognizes the importance of visual description techniques for learning a foreign language.

Generally, the results of the comparison of the students' average attitude towards the analytic reading strategies for Bahasa Indonesia and English indicated the existence of different frequency in using the analytic reading strategies when reading in Bahasa Indonesia and English were

concerned. In particular, the results shown in Table 2 suggest that the students reported more frequent use of the analytic reading strategies when reading in Bahasa. This result was rather predictable and an explanation for this might be due to the nature of the analytic reading strategies that required more cognitive skills. In the case of reading in English as a foreign language, the students might have problems with understanding the text to start with rather than reading in their first language, Bahasa Indonesia. Therefore, the students were less likely to use the analytic reading strategies.

Paired Samples T-tests of the Analytic Reading Strategies for Bahasa Indonesia and English

Paired samples t-tests were conducted in order to assess whether the differences use of the analytic reading strategies reported by the students were significant. The results were reported in Table 3.

Table 3 shows that the following analytic reading strategies: *Evaluate*, *Back*, *Revise*, *Consider*, *Infer*, *Search*, *Present later*, and *Hard* were reported by the Indonesian students as significantly more frequently used in Bahasa reading than in English reading.

Table 3. Paired Sample T-tests of the Analytic Reading Strategies

		Mean	Std. Deviation	Std. Error Mean	t (2-tailed)	df	Sig.
Pair 1	Evaluate (E1/B1)	-0.43	1.007	0.111	-3.840	81	0.000
Pair 2	Anticipate (E2/B2)	-0.08	.872	0.096	-0.881	82	0.381
Pair 3	Draw (E3/B3)	0.06	1.141	0.125	.481	82	0.632
Pair 4	Back (E4/B4)	-0.38	1.038	0.115	-3.298	81	0.001
Pair 5	Revise (E5/B5)	-0.66	1.129	0.124	-5.346	82	0.000
Pair 6	Consider (E6/B6)	-0.31	1.047	0.115	-2.726	82	0.008
Pair 7	Distinguish (E7/B7)	0.00	1.237	0.137	0.000	81	1.000
Pair 8	Infer (E8/B8)	-0.58	1.014	0.111	-5.198	82	0.000
Pair 9	Reading goals (E9/B9)	-0.10	1.175	0.129	-0.747	82	0.457
Pair 10	Search (E10/B10)	-0.49	1.240	0.137	-3.563	81	0.001
Pair 11	Present later (E11/B11)	-0.25	1.157	0.127	-1.993	82	0.050
Pair 12	Meaning (E12/B12)	-0.08	1.095	0.120	-0.701	82	0.485
Pair 13	Current information (E13/B13)	-0.11	1.220	0.134	-0.810	82	0.420
Pair 14	Strengths (E14/B14)	-0.19	1.163	0.129	-1.433	80	0.156
Pair 15	Visualize descriptions (E15/B15)	0.14	1.191	0.132	1.026	80	0.308
Pair 16	Hard (E16/B16)	-0.80	1.279	0.142	-5.647	80	0.000

Note: E stands for English and B stands for Bahasa Indonesia

In order to provide the magnitude of the differences, the eta squared statistics were also calculated using the formula:

$$\text{Eta squared} = \frac{t^2}{t^2 + N - 1} \quad (\text{Pallant, 2001, p. 184}).$$

The calculation of the effect sizes for the analytic reading strategies *Evaluate*, *Back*, *Revise*, *Consider*, *Infer*, *Search*, *Present later* and *Hard*, for both Bahasa and English, was presented in Table 4.

The results show that for almost all the strategies with significantly different mean values (except one reading strategy - *Present later*), at least moderate effect sizes were recorded. The cut points for a moderate and large effects were taken as 0.06 and 0.14, respectively (see Cohen, 1990).

The Average Usage of the Pragmatic Reading Strategies for Bahasa Indonesia and English

Similar to the examination of the analytic reading strategies, the mean values for the pragmatic reading strategies were also calculated only for those students who were present on both occasions. The results of the analysis showed that the most frequently used strategy out of all the six pragmatic reading strategies for English reading was *Re-read*, while the least frequently used was *Margin* (Table 5). The same pragmatic reading strategies were also found most and least

frequently used in Bahasa Indonesia reading although the mean values were lower and higher, respectively, than those for English reading.

Table 4. The Effect Sizes for Paired Sample t-test of the Analytic Reading Strategies

<i>df</i> = 80, 81, 82		Eta squared
Pair 1	Evaluate (E1/B1)	0.154**
Pair 4	Back (E4/B4)	0.118*
Pair 5	Revise (E5/B5)	0.258**
Pair 6	Consider (E6/B6)	0.083*
Pair 8	Infer (E8/B8)	0.248**
Pair 10	Search (E10/B10)	0.136*
Pair 11	Present later (E11/B11)	0.046
Pair 16	Hard (E16/B16)	0.285**

Note: *E* stands for English and *B* stands for Bahasa Indonesia

Table 5. Mean, Standard Deviation and Standard Error of Mean for All the Pragmatic Reading Strategies

		Mean English	Mean Bahasa	Std. Error Mean English	Std. Error Mean Bahasa
Pair 17	Note	3.31	3.02	.106	.133
Pair 18	Highlight	3.57	3.47	.120	.133
Pair 19	Margin	2.70	2.49	.102	.122
Pair 20	Underline	3.57	3.53	.115	.135
Pair 21	Read more	3.81	4.02	.100	.090
Pair 22	Re-read	3.96	4.32	.090	.074

In addition, Table 5 also shows that the students reported using the first four pragmatic reading strategies –*Note*, *Highlight*, *Margin*, and *Underline*– more frequently when reading in English than in Bahasa Indonesia. This was contrary to the situation with the analytic reading strategies in which the students expressed a tendency to use the analytic reading strategies more often in their first language. A possible explanation why the first four pragmatic reading strategies were used more frequently for English reading might result from the students' lack of understanding of certain words or sentences that they came across when reading the English texts. Logically, the sensible thing to do when facing a situation like this was underlining or highlighting the words or the sentences. Another thing that might be done was writing notes or questions related to the words or the sentences that were not understood. These actions not only helped the students to remember and to comprehend the information better, but also to locate the information more easily for later use.

However, the students reported using the last two pragmatic reading strategies, namely *Read more* and *Re-read*, more frequently when reading Bahasa Indonesia text. This outcome was surprising, but it was possible that the Indonesian students concentrated more and read slower from the beginning when reading the English text so that they were not likely to re-read the text. In both reading cases, either the students' better understanding of the English text after the first reading was due to their diligence or the students' lack of understanding of the English text after the first reading was due to limited vocabulary, reading more of the same text again might not seem to give immediate benefit. Therefore, this might be the reason why the pragmatic reading strategies *Read more* and *Re-read* were not used frequently when reading in English.

Paired Samples T-tests of the Pragmatic Reading Strategies for Bahasa Indonesia and English

Additional information about whether the difference use of the pragmatic reading strategies in Bahasa Indonesia and English reading were significant was produced by employing paired samples t-tests and the results were displayed in Table 6.

Table 6 shows that making notes when reading in order to remember the information (*Note*) was found to be used significantly more frequently in English reading. In addition, the pragmatic reading strategies *Read more* and *Re-read* were also found significantly different ($t = 1,999, p < 0.05; t = 3.479, p < 0.05$) between the two languages. The students appeared to

prefer using the pragmatic reading strategies *Read more* and *Re-read* more often in Bahasa Indonesia than in English.

Table 6. Paired Sample t-tests of the Pragmatic Reading Strategies

		Mean	Std. Deviation	Std. Error Mean	t (2-tailed)	df	Sig.
Pair 1	Note (E17/B17)	0.28	1.196	0.133	2.136	80	0.036
Pair 2	Highlight (E18/B18)	0.10	1.136	0.126	0.783	80	0.436
Pair 3	Margin (E19/B19)	0.21	1.069	0.119	1.767	80	0.081
Pair 4	Underline (E20/B20)	0.04	1.042	0.116	0.320	80	0.750
Pair 5	Read more (E21/B21)	-0.21	0.945	0.105	-1.999	80	0.049
Pair 6	Re-read (E22/B22)	-0.36	0.926	0.103	-3.479	80	0.001

Note: *E* stands for English and *B* stands for Bahasa Indonesia

Similarly to the analytic reading strategies, the effect sizes were also calculated for all the three pragmatic reading strategies for which the mean differences were found significant.

Table 7. Effect Sizes for Paired Sample t-test of the Pragmatic Reading Strategies

<i>df</i> = 80		Eta squared
Pair 1	Note (E17/B17)	0.054
Pair 5	Read more (E21/B21)	0.048
Pair 6	Re-read (E22/B22)	0.131*

Note: *E* stands for English and *B* stands for Bahasa Indonesia

In Table 7, the values of the eta squared statistic were reported, indicating only one moderate effect size for the pragmatic reading strategy *Re-read* that was above 0.06 (Cohen, 1990). The magnitudes of the mean differences were small for the pragmatic reading strategy *Note* and *Read more*.

DISCUSSION

This study aims to answer whether differences in the use of reading strategies occur when the students read in Bahasa Indonesia and in English. The results of the analyses show that some differences exist in the use of the analytic and the pragmatic reading strategies for Bahasa Indonesia and English. Particularly, the result reveals that on average the students report using some of the analytic reading strategies more frequently when they read in their mother tongue (Bahasa Indonesia) than in English. On the other hand, the students report more frequent use of the pragmatic reading strategies for English.

It is mentioned previously that the literature concerning the use of metacognitive reading strategies in first language reading and in English as a foreign language is limited. The previous studies investigating the use of metacognitive reading strategies in first language reading and in English as a foreign language focused on the use of these strategies by good readers and poor readers. Therefore, there has not much information that can specifically relate the results of this study to the existing literature, especially the one that is related to the use of metacognitive reading strategies in Bahasa Indonesia. However, this study adds valuable information to the body of knowledge about the metacognitive reading strategies students use when they read academic materials in their first language and in English as a foreign language, especially in Bahasa Indonesia as a first language and English as a foreign language (EFL). In addition, it is of value to suggest language teachers to encourage their students to use those metacognitive reading strategies used by the students in this study to improve their reading performance both in Bahasa Indonesia and in English.

However, there is an implication of a need for future research to verify the results and discussions reported in this paper. Despite the possible conclusions that have been drawn from this study, it is necessary to emphasize that this study needs to be repeated with larger samples. There is also a need to carry out a further investigation (i.e., by interviewing some students) so that a greater understanding and more detailed information concerning the students' use of the metacognitive reading strategies can be gathered.

CONCLUSIONS

The general picture of the observed differences between the average values for the analytic reading strategies use for Bahasa Indonesia and English revealed that on average the students reported using some of the analytic reading strategies more frequently when they read in Bahasa Indonesia than in English. In contrast to the results of the students' average attitude towards the analytic reading strategies, the outcomes revealed that the students generally used the pragmatic reading strategies more frequently when reading in English than in Bahasa. This might be due to the nature of the pragmatic reading strategies that are simple and appropriate for the less-sophisticated readers (Taraban et al., 2004).

However, there is an implication of a need for future research to verify the results and discussions reported in this paper. Despite the possible conclusions that have been drawn from this study, it is necessary to emphasize that this study needs to be repeated with larger samples and with more carefully constructed tests of reading in order to provide stronger answers to the proposed problem. There is also a need to carry out a further more descriptive study so that a greater understanding and more detailed information concerning the students' use of the metacognitive reading strategies can be gathered.

