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Person Misfit in Attitude Surveys: Influences, Impacts and Implications

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This study of person fit in attitude surveys was undertaken in order to investigate the influence of the inclusion of misfitting persons on item parameter estimates in analyses using the Partial Credit extension of the Rasch measurement model. It was hypothesised that the inclusion of misfitting persons in data sets used for the calibration of attitude survey instruments might compromise the measurement properties of those instruments. Using both actual and simulated data sets, the inclusion of misfitting cases was found to reduce item variance. Several characteristics of both item and person samples were found to influence the proportion of cases identified as misfitting. These characteristics must be considered before removing cases that, according to customary practice, appear to misfit. The residual based misfit indicators that are commonly reported in Rasch analyses, the weighted and unweighted mean squares, appear not to have the generality over all instruments nor the precision required to make clear decisions on the retention or elimination of cases from samples, and there is a need to seek better misfit indicators.

Person Misfit, Attitude Surveys, Rasch

INTRODUCTION

In analysing several attitude survey data sets, up to 25 per cent of cases have been identified as misfitting. In the case of one 40 item instrument that had been developed on a sound theoretical basis, classical item analysis suggested that the scale was coherent with a Cronbach alpha of 0.88, and Rasch analysis showed that all but three items fitted a coherent scale quite well. However, in a subsequent confirmatory factor analysis (CFA), many of the items were shown to have low factor loadings and relatively high error terms, and the fit indices for the hypothesised structure were disappointing (GFI=0.76). These findings led to the search for an explanation of the contradictory outcomes of the analyses. In the review of that instrument, a subset of items was selected, a number of misfitting cases were identified, and their removal resulted in acceptable GFI of 0.93. This observation raised questions about the influence of misfitting cases on the calibration of items and on the integrity of measures derived from the application of the instrument. It also led to a review of other scales that had been analysed previously using the Rasch model. The reviews of these instruments led to the questions: “What are the implications of this high incidence of questionable fit?”; “Does it compromise the inclusion (and exclusion) of items in the scale?”; and “What interpretations can be applied to persons who show either overfit or underfit?” The study has sought to address these and other related questions.

LITERATURE REVIEW

A review of the literature on fit indices revealed that there has been considerable emphasis on item fit, and even in introductory texts, the meanings attached to combinations of fit indices for items are explained well (Bond and Fox, 2001, pp.179-183). However, with the exception of

Wright and Masters (1982) and Wright (1995), the literature has been relatively silent on the implications of fit indices for persons. Wright quoted Rudner et al. (1995) who said:

> Nearly twenty years after Sato introduced his caution index, person fit statistics still seem to be in the realm of potential... The research has been largely unsystematic, the research has been largely atheoretical, the research has not been explored in applied settings. (p.23)

This criticism appears to be harsh, as a considerable body of work has emerged since the late 1980s. However, in most of the studies of fit indices, dichotomous test data have been the main concern. Attitude instruments warrant specific attention for several reasons. They are rarely high stakes activities for respondents and so respondent behaviour may be rather different from that observed in tests, and the number of response categories may interact with misfit indicators.

Two broad sets of issues are canvassed in this review. First, a range of issues identified as being of current interest in educational research and measurement are reviewed. Then literature on indices for the estimation of person fit is examined.

The Centrality of Measurement

Following concerns about the status of measurement in the social sciences, Stevens in 1946, proclaimed that measurement was the "assignment of numerals to objects or events according to a rule." Michell (1997) has shown that such assignment is a necessary but insufficient basis for true measurement as it does not require additivity. Such assignment may produce an ordered sequence, but not an interval one. Wright and Masters (1982, p.3) argued that measurement requires:

- the reduction of experiences to **one dimensional** abstraction;
- **more or less** comparisons among people and items;
- the idea of a **linear magnitude** inherent in positioning objects along a line; and
- a unit determined by a **process** which can be repeated without modification over the range of the variable.

Harwell and Gatti (2001) have argued that the application of item response theory (IRT) is essential to convert the ordered observations that arise from the application of survey instruments to true measures.