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APPENDIX A

Metacognitive reading strategies that construct 'Analytic cognition' component of the MRSQ

1. **Evaluate.** As I am reading, I evaluate the text to determine whether it contributes to my knowledge/understanding of the subject.
2. **Anticipate.** After I have read a text, I anticipate how I will use the knowledge that I have gained from reading the text.
3. **Draw.** I try to draw on my knowledge of the topic to help me understand what I am reading.
4. **Back.** While I am reading, I reconsider and revise my background knowledge about the topic, based on the text's

	content.
5.	Revise. While I am reading, I reconsider and revise my prior questions about the topic, based on the text's content.
6.	Consider. After I read a text, I consider other possible interpretations to determine whether I understood the text.
7.	Distinguish. As I am reading, I distinguish between information that I already know and new information.
8.	Infer. When information critical to my understanding of the text is not directly stated, I try to infer that information from the text.
9.	Reading goals. I evaluate whether what I am reading is relevant to my reading goals.
10.	Search. I search out information relevant to my reading goals.
11.	Present later. I anticipate information that will be presented later in the text.
12.	Meaning. While I am reading, I try to determine the meaning of unknown words that seem critical to the meaning of the text.
13.	Current information. As I read along, I check whether I had anticipated the current information.
14.	Strengths. While reading, I exploit my personal strengths in order to better understand the text. If I am a good reader, I focus on the text; if I am good with figures and diagrams, I focus on that information.
15.	Visualize descriptions. While reading, I visualize descriptions in order to better understand the text.
16.	Hard. I note how hard or easy a text is to read.
Metacognitive reading strategies that construct 'Pragmatic Behaviours' component of the MRSQ	
17.	Notes. I make notes when reading in order to remember the information.
18.	Highlight. While reading, I underline and highlight important information in order to find it more easily later on.
19.	Margin. While reading, I write questions and notes in the margin in order to better understand the text.
20.	Underline. I try to underline when reading in order to remember the information.
21.	Read more. I read material more than once in order to remember the information.
22.	Re-read. When I am having difficulty comprehending a text, I re-read the text.
<i>Note: Table derived from Table 1 in Taraban, Kerr, and Rynearson (2004)</i>	

APPENDIX B

Reading Tests for English

Text I

The John Hopkins School of Medicine has a new surgical assistant. His name is AESOP, short for Automated Endoscopic System for Optional Positioning.

The world's first robot in the operating room is just an arm – an electronic limb that manipulates instruments (in particular, miniature cameras used during surgery) usually controlled by a human. But unlike a human, AESOP never bumps into anyone, never drops the instruments and is rock steady. No matter how long the operation, AESOP never tires or suffers from stress.

Besides providing the precision required for repetitive actions during surgery, the machine also decreases the risk of infection for patients and doctors. Plus, the robot does not have to undergo years of education: AESOP is inexpensive compared with the cost of training surgical assistants and could 'decrease the need for surgeons and surgical specialists,' says Dr. Louis Kavoussi, director of the Brady Urological Institute and a surgeon who tested the robot.

He and his team at John Hopkins Bayview Medical Center have performed several operations using the new robot, exploring how doctors can work together with the new technology: Surgeons watching a monitor in an anteroom directed others working at the operating table. Such procedures hold promise for battle field and emergency operations in remote areas; surgeons in one part of the world will be able to assist colleagues in another. With AESOP, says Kavoussi, a much-needed specialist "could be in several different hospitals in one day."

01. It is obvious that compared to human beings AESOP _____
 - (A) cannot work under stress.
 - (B) can make decisions faster.
 - (C) is more precise in its operation.
 - (D) does not eliminate the risk of infection.
 - (E) performs well only in small surgery.
02. The phrase 'battle field and emergency operations' in line 14-15 is used to indicate that surgery can take place _____
 - (A) in an area far from a hospital
 - (B) at the operating table in a hospital
 - (C) by using the traditional system of surgery
 - (D) with the help of surgical specialists
 - (E) by collaborating with foreign surgeons

Text II

.....(04)

Dr. Tai Khoa Lam and colleagues at the Nepean Hospital in Sydney trialed the use of phone camera in their emergency room to assist with the treatment of hand injuries. Their study, published in the *ANZ Journal of Surgery*, looked at how effective snapshots of injuries and X-rays were at helping attendant doctors communicate with consultants in 27 cases of hand injuries. ER doctors usually rely on registrars and specialists-in-training to track down a busy expert consultant and then described the X-rays and injuries to them – a time-consuming task. In addition, not all doctors have a camera mobile phone. But by taking digital photos, Lam was able to communicate with the consultant almost straight away and despite the poor quality of the low-resolution image, the physicians found sufficient details to discuss the injuries and the patient's care. With photos costing just cents to send, camera phones may be a perfect addition to every doctor's bag.

03. Which sentence would best start the paragraph?
 - a. A mobile phone camera can be a useful and cheap diagnostic tool for Australian doctors.
 - b. Mobile phone cameras are widely used by doctors in emergency rooms.

- c. Doctors in the Nepean Hospital, Sydney, use mobile phone to communicate with one another.
- d. Australian doctors use a mobile phone camera to take pictures of patients in emergency rooms.
- e. You can always find a mobile phone camera in every Australian doctor's bag.

Text III

The importance of eight hours' sleep a night is widely accepted by health professionals. Scientists believe that sleep is the single most important factor _____(05) _____ to general health, before even diet or exercise. _____(06)_____ at the same time, studies show that people in developed nations increasingly spend less time asleep and more time at work or commuting. This _____(07)_____ to ever longer working hours is frequently counter-productive: it has been estimated that in the United States \$150 billion _____(08)_____ each year in direct and indirect costs due to sleep deprivation. These include medical expenses, sick leave, errors of judgment, accidents and injuries. The Challenger _____(09)_____ and the Exxon Valdez oil spill were both linked to errors made by sleep-deprived workers. Less dramatically, but still worryingly, it has been found that for every hour of sleep lost in a night our IQ will have dropped one point the next day. Thus, in a working week of only five hours sleep each night, the average person could drop fifteen IQ points, turning them from an average person into a marginally functioning wreck.

04. (A) contribute
(B) contribution
(C) contributing
(D) contributory
(E) contributed
05. (A) And
(B) Moreover
(C) Still
(D) Therefore
(E) Yet
06. (A) influence
(B) change
(C) alternative
(D) tendency
(E) direction
07. (A) is lost
(B) lost
(C) losing
(D) be losing
(E) to be lost
08. (A) explode
(B) explosion
(C) exploding
(D) explosive

Questions 9 to 11 are not related

09. "Jerry and I plan to go bowling tonight at 7. Would you like to join us? I'll pick you up then!"
'Well, _____ but I've got a lot of homework to do.'

 - a. I want to join
 - b. It's a lot of fun
 - c. I'd love to
 - d. It's impossible
 - e. There'll be much fun

10. 'What did the policeman tell your brother after his car hit the lamp post?'
'He told my brother _____ while driving.'

 - a. not to use cell phones
 - b. not using cell phones
 - c. he does not use cell phones
 - d. does not use cell phones
 - e. his not using cell phones

11. 'Did the travelers at last manage to continue their cross-country trip?'
'Oh, yes, after the old radiator _____.'

 - a. is replaced
 - b. has been replaced
 - c. is being replaced
 - d. to be replaced
 - e. had been replaced

Reading Tests for Bahasa Indonesia

Petunjuk: Lingkari jawaban yang menurut anda benar.

01. *Truly Asia, begitu Malaysia ... jati diri negerinya dalam promosi pariwisata ke seluruh penjuru dunia. Keberanian negeri jiran ini ... negerinya sebagai "asia yang sesungguhnya" ternyata ... pikiran berbagai kalangan di Indonesia.*

Kata berimbuhan yang sesuai untuk melengkapi kutipan di atas adalah

- (A) menyebut, memosisikan, mengganggu.
- (B) mengungkapkan, menentukan, membuat.

- (C) mengungkapkan, memosisikan, membuat.
- (D) memosisikan, mengganggu.
- (E) menyebut, menentukan, menjadikan.

02. (a) Kondisi ekonomi Indonesia saat ini cukup baik. (b) hal ini dapat dilihat dari berbagai usaha, baik jasa maupun barang yang berkembang pesat. (c) Salah satunya adalah usaha minimarket yang merupakan bisnis pelayanan. (d) Untuk usaha ini banyak didirikan di daerah yang jauh dari keramaian kota. (e) Fasilitas ini sangat membantu masyarakat dalam mencukupi kebutuhan sehari-hari, seperti sembako dan peralatan rumah tangga, sehingga proses distribusi barang dari produsen ke konsumen semakin mudah.

Dalam alinea tersebut terdapat kalimat yang strukturnya salah. Kalimat yang dimaksud adalah

- (A) kalimat (a).
- (B) kalimat (b).
- (C) kalimat (c).
- (D) kalimat (d).
- (E) kalimat (e).

03. Biologi molecular merupakan sains dasar kelas **akselerasi** adalah untuk memenuhi kebutuhan siswa yang memiliki potensi dan bakat akademis luar biasa.

Istilah akselerasi dalam kalimat di atas berarti

- (A) tambahan.
- (B) percepatan.
- (C) unggulan.
- (D) peningkatan.
- (E) khusus.

04. 1. Kami mendengar berita itu.
2. Berita itu disiarkan oleh berbagai televisi.
3. Isi berita itu NAD dan Sumatra Utara dilanda gempa dan tsunami.

Rangkaian yang tepat dari ketiga kalimat tersebut adalah

- (A) Gempa dan tsunami melanda NAD dan Sumatra Utara kami mendengar dari berita yang disiarkan berbagai televisi.
- (B) Bahwa NAD dan Sumatra Utara dilanda gempa dan tsunami kami mendengar dari berita berbagai televisi.
- (C) Kami mendengar berita bahwa NAD dan Sumatra Utara dilanda gempa dan tsunami dari siaran berita televisi.
- (D) Berita yang disiarkan berbagai televisi isinya bahwa NAD dan Sumatra Utara dilanda gempa dan tsunami kami dengar.
- (E) Berita bahwa gempa dan tsumani melanda NAD dan Sumatra Utara dari siaran berbagai televisi.

05. Sejak lahirnya konsep pemikiran baru dalam ilmu kedokteran, yang dicetuskan oleh Profesor Linus Pauling, yakni tentang **Ortomolekular medicine** yang dasarnya adalah studi biologi molecular sebagai sains dasar, penelitian medis diarahkan pada molekul-molekul yang secara normal biologis fisiologis ada dalam tubuh manusia.

Inti kalimat panjang tersebut adalah

- (A) Konsep pemikiran baru dicetuskan oleh professor Linus Pauling.
- (B) Ortomolekular medicine adalah sains dasar.
- (C) Ortomolekular medicine dasarnya adalah studi biologi.
- (D) Penelitian medis diarahkan pada molekul.
- (E) Biologi molekuler merupakan sains dasar.

06. Seorang pelukis yang kaya akan **ekspresi** seni mampu menangkap **fenomena** alam dan **merealisasikannya** dalam bentuk lukisan yang menarik. Kenyataan ini menunjukkan bahwa goresan kuas pada kanvas merupakan **refleksi** batin seorang pelukis atas pemahamannya terhadap alam.

Kata-kata bercetak tebal pada kutipan di atas dapat diganti dengan kata-kata

- (A) jiwa-gejala-menggambarkannya-situasi.
- (B) ungkapan-gejala-menggambarkannya-cerminan.
- (C) ungkapan-gejala-mewujudkannya-cerminan.
- (D) jiwa-suasana-mewujudkan-cerminan.
- (E) jiwa-suasana-melukiskan-situasi.

07. Segala hal yang dilakukan selama ini sebenarnya tidak **konsisten**.

Kata *konsisten* dalam kalimat tersebut berarti

- (A) taat asas.
- (B) ada gunanya.
- (C) berbahaya.
- (D) penting.
- (E) tepat.

08. Tidur adalah kebutuhan hidup yang tidak bisa diabaikan. ... banyak orang menyepelkan aktivitas nikmat. ... banyak orang memotong waktu tidurnya supaya bisa melakukan pekerjaan atau aktivitas lain dalam jumlah lebih banyak. ..., hal tersebut justru akan berpengaruh negatif pada tubuh.

Kata penghubung yang tepat untuk mengisi titik-titik tersebut adalah

- (A) tetapi, sehingga, sedangkan.
- (B) tapi, hingga, sedang.
- (C) namun, oleh karena itu, padahal.
- (D) tetapi, sampai, meskipun.
- (E) sebaliknya, karena, walaupun.

09. *Melihat fenomena yang terjadi saat ini, maka di sinilah peran Bank Pengkreditan Rakyat, di mana Bank Pengkreditan Rakyat dirancang untuk melayani kebutuhan kredit dan permodalan masyarakat kelas menengah ke bawah.*

Rangkaian kata tersebut akan menjadi kalimat ragam baku bila diubah menjadi

- (A) Melihat fenomena yang terjadi saat ini, maka di sinilah peran Bank Pengkreditan Rakyat, Bank Pengkreditan Rakyat dirancang untuk melayani kebutuhan kredit dan permodalan masyarakat kelas menengah ke bawah.
 (B) Setelah melihat fenomena yang terjadi saat ini, maka di sinilah peran Bank Pengkreditan Rakyat, dimana Bank Pengkreditan rakyat dirancang untuk melayani kebutuhan kredit dan permodalan masyarakat kelas menengah ke bawah.
 (C) Setelah melihat fenomena yang terjadi saat ini, di sinilah peran Bank Pengkreditan Rakyat yang dirancang untuk melayani kebutuhan kredit dan permodalan masyarakat kelas menengah ke bawah.
 (D) Melihat fenomena yang terjadi saat ini, di sinilah peran Bank Pengkreditan Rakyat sebagai bank yang dirancang untuk melayani kebutuhan kredit dan permodalan masyarakat kelas menengah ke bawah.
10. *Produksi Beras, Impor, dan Pengadaan Beras* Pernyataan di bawah ini yang TIDAK sesuai dengan isi tabel di atas adalah

Tahun	Produksi padi (juta ton GKG*)	Produksi Beras (juta ton)	Impor beras (juta ton)	Pengadaan Beras (juta ton)
1996	51,10	33,22	2,14	35,36
1999	50,87	33,06	-4,50	37,56
2002	51,49	33,47	1,81	35,28
2004	54,34	35,32	0,17**	33,69

Sumber BPS GKG (Gabah Kering Giling*) Ramalan III,**) Januari-September 2004

Pernyataan di bawah ini yang TIDAK sesuai dengan isi tabel di atas adalah

- (A) Semakin tinggi produksi padi semakin rendah impor beras.
 (B) Impor beras tertinggi terjadi pada kondisi pengadaan beras tertinggi.
 (C) Tingginya produksi beras seiring dengan tingginya pengadaan beras.
 (D) Kondisi produksi beras paling tinggi justru pengadaan beras terendah.
 (E) Impor beras terendah terjadi ketika terjadi pengadaan beras terendah.
11. *Penentuan warna untuk terapi membutuhkan kehati-hatian. Kesalahan dalam penentuan warna justru bisa menimbulkan ketidakseimbangan energi dalam tubuh. Sebagai contoh, warna merah tidak boleh diterapkan pada penderita tekanan darah tinggi dan jantung karena sifat warna merah yang penuh energi dan vitalitas akan menaikkan tekanan darah. Untuk penderita tekanan darah tinggi dan jantung lebih cocok digunakan warna hijau karena sifatnya menyeimbangkan emosi, menciptakan suasana tenteram dan tenang. Selain bermanfaat untuk kesehatan, terapi warna dapat digunakan untuk dunia mode, kecantikan, dan desain interior.*

Informasi inti dalam paragraf tersebut adalah

- (A) kehati-hatian dalam menentukan warna untuk terapi.
 (B) manfaat lain terapi warna.
 (C) contoh penyakit yang memanfaatkan warna untuk terapi.
 (D) akibat kesalahan penentuan warna untuk terapi.
 (E) terapi warna yang tepat untuk penyakit darah tinggi dan jantung.
12. *Pada tahun 1984, Indonesia telah berhasil mencapai swasembada beras. Hal ini berarti harga beras relatif terjangkau oleh masyarakat. Meningkatnya ketersediaan beras, pendapatan penduduk, dan sistem nilai sosial pada beras telah mengarahkan pola konsumsi pangan pokok pada beras. Karena itu, diperlukan upaya-upaya penganeekaragaman pangan pokok untuk mengurangi ketergantungan pada beras sekaligus mempertahankan swasembada beras, serta meningkatkan mutu gizi pangan penduduk.*

Pernyataan berikut yang sesuai dengan isi paragraf di atas adalah

- (A) Keberhasilan Indonesia dalam mencapai swasembada beras dapat meningkatkan mutu pangan.
 (B) Peningkatan kecenderungan penduduk beralih ke pola konsumsi pangan pokok beras perlu diimbangi dengan penganeekaragaman pangan pokok.
 (C) Karena swasembada beras dapat meningkatkan mutu gizi keluarga, pemerintah perlu mengusahakan pola konsumsi pangan pokok yang lain.
 (D) Penganeekaragaman pola konsumsi pangan pokok penduduk merupakan pekerjaan besar yang mendukung program pemerintah.
 (E) Keberhasilan swasembada beras ditunjang oleh pemerintah dengan upaya perbaikan menu makanan rakyat.

Islamic view of nature and values: Could these be the answer to building bridges between modern science and Islamic science

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This paper discusses the basic tenets of Islam and the Islamic view of nature that were influential in the development of science in the so-called 'Golden Age of Islam'. These findings have been the catalyst for present day Muslim scholars, who have emphasized the importance of Islamic science, as the means of understanding Western science. There is also a strong body of opinion within researchers of Islamic science that the abandonment of Islamic values and the rapid adoption of Western science and technologies have led to conflict in social, educational and scientific fields in Islamic countries. The article examines how these two views can be reconciled in order to build bridges between modern science and Islamic science.

Islamic science, tenets of Islam, Islamic values, modern science, view of nature

INTRODUCTION

Contemporary Muslim and non-Muslim scholars have recognized that scientific knowledge is not necessarily neutral and objective, but instead carries values and concepts that are explicit to modern Western culture (Rehman, 2003). Therefore this has resulted in a concerted effort by contemporary Islamic scholars to call for an 'Islamic science' or the 'Islamization of knowledge' (Golshani, 2000b; Davies, 1991; Ravetz, 1991). Islamic scholars have also been calling for an investigation to reflect back to the so-called 'Golden Age of Islam' when there seemed to have been development in science; and an acceptance of harmony between religion and science. This article examines how the tenets of Islam, and the Islamic view of nature facilitated the development of science in the so-called 'Golden Age of Islam'; how the Western view of nature conflicts with the Islamic view. And how common or universal values can help build bridges between modern science and Islamic science.

Islam is not just a way of life but a civilization, in which the way of life may vary "from one Muslim country to another, but is animated by a common spirit far more humane than most Westerners realize" (Mazrui, 1997, p. 118). The religious life of Muslims in Islamic countries is governed by the tenets of Islam. Very briefly these tenets are considered, along with the values that they exemplify, in the following section.

TENETS OF ISLAM

Islam is not so much about believing in the faith but how Muslims respond to the faith, that is, "not so much a noun but a verb, an action" (Ball and Haque, 2003, p. 317). Ball and Haque (2003, p. 315) argue that "Islam is tantamount to accepting a way of life – spiritually, politically, and socially, about how to behave in family and public life", Islamic values impact on all areas of

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society. In Arabia in the early seventh century, God or *Allah*² through the Prophet Muhammad (PBUM), revealed the religion of Islam, which means ‘to surrender’ or “submission to the will of God” (Donner, 1999).

At the core of the belief system of Islam are the five pillars of Islam, along with core values, laws, and behaviours outlined in both the *Quran*; and the practice (*Sunna*³) and teaching (*Hadith*⁴) of the Prophet Muhammad (PBUM⁵) (Moore, 2006). Monotheistic in nature, Islam claims that human beings believe in the “same God, have similar needs, wants, and experiences, and can relate to a set of universal moral principles” (Cornell, 1999). Thus the Islamic set of moral principles is good for all mankind, regardless of race, ethnicity, gender, or origin (Moore, 2006). Islam’s rapid expansion in the seventh and eighth centuries, as well its vigour today, lies in its claim of universal validity across time and space (Cornell, 1999).

Individuals can convert to Islam by practising the Five Pillars of Faith and adhering to the core values, laws, and behaviours outlined in the *Quran* and the *Hadith*, teachings of Prophet Muhammad (PBUM). The first pillar of Islam is called *Shahadah* (the act of bearing witness). The *Shahadah* requires that a Muslim declare his or her devotion to Allah or God by declaring “there is no God but Allah and Muhammad is the messenger of Allah”. Therefore by this profession of faith Muslims assert that Allah is the only God, and not part of the pantheon (Moore, 2006). Thus clearly Islam rejects the concept of ‘Trinity’ and presents a direct theological challenge to Christianity. For 14 centuries this has been at the heart of the tension between Christianity and Islam (Smith, 1999) with intractable views held by both religions that prevent any compromise.

The second tenet or pillar of Islam requires Muslims to pray at five specified times during the day. The establishment of prayers is stated in the *Quran* and was demonstrated by the Prophet Muhammad (PBUM) during his lifetime (*Sunna*). While performing prayers Muslims must face the Great Mosque (*Holy Kaaba*⁶) in Mecca, the holiest city of Islam (Cornell, 1999). Prayers or *al-salat* are viewed as a vital component of submission to the will of Allah, and “involve a variety of important rituals, each signifies the centrality of prayer in Islamic life”. By performing the prayers five times a day, “Muslims acknowledge humanity’s total dependence on the will of Allah” (Moore, 2006, p. 141).

The third pillar of Islam is *Zakat* or charity, giving of one’s wealth for the benefit of the poor. The *Quran* mandates this as 2.5 percent of the individual’s saving, to be used to help the less fortunate in the society. The *Zakat* reflects the importance of charity and emphasizes the *Quranic* view of social justice and compassion.

The fourth pillar of Islam involves fasting or *al-saum* from sunrise to sunset in the month of Ramadan⁷. During Ramadan, Muslims abstain from food, drink, and sex during the day. By fasting, Muslims develop a deep sense of devotion to Allah, and that helps them participate in, and be responsible to, a larger moral community (Cornell, 1999).

The fifth pillar is the *hajj* or annual pilgrimage to Mecca, Saudi Arabia. The *hajj* must be performed by every healthy and financially able Muslim once in their lifetime. It is undertaken in *Dhul-Hijjah*, the twelfth month of the Islamic lunar calendar. The pilgrims perform *hajj* repeating the rituals that were performed by the Prophet during his last pilgrimage. The *hajj* symbolizes the

² *Allah*: in this paper Allah will be used to represent God as stated in the Islamic belief system.

³ *Sunna*: the habits and the religious practice of the Prophet Muhammad (PBUM)

⁴ *Hadith*: documented traditions of the teaching, actions, and sayings of the Prophet Muhammad (PBUM).

⁵ PBUM: means peace be upon the Prophet Muhammad and is written after his name as a mark of respect.

⁶ Holy Kaaba: the cube-shaped shrine in the holy city of Mecca is considered the earthly house of God and the most sacred in the Islamic world.

⁷ Ramadan: is the ninth month of the Islamic lunar calendar.

believer's entry into the earthly House of God in Mecca, a replica of the cosmic House of God in the Seventh Heaven (Cornell, 1999).

Furthermore, Muslims have a belief in Allah's angels; a belief in Allah's revealed texts, including the *Quran*; a belief in Allah's messengers; a belief in the day of judgement (the world has been created for a fixed period of time); and a belief of Allah's complete control over worldly affairs (Cornell, 1999). Moreover, in Islamic societies religion and politics are closely linked. The Islamic society is supposed to be governed by the *Shariah* and *Fiqh*, two complex sources of *Quranic* law. These *Quranic* Islamic laws provide justifications for formation and implementation of laws that govern religious practices and obligations, social life, marriage and divorce, commerce and business, taxation, government, criminal justice, economics, and other areas (Kamali, 1999).

While Islam, like Christianity and Judaism, is a highly complex religion that has scholars debating interpretations of Islamic values, history, laws and practices, the above mentioned core tenets and beliefs are not debatable. Based on these tenets Man (human being) has a designated role to play on earth.