In the physical world, measures are objectively observable and conformity with measurement is also observable. For example, if a ruler can be placed adjacent to an object, its length can be measured using that ruler. In the social sciences, constructs of interest are often latent. Instruments, such as questionnaires, are said to make the construct 'observable', but fitness for measurement cannot be directly observed. In the social sciences, fit indices are used to demonstrate compatibility with measurement.

Current Issues in Measurement

Keeves and Masters (1999) identified a number of issues that may impact upon effective measurement using the Rasch model and that are in need of further research. They included dimensionality, significance tests, reliability, and threshold relationships. These issues bear on the study of fit indices, since variations in fit estimates may result from person misfit but also from other characteristics of the items used in the assessment of a trait.

Dimensionality

A vital characteristic of sets of items that purport to measure a construct is that the items are unidimensional. Under Rasch analysis, if all items cohere to form a single scale, unidimensionality may be asserted. However, Kline (1993) claimed that the Rasch model is insensitive to departures from unidimensionality. Often, constructs of interest in the social sciences are complex and are represented by a set of correlated factors. In these cases, it may be difficult to assert unidimensionality. Attitudes are often complex cognitive and conative constructs and theory about them often involves several components. This is certainly the case with the attitude survey instruments used in this study. Whether these constructs constitute several dimensions, or whether the factors operate in concert and comply with the assumption of unidimensionality, must be established. Bejar (1983, p.31) suggested:

> Unidimensionality does not imply the performance on items is due to a single psychological process. In fact, a variety of psychological processes are involved in responding to a set of items. However, as long as they function in unison – that is, performance on each item is affected by the same process in the same form – unidimensionality will hold.

Nonetheless, if a claim is advanced that attitudes are being measured, it is necessary to show that the responses to survey items do comply with the requirement of unidimensionality. Keeves and Masters (1999) proposed that CFA be used to verify item structure and suggested that, in structures with multiple factors, if more variance is explained by the single factor than by the other factors in a nested model, then an assumption of unidimensionality is warranted. They also suggested that both person and item fit should be checked to demonstrate unidimensionality.

Significance

Keeves and Masters (1999) indicated that traditional significance testing, which assumes simple random samples, is inadequate in social science research because simple random samples rarely exist. The problems that ensue when clustered samples are taken to be random, for example underestimation of variance and overestimation of significance, are well known (Kish, 1987). Clustering may apply to items and to the persons who respond to the instruments. While clustering of subjects is well known, the clustering of items is less frequently acknowledged. Keeves and Masters noted that the use of common item stems for multiple responses leads to item clustering and a breach of the assumption of item independence. However, Linacre (1995) has contended that a breach of local independence is less serious than other deviations from measurement model assumptions.

Whatever the cause of departure from ideal model behaviour, for valid measurement it is necessary to quantify this deviation. This is done with a range of fit statistics, and it has been common practice to accept items as fitting if their Infit and Outfit Mean Square values lie within a specified range (often 0.83 to 1.20). Fit statistics are transformed to produce a *t* statistic and the critical values are usually set at ±2. However, Karabatsos (2000) and Smith (1991) have shown that IMS and OMS deviate from normality. Karabatsos also argued that the value of the *t* statistic was sensitive to sample size and that reliance on the *t* statistic could lead to the false detection of misfit. Item fit is often judged on the basis of responses from very large numbers of cases, while person fit is based on a much more modest number of items. Both the magnitude of Infit and Outfit statistics (and other fit indices) and their corresponding *t* values warrant consideration as do the structure of the samples of items and persons that lead to the data sets that are analysed.

Reliability Indices

Keeves and Masters (1999) pointed out that the traditional scale reliability index (Cronbach alpha) is of limited value as an indicator of scale coherence as it is not generalisable. It is dependent upon both the sample of items and the sample of persons used in the calibration. Baker (2001, pp.52-56) provided a very good account of group invariance which leads to the generality of Rasch parameters. Two important instrument parameters are reported in Rasch analyses conducted using Quest (Adams and Khoo, 1999). The Person Estimate Reliability is an indication of the precision of the instrument and shows how well individuals can be distinguished by the instrument and which should be reported routinely in calibrating instruments. Andrich (1982) has shown that this index is virtually identical to the KR-20 or its generalisation, Cronbach alpha. The Item Estimate Reliability shows how well the items that form the scale are discriminated by the sample of respondents. Wright and Masters (1982, pp.90-92) argued that good item separation is a necessary condition for effective measurement.