ROLE OF MAN AS STATED IN THE QURAN: KHĀLIFAH AND AMĀNA [STEWARDSHIP AND TRUST]

The purpose for the creation of mankind and Man's role as stated in the *Quran* is that human beings have been placed on the earth as God's representative or '*Khalifah*'. The *Quranic* doctrine of vice-regent or '*Khālifah*' placed Man in the role of *Amāna* or trustee and custodian of the earth, thus responsible for building the earth and utilizing its resources with a sense of justice to oneself and to fellow mankind (Kamali, 2003). While nature can be said to be man's testing ground, man is instructed to read it's 'signs' (Manzoor, 1984, p.156) in order to understand God. Thus Muslims developed natural science in order to understand God and fulfil their role as God's representatives.

The role assigned to 'Man' by the *Quran* included accountability of the numerous resources given by God or *Allah*. Moreover, the Islamic concept of knowledge includes both the transcendental knowledge as well as the knowledge based on sense perception and observation. Consequently, all knowledge gained through scientific activities aims to result in human welfare; and seeks to utilize the resources of the universe for beneficial purposes; (Kamali, 2003), that is, there is both social justice and compassion. Hence all scientific endeavours by scientists need to be scrutinized by the values, ethics and theological standards as encompassed in Islam.

ISLAMIC VIEW OF NATURE VERSUS WESTERN VIEW OF NATURE

In Islam the purpose of nature is for man 'to study nature in order to discover God and to use nature for the benefit of mankind'. Nature can be used to provide food for mankind and its bounty is to be equally distributed among all peoples. All activities that cause harm to mankind and in turn destroy nature are forbidden. Destruction of the natural balance is discouraged, for example, unnecessary killing of animals or removal of vegetation may in turn lead to starvation due to lack of food. This view is an extension of the idea that 'Man' has been placed on earth as God's representative (Faruqi, 2006a; Zaidi, 1991; Said, 1989). Modern-day Muslims scholars advocate that scientists and scholars are best motivated by these underlying values when undertaking scientific endeavours.

The Islamic view of nature has its roots in the *Quran*, the very word of God and the basis of Islam. The following passages from the *Quran* illustrate the relationship between nature and man and how this relationship inspires Muslim scholars to study natural phenomenon, in order to understand God (Wersal, 1995). The following verses also show the way the *Quran* presents the whole universe:

We created not the heavens, the earth, and all between them, merely in (idle) sport; we created them not except for just ends. But most of them do not understand (Surah Al-Dukhān 44: 38-39, [Ali, 1989, p. 1289]).

Behold! In the creation of the heavens and the earth; In the alternation of the night and the day; In the sailing of the ships through the ocean for the profit of mankind; In the rain which Allah sends down from the skies And the life which He gives therewith to an earth that is dead; In the beasts of all kinds that He scatters through the earth; In the change of the winds and the clouds which they trail like their slaves between the sky and the earth - (here) indeed are Signs for a people that are wise (Surah Ad-Baqarah 2: 164 [Ali, 1989, p. 64-65]).

Thus mankind is inspired to study, understand and mould the natural forces for its own purposes. The point to note is the general empirical attitude of the *Quran* that engendered in its followers a feeling of reverence and thus made them founders of an enlightened society (Iqbal, 1986). This view of nature influenced the scholars of the so-called 'Golden Age of Islam' to undertake scientific activities that resulted in the vast corpus of scientific works of that era.

The Western view of nature that emerged after the Scientific Revolution was that "no footprints of the divine can be discerned in the sands of the natural world" (Peters, 2003, p. 33). Furthermore, any commonality that existed between the sciences that emerged in the Europe and those that had developed in the Islamic civilization "was rent asunder by the rise of modern science" (Nasr, 1996, p. 129). Seyyed Hossein Nasr, notes in his work *Religion and the order of nature*, (1996, p. 133)

From the idea of cosmic order and laws created by God through His Will and applicable to both men and nature to the idea of 'laws of nature' discoverable completely by human reason and usually identified with mathematical laws, divorced from ethical and spiritual laws, there is a major transformation that played a central role in the rise of modern science. This new idea of laws of nature also eclipsed the earlier Christian understanding of the subject, although later theologians tried to 'Christianize' the seventeenth-century scientific concept of laws of nature. Interestingly enough, such an event did not take place in other civilizations with a long scientific tradition such as the Chinese, Indian, and Islamic, and this is of great significance in the parting of ways between the modern West and other civilizations as far as the understanding of the order of nature and its religious significance are concerned.

In the final analysis, it seems that Europe decided to transform the medieval science that had been influenced by the Islamic scientific traditions. Plato replaced Aristotle, and mathematics was the new tool of science. With contributions from Nicholas Copernicus (1473-1543), to Galileo Galilei (1564-1642), and Johannes Kepler (1571-1630) it climaxed with Charles Darwin's work '*The Origins of Life*' in the biological sciences and had philosophical implications.

Koyré (1892-1964), a respected French historian of science, (cited in Iqbal, 2002, p. 29) stated that

What the founders of modern science did was neither refinement, nor improvement of what they had inherited; they had to actually destroy one world and to replace it with another. They had to reshape the framework of our intellect itself, to restate and to reform its concepts, to evolve a new approach to Being, a new concept of knowledge, a new concept of science.

DEVELOPMENT OF ISLAMIC SCIENCE IN THE GOLDEN AGE OF ISLAM

In the so-called ‘Golden Age of Islam’ inspiration for the development of sciences was found in the *Quran*. Moreover, scientific activities were undertaken for the betterment of mankind; therefore the sciences that initially attracted the attention of Islamic scholars were medicine, mathematics, pharmacy, and pharmacology (Faruqi, 2006b). In addition, major scientific works were carried out under the patronage of rulers whose primary interests lay in the benefits derived from these scientific works for the peoples they ruled (Sabra, 1996).

In Islam it must be understood that there is no ‘philosophy’ as recognized by Western standards. For traditional Muslims, answers to questions pertaining to God, the creation of the universe, and the destiny of mankind, could be sought in the *Quran*, (Faruqi, 2006a&b). Some orthodox Muslims subjected *Quranic* verses to *Kalam* or a theological discipline involving rational dialectical examinations (a form of Muslim scholastic theology). Philosophers like Al-Kindi (800-870), Al-Farabi (d. 950) were inspired by the translations of the works of Aristotle. They attempted to reconcile Aristotelian and Platonic ideas with revelation thus trying to build a bridge between belief and reason (Taton, 1963). Al-Farabi’s works illustrated that Aristotelian logic had scriptural support in the *Quran* and the prophetic *hadith* (Bakar, 1999). Al-Farabi and Ibn Sina/Avicenna (980-1037) tried to develop the use of logic within the framework of religious consciousness of the Transcendent. Al-Farabi and Ibn Sina wrote works which sought to demonstrate that logic, when used correctly, could in relation to religious truths help explain their rationality and clarify overall consistency (Armstrong, 2000; Sarton, 1927). However, there emerged opposition to Aristotelian logic from within both religious and intellectual quarters.

Abu Bakr al-Razi/Rhazes (d. 925) was probably the first to write a critique on Aristotle’s logic. Al-Ghazzali (1058-1111) wrote his famous critique of the earlier philosophers such as Al-Farabi and Ibn-Sina, entitled ‘*Tahâfut al-falâsifa*’ or ‘The Incoherence of the Philosophers’ who had been inspired by Aristotle. Al-Ghazzali accentuated the unacceptability of the three metaphysical claims: (a) the denial of bodily resurrection; (b) the limitation of divine knowledge to universal, eternal truths; and (c) the doctrine that the world is eternal (King 2004, p.58). Al-Ghazzali denounced these claims and all who held these beliefs were disbelievers. But Al-Ghazzali also wrote works which encouraged the use of logic for enhancing religious understanding, but reason always was subservient to revelation. According to Al-Ghazzali, “the *Quranic* term *al-mîzân* usually translated as the balance, refers among other things to logic. Logic is the balance with which man weighs ideas and opinions to arrive at the correct measurement or judgement” (Bakar, 1991, p.4). Al-Ghazzali being a scientist and religious scholar was able to combine religious beliefs with the scientific ideas of the time (Faruqi, 2006b).

However, Ibn Rushd/Averroes (1126-98) wrote ‘*Tahâfut al-Tahâfut*’ or the ‘Incoherence of the Incoherence’ a rebuttal to the arguments presented against philosophers in Al-Ghazzali’s (1058-1111) *Tahâfut al-falâsifa* (Taylor, 2000). Ibn Rushd sought to prove that there was nothing either philosophically or religiously objectionable in Aristotelian doctrine of the eternity of the world (Faruqi, 2006). Ibn Rushd’s works demonstrated the relationships that existed between religious thinking and the scientific developments of this period. Ibn Taymiyyah (d. 1328) and Ibrahim al-Shatibi (d. 1398), both undertook inquiries and systematic refutation of Aristotelian logic. This demonstrates the intellectual struggle between Islamic science based on the *Quranic* worldview and Greek thought.

The inspiration for Islamic philosophy and science appears to have been the ancient knowledge consisting of Greek, Indian and others that the Muslims acquired through the translation movement of the eighth and ninth centuries. Muhammad Iqbal (d. 1939) undertook an incisive analysis of the Greek philosophy and its comparison with the worldview of the *Quran* (Kamali, 2003). Muhammad Iqbal refuted some of the hitherto parallels that had been drawn between the two. Iqbal acknowledged that the “Greek philosophy had been a great cultural force in the history of Islam” (Iqbal, 1986, p. 3), but the worldview of the *Quran* which inspired the Muslim scholars

was different from the Greek thought. For example, Aristotle wrote extensively on physics without undertaking a single experiment; and on natural history without determining the most easily verifiable facts (Kamali, 2003). Socrates postulated that the study of man alone, was sufficient in the study of the human world, whereas the *Quran* encompasses that all of nature must be studied, the “humble bee a recipient of Divine inspiration” and “to observe the perpetual changes of the wind, the alternation of day and night, the clouds and the planets swimming through infinite space” (Kamali, 2003).

Furthermore, the *Quran* deems ‘hearing’ and ‘sight’ as valuable instruments in the process of learning. Thus Islamic science developed in scientific inquiry the method of observation and experimentation. Therefore the experimental method that developed in “Islam was not due to a compromise with Greek thought but to a prolonged intellectual warfare with it” (Kamali, 2003). Consequently, this resulted in the magnificent developments in science during the period from the twelfth to the fifteenth centuries in the various territories of the Islamic Empire, Baghdad, Andalusia, and Sicily (Faruqi, 2006).

Subsequently, it was this Islamic science that made its way to Europe through North Africa, Sicily and Spain. Beginning from the end of the tenth century this knowledge began to filter back to Europe through the translations of Arabic versions of the Greek knowledge and the original Greek treatises (Burnett, 2001). But also transferred to Europe were the seminal contributions of scholars of the Islamic world. Modern science as we know it today works with theories and models that must be tested empirically. This was standard practice in the fields of mathematics, astronomy and medicine in the Islamic world of 1000 years ago. The Muslims developed the procedures for testing knowledge both empirically and logically (Faruqi, 2006b). More over, an important characteristic of Islamic science was its experimental character. Islamic scientists were interested especially in the applied sciences, in the construction of apparatus, in testing theories by undertaking observations, and analysis of results through mathematics (Bammate, 1959). These ideas and procedures were all available before the times of Galileo and Newton to whom they have been largely attributed in Western Europe (Faruqi, 2006a).

Europeans have been slow to acknowledge the Islamic origins of their scientific method. Bacon, who has been credited with the invention of experimental method, studied in the Islamic universities of Spain (Kamali, 2003). Bacon acknowledged this and emphasized the importance of Arabic science (cited in Kamali, 2003) and probably used the original Arabic works of Ibn al-Haytham/Alhazen (965-1039) as well as Latin translations (Meyers, 1964). Thus by promoting the use of experiments in scientific research, al-Haytham played an important role in setting the scene for modern science (Rashed, 2002, p.773).

However, the development of modern science and technology led to the separation of facts from values and this has resulted in destructive consequences for humanity that have arisen from some scientific discoveries (Golshani, 2003). Production of chemical, biological and nuclear weapons can be cited as examples, as well as the side effects of preservatives, chemicals and pollutants in our food and environment. Furthermore scientific progress has raised serious ethical issues in terms of human or animal subjects and public safety (Golshani, 2003). Consequently, in the Islamic world and in the West, Muslim scholars need to tackle these issues using all the tools available including religious knowledge.

TO BUILD BRIDGES BETWEEN ISLAMIC SCIENCE AND MODERN SCIENCE

In Islam, the acquisition of knowledge, be it scientific or non scientific is not an end in itself but “one method to comprehend the glory of God” (Al-Hayani, 2005, p. 565). Moreover, scholars of Islam have displayed their “diversities in theme and orientation that demonstrated the dynamic nature of Islam, far from its image that has been portrayed in certain media as a monolithic and stagnated system of ideas” (Moaddel and Talattof, 2000, p. 1). Throughout history there have been clashes between religion and science, with all religions trying to find solutions to problems

and ramifications of new scientific discoveries. With the advent of modern science the central theological problem that Islamic scholars were confronted with was “the question of the validity of the knowledge derived from sources external to Islam and the methodological adequacy of the four traditional sources of jurisprudence: the *Quran*, the dicta attributed to the Prophet (*hadith*), the consensus of theologians (*ijma*), and juristic reasoning by analogy (*qiyas*)” (Moaddel and Talattof, 2000, p. 1).

Some intellectuals have tried to formulate reform in Islamic sources of knowledge, in line with the prevailing standards of scientific rationality and modern social theory. These include intellectuals and theologians such as Sayyid Jamal al-Din al-Afghani, Sayyid Ahmad Khan, Chiragh Ali, Muhammad Abduh, Amir Ali and Shibli Nu‘mani (Moaddel and Talattof, 2000, p. 2). These Islamic scholars were influenced by the West, especially by its achievements, “ranging from scientific and technological progress, the Newtonian conception of the universe, Spencer’s sociology, and Darwinian evolutionism, to the Western style of living” (Moaddel and Talattof, 2000, p. 2). Clearly there is debate and disagreement between the scholars who have tried to interpret development of modern scientific thought within the context of Islamic historical and religious perspectives. The author is of the view that in order to enhance understanding there is a need for further input and active participation of scholars engaged in research in modern scientific development in the West with Islamic thought. Therefore there is a need for discourse between Islam and Western science, rooted in the *Quran* (Iqbal, 2002) on the one hand, and between Western science and religious thought on a global setting on the other hand. In both cases, the origins of modern science over the past 1000 years needs to be better understood since it appears to be different from the views that have been promulgated in the United Kingdom and the United States during the nineteenth and twentieth centuries.

CONCLUSIONS

Some characteristics may be included in the further study of nature in an Islamic context warrant consideration. Golshani (2000a) has raised three fundamental questions:

- (1) “Such a study should be pursued within the framework of the Islamic worldview. This worldview is characterised by the holistic approach and is premised on the unicity of nature, which is an indication of the unity of nature’s Creator. The idea of unity of the creator is the fundamental principle of Islam and overrules all other ideas” (p. 609).
- (2) Furthermore science from an Islamic outlook must show the interrelatedness of all parts of the universe. Indeed when empirical data are collected, the researcher must pay attention to details and this requires “the division of knowledge into various disciplines. But one is not supposed to forget the whole at the expense of the parts” (p. 611).
- (3) “Modern science has neglected teleology” (p. 610). Some scholars believe the world has no purpose, while others consider teleology futile. However, in the *Quranic* view the world has a telos and it is stated in the *Quran* that mankind should not neglect this aspect of existence, “do they not reflect in their own minds? Not but for just ends, and for a term appointed, did Allah create the heavens and the earth and all between them. Yet there are truly many among men who deny their meeting with their Lord” (Surah Al Rūm 30: 8 [Ali, 1989, p. 1009]).

For Muslims to tackle the contemporary modern world with self-assurance and confidence there is the need to rediscover and restore the “mainsprings of Islamic civilization. They need to rebuild an idea of Islam which includes justice, integrity, tolerance and the quest of knowledge the classic Islamic civilization (Ahmed, 2002, p. 44). Furthermore other peoples need to learn from the holistic Islamic approach and benefit from learning the facts about the medieval Islamization of Western science. This aspect needs to be fully researched, accepted and incorporated in specialized works and in the teaching materials of schools and colleges around the world. Thus by

acknowledging the Muslim contributions to scientific knowledge bridges can be built both within Islamic communities and others.

Polkinghorne (1998, pp. 124-125) has argued this well:

It is essential that Christians and other religious people should seek what common ground they find with all other people of good will in trying to articulate an ethical basis for caring for our world. Perhaps that common ground can be found in the acknowledgement of a respect for all humanity and for life and for the world that gave us birth. We need a sharp concept of the common good, wide enough to embrace the natural world and future generations

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A Rasch analysis of the Academic Self-Concept Questionnaire

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This study used the Rasch model to assess the unidimensionality and item-person fit of an Academic Self-Concept Questionnaire (ASCQ) that is based on the Confucian Heritage Culture (CHC) perspective. Knowledge of the relationship between academic achievement and academic self-concept is particularly useful because academic achievement is overemphasized in the CHC. ASCQ largely satisfies the Rasch model for unidimensionality. However, four items had poor Infit statistics, suggesting that they do not contribute significantly to the scale hierarchy. Rasch model also confirmed the unidimensionality of the two subscales – Academic Confidence and Academic Effort. The academic self-concept scale, academic effort and academic confidence subscales were also been found to be valid with students with learning disabilities. Results from this study will extend the predominantly Western based literature regarding Academic Self-Concept by reaffirming the construct of a CHC measure of academic self-concept that incorporates the values of academic effort and academic confidence.

Academic self-concept, Confucian heritage culture, Rasch analysis,
Singapore, learning disabilities

INTRODUCTION

Singapore was the top performing country in the 2003 *Trends in International Mathematics and Science Study* (TIMSS), having significantly higher average achievement in mathematics and science than the rest of the participating countries (Ministry of Education, 2004). The TIMSS study conducted of Grade 4 (Singapore Primary 4) and Grade 8 (Singapore Secondary 2) students in 49 countries by the International Association for the Evaluation of Educational Achievement (IEA) affirmed the high quality of Mathematics and Science education in Singapore. Previously, Singapore's Secondary 2 students consistently performed among the top in Mathematics and Science in three similar TIMSS studies. They finished first in both Mathematics and Science in TIMSS 1995 and 2003, first in Mathematics and second in Science in TIMSS 1999. Singapore's Primary 4 students finished first in Mathematics and seventh in Science in TIMSS 1995 and first in both Mathematics and Science in TIMSS 2003 (Ministry of Education, 2004).

Although Singapore was the top performing country, it scored below the international average in the Index of Students' Self-confidence in learning Mathematics as well as Science. Supporting this, an international investigation using the TIMSS data showed that Singapore ranked sixth from the bottom of 41 countries ($M = 2.68$, $SD = 0.73$, $r = 0.25$) (Wilkins, 2004). When using a large nationally representative sample ($N = 14,825$ students, 1,015 high schools), it was reported that there was a negative effect relating to schools: those students who have higher self-concept tended to have lower performance in terms of achievement and vice versa.

Self-concept is an important construct in psychology and education especially academic self-concept which is generally defined as a person's *perception of self with respect to achievement in school* (Reyes, 1984, pp. 558-560). Considering that the TIMSS study had identified an existing discrepancy between academic self-concept and high achievement schools in Singapore, it may be possible that there will be an even greater discrepancy between academic self-concept and students with learning disabilities who are studying in mainstream schools. Academic self-concept is extensively researched in the Western cultures (Marsh, 1990a, 1990b, 1990c, 1993 & 2005) but the view on academic self-concept from a Confucian Heritage Culture perspective is not as widely known. Thus, it is often difficult to generalize the findings from Western studies in an Asian context because of the differences in culture.

CONFUCIAN HERITAGE CULTURE

In Singapore, Confucianism is generally understood as a secular system of ethics rather than a religion. Confucianism has been held by some to lie at the heart of the value system of the local community. Chen, Lee and Stevenson (1996) found in their cross-cultural studies that intelligence was not a factor in explaining the superior performance of students from a Confucian Heritage Culture (CHC) background. One cultural factor proposed is the high value placed on education. A second factor is the value of hard work, with effort emphasized over ability. Family involvement also plays a great deal in the high academic achievement of students. Parents have high aspirations and standards for their children and spend a great deal of time supervising their children's school work. Children are aware of their parents' high standards, subsequently spending more time doing homework. Last of all, these students are realistic in their self-evaluation of their academic performance. They appear to have more accurate self-perception because frequent, explicit evaluations occur both at the levels of the classroom and the school (Chen, Lee & Stevenson, 1996). In short, parents who have higher expectations, greater dissatisfaction with their children's performance and greater involvement in their children's homework and who provide a more stable home environment tend to give a higher achievement level among their children.

The Confucian culture encourages hard work and effort in the pursuit of learning. 'No pain, no gain' is a motto that students work by. The importance of education and diligence is stressed by parents and their children, therefore the willingness to work hard especially in the academic area is extremely important to students. Students view academic achievement as a route which prepares them to earn money, acquire luxuries and eventually enter prestigious schools and thus establish an outstanding career (Lau, Nicholls, Thorkildsen & Patashnick, 2000).

Singapore, an Asian country with predominantly a Chinese origin and a Confucian Heritage Culture (Volet, 1996; Biggs & Watkins, 1996) has diligence, hard work and high achievement motivation inculcated into students from a very young age. The process of learning is described as "studying extensively, enquiring carefully, pondering thoroughly, sifting clearly and practicing earnestly" (cited in Lee, 1996, pp. 35). Singapore not only has a CHC but also a school system which is segregated on the basis of achievement. Face – one's reputation – is of great concern in the Chinese culture and admission to a mainstream school is highly valued in a family which has a child that has learning difficulties. The family does not want to accept that the child has a learning difficulty and will push the child to a mainstream school. There is a paramount desire for the child to be placed into a mainstream school. It is possible that a brighter sibling enters a prestigious school first followed by a sibling who has a learning difficulty. Any social comparison with normal-achieving classmates leads to a negative contrast and results in a loss of academic self-concept. The gain in status and face for the individual and his family due to attending a prestigious mainstream school may possibly overshadow the denial that 'my child has a learning difficulty' and any negative academic self-concept.

SELF-CONCEPT

Self-concept is an important construct in psychology and education. Byrne (1984) concluded that 'self-concept' is a multidimensional construct, having one general facet and several specific facets, one of which is 'academic self-concept'. The term 'academic self-concept' can be characterized by two elements consistent with the Shavelson model (Strein, 1993). First, academic self-concept reflects descriptive (e.g., *I like math*) as well as evaluative (e.g. *I am good at math*) aspects of self-perception. Second, self-perceptions associated with academic self-concept tend to focus on scholastic competence, rather than attitudes. It is referred to as a person's *perception of self with respect to achievement in school* (Reyes, 1984). A student's self-perception of academic ability or achievement will affect their school performance (Marsh, 1990a).

There is a general consensus that children with special educational needs or learning difficulties tend to have lower self-concept than those without difficulties (Gurney, 1988; Elbaum & Vaughn, 2001). They are vulnerable to low self-concepts because of a tendency to academic failure, the stigmatizing nature of their learning problems and the segregation from mainstream schooling that many learning disabled students experience.

Learning disability is defined as *a condition in which a student has dysfunction in processing information typically found in language-based activities, resulting in interference with learning. Students with learning disabilities have average or above average intelligence but experience significant problems in learning how to read, write and use a computer* (Friend & Bursuck, 2006).

Elbaum and Vaughn (2001) in a meta-analysis review of 64 studies from 1975 to 1997 showed the effects of intervention of student's academic self-concept in students with learning disabilities. In line with this comparison, Chapman (1988) reviewed 21 studies addressing the general self-concept of students with and without learning disabilities and 20 studies addressing their academic self-concept. He found that students with learning disabilities tended to have general self-concepts that were lower than those of their peers without learning disabilities but within the normal range. By contrast, on a measure of academic self-concept, the average difference between students with and without learning disabilities was large, as indicated by mean effect size (ES) of -0.81. Thus, learning disability has a significant impact on academic self-concept, but not general self-concept.

Three major points in understanding the self-concept of Chinese people are found in studies relating to self-concept from the CHC viewpoint. The first point relates to the discrepancies between one's actual self, ideal self and ought self. Despite the higher academic performance of Chinese students than American students, they tended to have a low ability self-concept (Sue & Okazaki, 1990). Chinese parents usually place high expectations on their children such that the actual self of the child might not measure up to the high expectations of the parents. The second point is based on the looking-glass self tradition (Cooley, 1902; Shrauger & Schoeneman, 1979) – how we see ourselves depends to a great extent on how we imagine others see us. Chinese people tend to place a significantly high importance on how they appear in others' eyes or how they are being judged (Cheung & Lau, 2001). The last point comes from the multifaceted and hierarchical nature of self-concept developed by Marsh, Byrne and Shavelson (1988). Research has shown that Chinese people's self-concept has adopted the multidimensional approach to self-concept (Lau & Leung, 1992; Leung & Lau, 1989).

Psychologists have recognized the important role of self-concept in an individual's personal adjustment while educators are becoming increasingly aware that a student's perception of him/herself may have a significant influence on his/her academic performance in school. Studies done over the years have substantiated the positive relationship between these two variables and the volume of growing evidence that the two influence each other cannot be overlooked. This study may have significance for educators in that it could provide useful information pertaining to

the relationship between academic self-concept and academic achievement among primary school children with learning disabilities in Singapore.

PURPOSE OF STUDY

The purpose of the study was to assess whether the items in the *Academic Self-Concept Questionnaire* (ASCQ) (Liu & Wang, 2005) fitted the Rasch model. A previous longitudinal academic self-concept study (Liu & Wang, 2005) relating to the measurement properties of the ASCQ including variability, reliability and the relationship between academic self-concept and academic achievement using a sample of secondary school students was done in Singapore but there is no published study that supports the unidimensionality of the instrument especially with mainstream primary school students with learning disabilities in Singapore. Unidimensionality means that only a single construct is measured by items in a scale. If the 20 items in the ASCQ produces a valid unidimensional scale, then they all should contribute to the measurement of academic self-concept, the underlying construct that the instrument purports to measure. Furthermore, separate analyses can be undertaken to establish whether academic confidence and academic effort form separate subscales in their own right. Rasch analysis addresses unidimensionality by assessing the contribution that the items make to the scale hierarchy. The technique provides an estimate of item difficulty based on the frequency with which students respond to an item, which can be used to assess the position of items along the scale and to consider any possible redundancy or gaps in the scale hierarchy.

Research Questions

Bearing in mind that Singapore has a mainly Confucian Culture heritage, this research study attempts to answer two research questions.

Will the items in the ASCQ fit the Rasch model?

Can academic self-concept be formed by two subscales: academic confidence and academic effort?

Hypotheses

Based on the research questions the following hypotheses were tested:

H1: The items will fit the Rasch model, confirming the unidimensionality of the instrument.

H2: Academic self-concept is formed by academic confidence and academic effort.

METHOD

The Sample

The sample consisted of 120 students from three private Student Care Centres that cater to students with learning disabilities outside school hours. These 120 students came from thirteen government schools. The sample presented in Table 1 included 48 Primary 4 pupils, 41 Primary 5 pupils and 31 Primary 6 pupils. Thus, participants were drawn from 30 different primary school classes in 13 different schools. All students had been identified as having a learning disability based on their verbal IQ, pictorial IQ and full-scale IQ obtained in the WISC testing done by educational psychologists from the Ministry of Education, Singapore.

The total sample comprise of 88 male and 32 female students. Their age ranged from 9 years 5 months to 12 years 7 months with a mean age of 11 years 1 month. For ethnicity, there were 81 Chinese students, 24 Malay students, 8 Indian students and 7 Eurasians. A pupil was classified in school records an ethnic Eurasian if both his/her parents were not Chinese, Malay or Indian (e.g. Arabian) or if the father was a Caucasian.

Table 1: The Sample

	Centre 1			Centre 2			Centre 3			All Schools		
	M	F	T	M	F	T	M	F	T	M	F	T
Pri 4	10	2	12	12	1	13	9	14	23	25	8	48
Pri 5	10	2	12	13	2	15	11	3	14	34	7	41
Pri 6	8	4	12	8	1	9	7	3	10	23	8	31

M = Male; F = Female; T = Total

Instrumentation

The study made use of the *Academic Self-Concept Questionnaire* as a measure of students' self-concept. Students' scores in the Primary Three Examination taken by all participants at the end of their 3rd year of primary schooling were used as the academic variable. Obtaining a mark on the Primary Three final examination of between 85-100 per cent was allocated to Band 1, while the mark range of 75-84 per cent was allocated to Band 2, Band 3 had the mark range of 50-74 per cent and the mark range of Band 4 was below 50 per cent.

The Academic Self-Concept Questionnaire

The *Academic Self-Concept Questionnaire* (ASCQ) was developed by Liu & Wang (2005) which was designed with reference to the *Academic Self-Esteem* subscale (Battle, 1981), the *School Subjects Self-Concept* (Marsh, Relich & Smith, 1983) and the *General and Academic Status* scale (Piers & Harris, 1964), and was also designed specifically for a CHC value system. Sixteen items were selected from the established instruments and four additional items were constructed, guided by a general understanding of the students and the cultural context in Singapore. Several items were reworded so that the questionnaire contained both positive and negative items. Negatively worded items are included in questionnaires to disrupt a response set where subjects respond favourably or unfavourably to all items (Marsh, Barnes, Cairnes & Tidman, 1984).

The original ASCQ consisted of two 10-item subscales: students' academic confidence (10 items) and students' academic effort (10 items). The academic confidence (AC) subscale assessed students' feelings and perceptions about their academic competence. Example items included 'I am good in most of my school subjects' and 'Most of my classmates are smarter than I am' (negatively worded). The academic effort (AE) subscale assessed students' commitment to and involvement and interest in schoolwork. An example of an item would be 'I am interested in my school work' and 'I study hard for my tests'. Odd numbered items (items 1, 3, 5, 7, 9, 11, 13, 15, 17 and 19) were items that measured students' confidence subscale. Even numbered items (items 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20) were items that measured students' effort. Item 13 that was deleted from the original questionnaire was included in this current study because the questionnaire had not been tested on students with learning disabilities. Items 2, 4, 7, 9, 11, 13, 14, 16, 17 and 20 were negatively worded items. The questionnaire items are presented in Appendix A.

PROCEDURE

These procedures were adopted in this study:

Permission was obtained from the Principals / Centre Director of the three Student Care Centres to conduct the study.

The researcher along with some assistants visited each centre and met the principals in June 2006 to discuss the study and plan the strategy for the administration of the questionnaire.

Written consent was obtained from all parents or guardians of students participating in the study, with verbal consent gain from the student again at the time of administration.

The questionnaires were administered orally in English by the researcher and her assistants to each student individually from the beginning of July 2006 until 21st of July 2006. The

administration was conducted in an unobtrusive location in the centre grounds to ensure that responses from other students were not heard. Administration time was about 10-15 minutes. The administration procedures outlined by Marsh, Craven & Debus (1991, 1998) were followed. Using a double binary response format, students were initially asked to respond 'yes' or 'no' to each question (the first binary response). This binary response was followed by a second binary response ('no always', 'no sometimes', 'yes sometimes' and 'yes always'). Special care was taken to ensure that pupils understood the instructions before they answered the questions and that it was not a test, that there were no right or wrong answers and that everyone would have different answers. All students' responses were recorded on a prepared response sheet by the administrator.

Information pertaining to the students' demographics, results, type of learning disability and the WISC-III IQ scores were obtained from data files which were made available to the researcher by the centre's Principal. The individual band for each of the three examination subjects, English Language, Chinese Language, Mathematics and Science in the Primary Three Examinations were also made available to the researcher

The completed questionnaires were coded and data entered into the Statistical Package for Social Science (SPSS). Negatively worded items were reversed for analysis.

DATA ANALYSIS

The data were analysed using Rasch (1980) measurement techniques, which allowed both students' performance and item difficulties to be measured using the same metric and placed on the same scale. Rasch calibration was used to evaluate the fit of data to the unidimensionality of the Rasch model and for the construction of the academic self-concept questionnaire. The 20 items were analyzed using the partial credit model (Masters, 1982). Items were calibrated in terms of the degree to which students agreed with the items (this corresponds to item difficulty for the questionnaire) and the three category/step thresholds were estimated for each item. A high item difficulty means low levels of agreement with the item. *Quest* (Adams & Khoo, 1996) test analysis computer software was used to perform the partial credit analysis. The item difficulties and step thresholds as well as indicators of the extent to which each item fitted the model were examined. The Rasch model requires that data fit the model and it follows three main requirements. 1) Equal differences have to be found between two sets of item difficulties on the scale and between the two corresponding sets of measures on the scale, 2) An individual's measure on the scale should not be affected by any omissions of any items, 3) the construct of the final scale cannot be affected by any opinions/answers of students.

The Rasch person-item map presented in Figure 1 displays a ruler created from the measurements of students' academic self-concept in response to the questionnaire. The Rasch person-item map in Figure 1 orders the level of self-reported answers of the students in the study (left hand side) and the difficulty of the items (right hand side). Items at the top of the scale are harder to perform. Items become easier to answer further down the scale. Students with higher academic self-concept (at the top of the scale) have no difficulty with the questionnaire; students with lower academic self-concept (at the bottom of the scale) have difficulty even with the easiest questions.

The vertical scale is an interval level iterative scale: the spaces between items, between persons and between items and persons have substantive meaning in terms of the underlying variable (Callingham & Bond, 2006). The academic self-concept of each student to answer the questions is referred to as the person measure and the level of self-concept to perform each item with a criterion level of difficulty is called item measure. The map of students and items to compare the range and position of the item measure distribution (left side of the Figure 1) to the range and position of the student measure distribution (right side of the Figure 1). Items should be located at each point on the scale to measure meaningful differences. The items must cover all the areas on the ruler to measure the academic self-concept of all students. On the academic self-concept scale,

the distance of the item from the top of the ruler correlates to its difficulty relative to the other items. Items closer to the top are harder to answer; moving down the scale, the items become easier to answer – that is, they require a lower level of academic self-confidence to answer it.

Two mean square fit statistics are used to determine how well individual items fit the Rasch model. These statistics assess the extent to which unpredicted responses to an item are given by students whose position in the hierarchy, as determined by their academic self-concept is either close to the item's position (Infit statistic) or far from the item's position (Outfit statistic) in the hierarchy of items. For the data to fit the model adequately, it is generally recommended that the two fit statistics range from 0.6 to 1.4 (Bond & Fox, 2001, p. 179). Fit statistics higher than 1.4 and below 0.6, respectively, indicate too much and too little variation in response patterns. Items with poor fit statistics should be considered for removal from the instrument.

RESULTS

Rasch analysis was used to assess the ASCQ for unidimensionality and person-item fit. The items in the ASCQ appear to form a unidimensional scale presented in Figure 1, with academic confidence and academic effort forming the separate subscales of the academic self-concept scale presented in Figures 3 and 5 respectively. The majority of items fitted the model adequately, supporting the first hypothesis. Three of the items (items 4, 13 and 18) had poor Infit statistics and were deleted from the questionnaire. Item 7 (“Most of my classmates are smarter than I am”) and item 15 (“I am good in most of my school subjects”) are items on the confidence subscale. There was an absent in “yes always” answers in both items. An examination on students’ background did not reveal any significant differences between the students. A person-case estimate was conducted and it was found that there was an erratic student whose second binary answer was contradicting his first response (i.e. a “Yes” was followed by a “No Sometimes” or “No Always”) and a low response student with a score of 3. A decision was made to omit these two cases from the sample size and items 4, 13 and 18 from the questionnaire.

Academic Self-Concept Scale

A new Rasch scaling was used to assess the revised questionnaire with a new sample size of 118 students. The Quest programme (Adams & Khoo, 1996) was used on the 118 students to obtain a variable map. Figure 1 shows this variable map which is the thresholds of the items of the overall academic self-concept scale. X's which are located on the left-hand side of the diagram represent 1 student. The range of item difficulties approximately matches the range of students' scores, implying that the test is appropriate for this group of students (i.e. students with learning disabilities with a CHC background). From Figure 2, items 17 and 3 are seen as the most difficult items in the questionnaire while items 20 and 8 are the easiest items. There are some students at the higher end of the scale who do not have any corresponding items, implying that they have a high level of academic self-concept. Likewise, two students at the lower end of the scale who do not have any corresponding items from the questionnaire have low level of academic self-concept.

Table 2 shows the INFIT statistics scores of items in the questionnaire before (INFIT 1) and after (INFIT 2) deletion of items. It was found that the revised questionnaire fitted the Rasch model with items falling within the expected values of 0.60 – 1.40 except for Item 20. Item 20 had an Infit of 1.61 that lies outside the acceptable range of 1.40. However item 20 was retained as it was within the acceptance range prior to the deletion of items 4, 13 and 18. The Infit for boys (n=86) is 1.34, is marginally smaller than 1.40 and value of this index for girls (n=32) is 1.71. Figure 2 provides a visual diagram showing item fits.

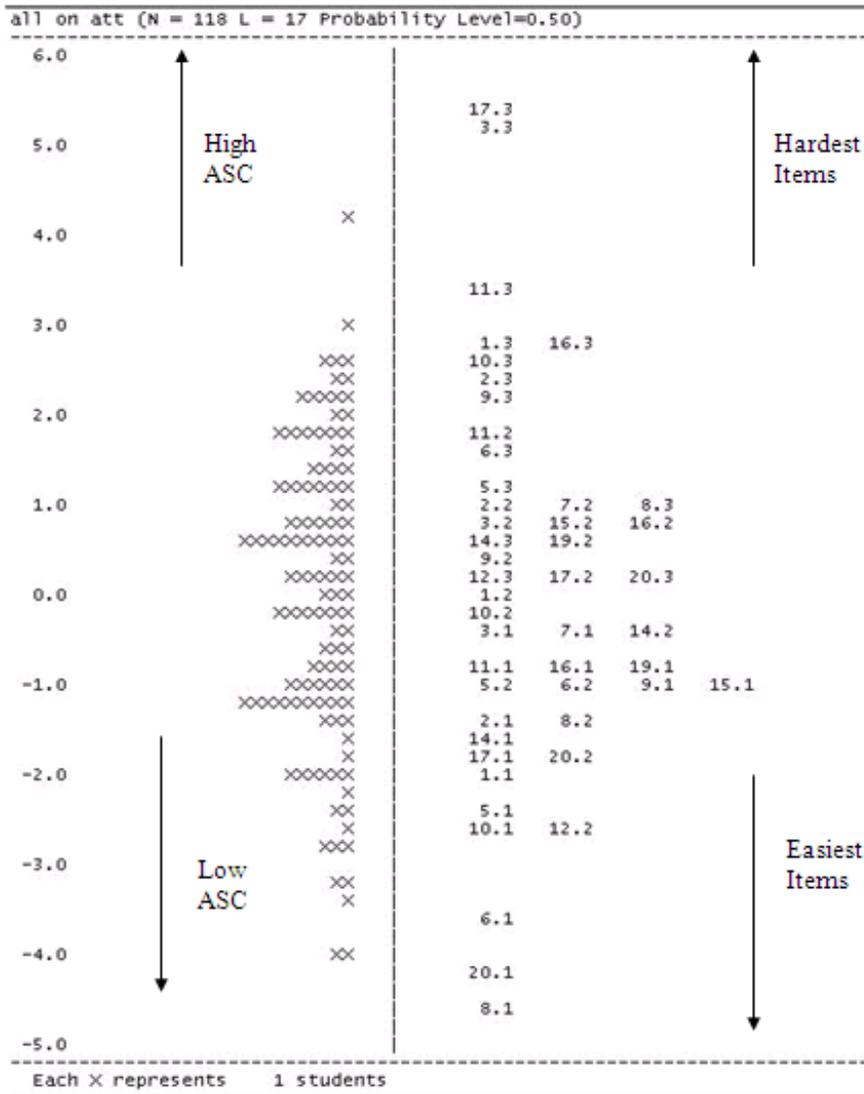


Figure 1: Item estimates (thresholds) of all items in Academic Self-Concept Scale

Table 2: INFIT Mean Square Statistics of items in the ASCQ

Item No.	INFIT 1	INFIT 2
1	0.97	1.12
2	0.82	0.96
3	0.87	1.00
4	2.41	-
5	0.64	0.73
6	1.01	1.24
7	0.84	0.96
8	0.94	1.17
9	0.71	0.80
10	0.74	0.84
11	1.00	1.19
12	0.93	1.11
13	1.48	-
14	0.78	0.93
15	0.72	0.82
16	0.76	0.81
17	0.64	0.74
18	1.52	-
19	0.92	1.02
20	1.27	1.61

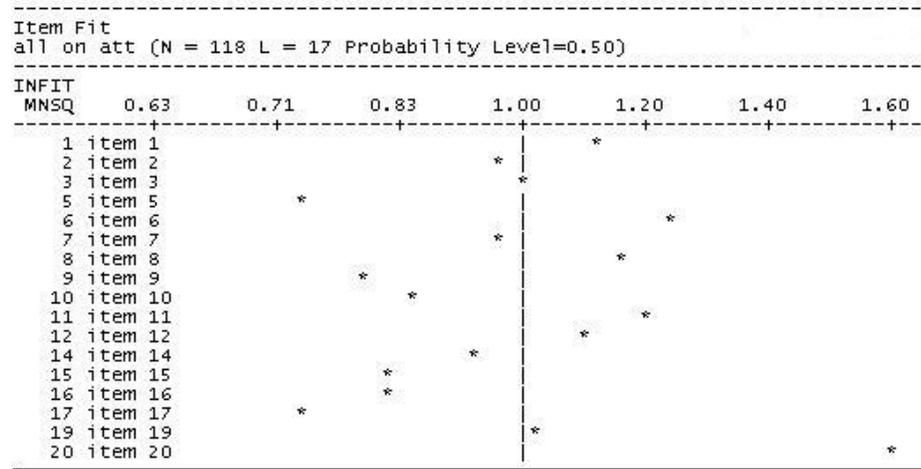


Figure 2: Item fit of all items in the Academic Self-Concept scale

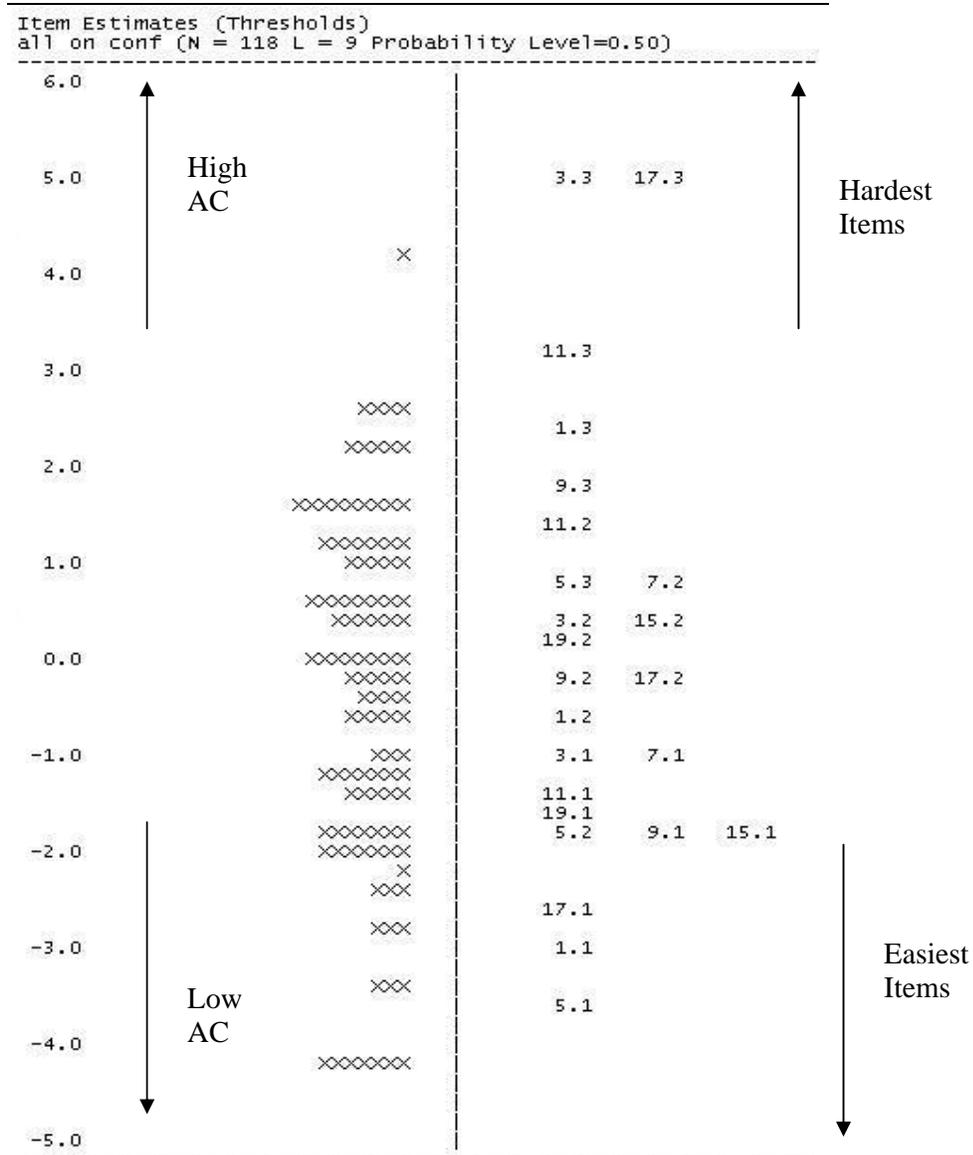


Figure 3: Item estimates (thresholds) of items in the academic confidence subscale

Table 3 shows the INFIT statistics scores of items in the questionnaire before and after deletion of items. Figure 4 show that the final items fit the unidimensionality of the academic confidence subscale. All the INFIT values of the items fall within the expected values of 0.60-1.40.

Table 3: INFIT Mean Square Statistics of items in the AC subscale

Item No.	INFIT 1	INFIT 2
1	1.12	1.27
3	1.01	1.03
5	0.79	0.94
7	0.76	0.81
9	0.75	0.83
11	1.27	1.32
13	1.91	-
15	0.71	0.85
17	0.80	0.90
19	0.89	0.97

Figure 3 shows the item thresholds of the academic confidence subscale. The items fitted the unidimensionality of the subscale. Students with lower scores on the variable are towards the bottom of the variable map and students with higher scores are towards the top. The range of item difficulties approximately matches the range of student scores, implying that the subscale is appropriate for this group of students (i.e. students with learning disabilities coming from a CHC background). The linear distribution of item difficulties shows that no students have an unfair advantage due to being presented with the items at their level. Questions 3 and 17 of the academic confidence subscale were the hardest items. A student at the top of the diagram shows a high level of academic confidence while at least seven students were shown to have an extremely low of academic confidence. However the exact level of their academic confidence could not be estimated accurately because of the paucity of items at the lower end of the scale.

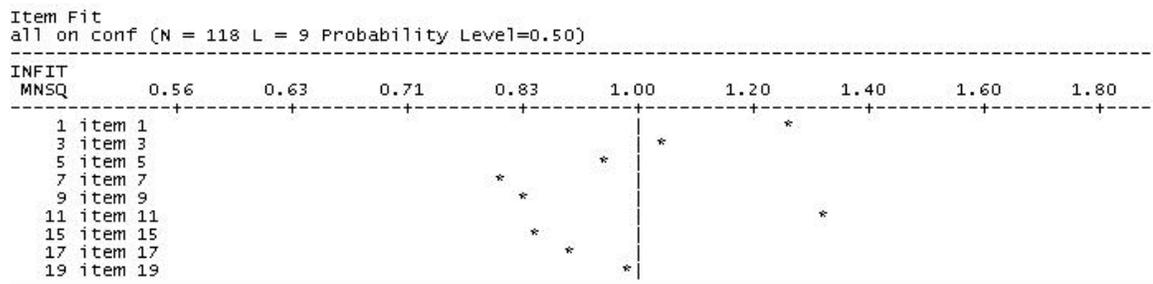


Figure 4: Item fit of the items in the academic confidence subscale

Academic Effort Subscale

For the academic effort subscale, the range of items show a linear distribution with respect to the students, implying that the academic effort subscale is appropriate for primary school students with learning disabilities from a CHC background. Items 10 and 16 are the most difficult items, while item 8 is viewed as the easiest item in the academic effort subscale. Two students show a high level of academic effort but the exact level of their academic effort could not be estimated accurately because of the paucity of items at the higher end of the scale (see Figure 5).

As shown in Figure 6, only item 20 had a poor Infit statistic of 1.60. Table 4 presents shows the INFIT statistics scores of items in the questionnaire before and after deletion of items. Majority of the items fit the unidimensionality of the subscale, with expected values falling in between the range of 0.60-1.40 range (Table 4).

Table 4: INFIT Mean Square Statistics of items in the AE subscale

Item No.	INFIT 1	INFIT 2
2	0.78	0.96
4	1.96	-
6	0.84	1.00
8	0.79	0.95
10	0.79	0.89
12	0.79	0.94
14	0.67	0.80
16	0.70	0.89
18	1.46	-
20	1.28	1.60

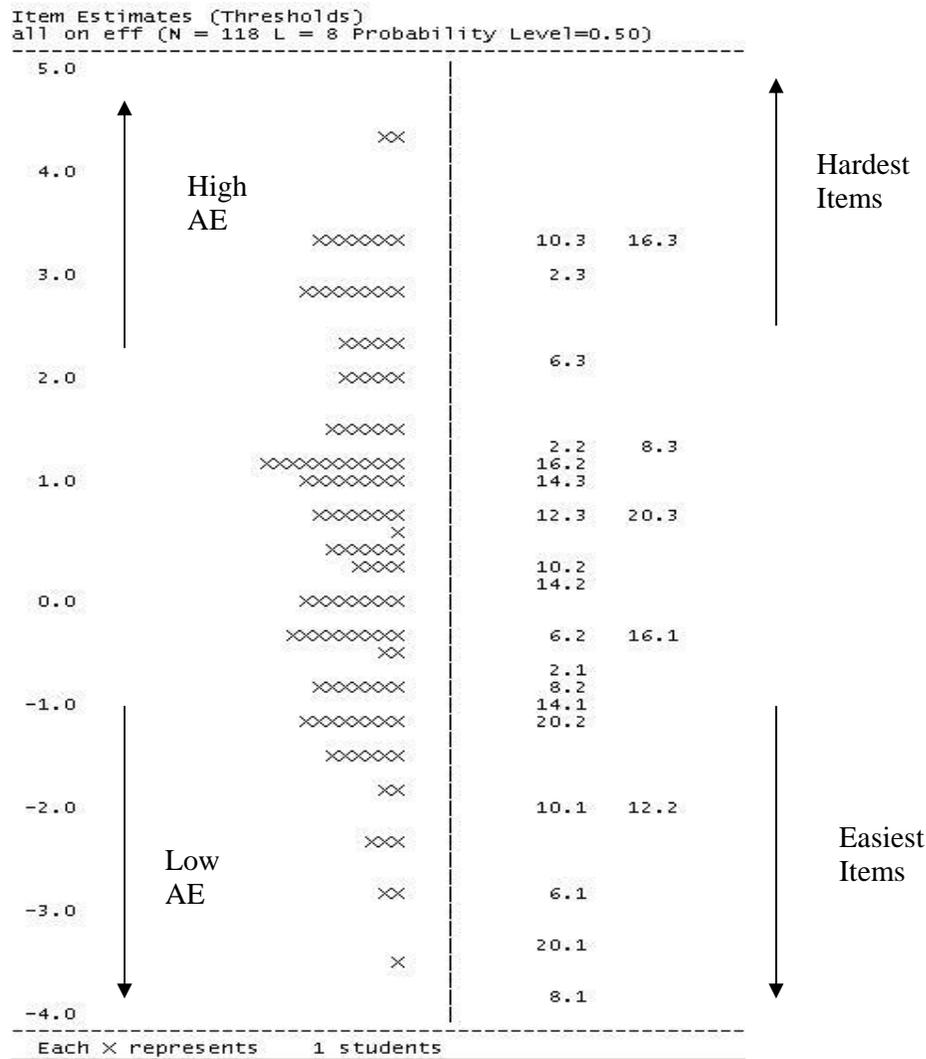


Figure 5: Item estimates (thresholds) of Academic Effort subscale items

Item Fit									
all on eff (N = 118 L = 8 Probability Level=0.50)									
INFINIT	0.56	0.63	0.71	0.83	1.00	1.20	1.40	1.60	1.80
MNSQ									
2 item 2					*				
6 item 6					*				
8 item 8					*				
10 item 10				*	*				
12 item 12				*	*				
14 item 14			*	*	*				
16 item 16				*	*				
20 item 20								*	

Figure 6: Item fit of Academic Effort subscale items

DISCUSSION

A Rasch analysis using case estimate scores based on the second binary answer of the ASCQ, the AE and the AC subscales had been conducted. The findings from this Rasch analysis confirm the study done by Liu & Wang (2005) that academic self-concept in a CHC perspective is formed by 2 factors – academic confidence and academic effort and further extends the findings to show that these 2 factors form separate scales which fit the Rasch model. The academic self-concept scale has also been found to be valid with students with learning disabilities.

Hypothesis 1 states that the items will fit the Rasch model, confirming the unidimensionality of the instrument. Rasch analysis of the ASCQ largely confirms the unidimensionality of the instrument. This means that the ASCQ shows considerable promise in determining the academic self-concept of students with learning disabilities of a CHC background. Hypothesis 2 states that academic self-concept is formed by academic confidence and academic effort. It was found that the items in the ASCQ appear to form a unidimensional scale of academic self-concept measured from a CHC perspective which itself is formed by two unidimensional subscales of academic confidence and academic effort which are the essential elements of the CHC view.

Three of the items (items 4, 13 and 18) had poor Infit statistics and were removed from the questionnaire (Table 1, Figures 1 & 2). There are a number of possible reasons for the poor fit of the items. The word “often” in Item 4 (“I often do my homework without thinking”) may have caused some confusion with the students’ ability to process the sentence. It may also be that students with learning disabilities are not able to do their homework without thinking. Item 13 (“I get frightened when I am asked a question by the teachers”) was previously found to have poor validity (Liu & Wang, 2005). Item 18 (“I do not give up easily when I am faced with a difficult question in my schoolwork.”) is the longest question in the questionnaire. This question has 18 words which is considerably more than the seven items proposed for human short term memory (Miller, 1965). Peterson and Peterson (1959) tested the duration of short term memory and found that at least 50 per cent of information was forgotten after a time of six seconds. A long question may be particularly difficult for students with learning disabilities as the cognitive load imposed on their short term memory may interfere with their capability to understand the question or process the information. With a learning disability, it is possible that the amount of information retained after the question has been read would be less than 50 per cent.

When these items were removed from the questionnaire, item 20 (“I am not willing to put in more effort in my schoolwork”) presented as a misfit problem in the questionnaire. For the information provided by the Rasch analysis for item 20, there would appear to be a small number of girls who responded inconsistently to this item. As a consequence, some doubt must be expressed about the strength of the item that is negatively worded at least with respect to female students with learning disabilities. Furthermore, this is the last item of the test and it only showed signs of lack of strength after three other items had been removed from the test. Item 20 that has been presented as a misfit problem after a further modification to the instrument could be considered for future removal from the ASCQ. A shortened version of the ASCQ can be considered after further modification.

Understanding the academic self-concept of students with learning disabilities in Singapore presents an interesting perspective because unlike the Western countries including Australia where academic self-concept is intensively researched (Marsh, 1990a, 1990b, 1990c, 1993 & 2005), little is known about the academic self-concept of students in Singapore and other Asian countries. Despite Singapore's acceptance of Western technologies and its cosmopolitan appearance, it is still at heart a traditional Chinese society in which Confucian Heritage Culture (CHC) values such as academic effort and academic confidence are predominant. Thus, it is often difficult to generalize the findings from Western studies in an Asian context because of the differences in culture. By using Rasch analysis to analyse a previously constructed Academic Self-Concept Questionnaire (ASCQ) based on CHC educational values and incorporating the values of academic effort and academic confidence, it was hoped to extend the predominantly Western based literature regarding academic self-concept to Singaporean students by examining the construct of a measure of academic self-concept that had been developed from a CHC viewpoint. Moreover, knowledge gained from this study will provide an insight to future policies that can be made to provide better support for students with learning disabilities studying in mainstream schools.

Rasch analysis of the ASCQ largely confirms the unidimensionality of the instrument. In addition, the original ASCQ developed by Liu & Wang (2005) has been improved through the removal of three items with poor fit statistics. However, the addition of further items toward the extremes of the scale hierarchy could be considered in future studies to ensure valid estimates of academic self-concept can be obtained for all students. Subject specific self-concept questionnaires in reference to a CHC perspective should also be developed.

Although present findings are interesting and have important implications, it has to be acknowledged that this study has some limitations. There is a need for further studies using more representative samples of various school zones in Singapore, as well as a comparative study between students with learning disabilities and students without learning disabilities. Future research could also include a larger sample size and within-class effects can be considered. It would also be interesting to find out if these effects could be applied on students without learning disabilities. A replication of this study can also be done in countries with a CHC tradition such as Hong Kong or China.

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APPENDIX A

Y – Yes; N – No; NA – No Always; NS – No sometimes; YS – Yes sometimes; YA – Yes always

No	Questions	1 st Response		2 nd response			
		Y	N	NA	NS	YS	YA
1	I can follow the lessons easily	Y	N	NA	NS	YS	YA
2	I day-dream a lot in class	Y	N	NA	NS	YS	YA
3	I am able to help my classmates in their schoolwork	Y	N	NA	NS	YS	YA
4	I often do my homework without thinking	Y	N	NA	NS	YS	YA
5	If I work hard, I think I can go to the Polytechnic or University	Y	N	NA	NS	YS	YA
6	I pay attention to the teachers during lessons	Y	N	NA	NS	YS	YA
7	Most of my classmates are smarter than I am	Y	N	NA	NS	YS	YA
8	I study hard for my tests	Y	N	NA	NS	YS	YA
9	My teachers feel that I am poor in my work	Y	N	NA	NS	YS	YA
10	I am usually interested in my schoolwork	Y	N	NA	NS	YS	YA
11	I often forget what I have learnt	Y	N	NA	NS	YS	YA
12	I am willing to do my best to pass all the subjects	Y	N	NA	NS	YS	YA
13	I get frightened when I am asked a question by the teachers	Y	N	NA	NS	YS	YA
14	I often feel like quitting school	Y	N	NA	NS	YS	YA
15	I am good in most of my school subjects	Y	N	NA	NS	YS	YA
16	I am always waiting for the lessons to end	Y	N	NA	NS	YS	YA
17	I always do poorly in tests	Y	N	NA	NS	YS	YA
18	I do not give up easily when I am faced with a difficult question in my schoolwork	Y	N	NA	NS	YS	YA
19	I am able to do better than my friends in most subjects	Y	N	NA	NS	YS	YA
20	I am not willing to put in more effort in my schoolwork	Y	N	NA	NS	YS	YA