Threshold Parameters

Attitude survey items usually present multiple response options and so for each item there are multiple item thresholds. Disordered threshold parameters are the subject of disagreement. Keeves and Masters (1999) cited Samejina (1997) who argued that thresholds need not be ordered. Adams and Khoo (1999) identified three types of threshold parameter and suggested that, in order to establish coherence in response patterns, only the Thurstone thresholds need be ordered. In some of the data sets that were analysed in this study, disordered Andrich and Masters thresholds (Taus and Deltas in Quest output) were associated with poor person fit. However, there have also been other complicating factors, such as skewed response patterns and low frequencies of some response options. Keeves and Masters suggested that if thresholds were disordered, it may be possible to redefine categories so that they become ordered. However, Andrich (1995) has advised strongly against this practice, arguing that it violates the assumptions of the Rasch measurement model. This matter is of some importance in attitude surveys, as most use multiple response categories and therefore each item has several threshold levels.

The Measurement of Attitude

In testing, it is common to identify a single construct of interest and to ensure that items are related to that attribute. Multidimensionality is a problem for test developers. For example, where mathematical test items are presented as word problems, the test takers' language comprehension as well as their mathematical skill are involved in the responses that are generated. However, attitudes are often complex cognitive and conative, as well as affective, constructs and theory about them often involves several components. This is certainly the case with the attitude survey instruments used in this study. Whether these constructs constitute several dimensions, or whether the factors operate in concert and comply with the assumption of unidimensionality, must be established.

Weiss and Yoes (1991, pp 72-74) identified four assumptions made of measures. They were:

- if a respondent holds a certain attitude, s/he will respond honestly to an item which taps that attitude;
- the choices that respondents make among response options indicate the strength of the underlying attitude trait that they hold;
- the responses that participants make to particular items are not influenced by the presence of other items in the instrument;
- the pattern of responses to items will conform to a probability function.

These assumptions present challenges to the developers and users of attitude survey instruments as there are many problems that are unique to attitude measurement. There are analogous problems in testing, and guessing, carelessness and prior knowledge of particular items are all acknowledged as threats to test data as a basis for valid achievement measurement (Bond and Fox, 2001, p.178). Anderson (1997, pp.891-3) identified a number of threats to valid attitude measurement, including social desirability, acquiescence, self awareness, irrationality, inadmissibility, self-incrimination and politeness. These influences may have several effects on attitude measures. First, most are likely to decrease overall variation in responses, although some may increase it. Second, they may lead to reduced precision in item and scale parameters. They may also influence the fit of persons to the instrument in that those who hold strong views on some aspects of a construct may provide responses biased by a factor such as social desirability. In addition, and in contrast to achievement tests, responding to attitude survey instruments is rarely a high stakes activity. For this reason, some participants may respond carelessly to an instrument and therefore compromise its calibration. The influences of response behaviours such as these on item and person parameters must be established so that where possible, cases that reveal these behaviours can be identified in data sets and appropriate actions taken by analysts.

Item and Person Fit

Two aspects of item and person fit appear in the literature. One is a technical issue of which fit parameters to use, the distributional properties of those indices, and their sensitivity to departures from expected response behaviours – that is, their ability to detect cases of misfit and to accept fitting cases. The second aspect of item and person fit entails the interpretation of fit indices and the actions that an analyst might take in dealing with cases of misfit.

Technical Aspects of Misfit Detection

The expected response pattern of persons to items is a Guttman pattern, but with added random variance. If a strictly Guttman pattern were to be observed for all respondents, the response model would be deterministic rather than stochastic. The Rasch measurement model is indeed a stochastic one. The ideal Guttman pattern is expected to be approximated but not followed precisely and a range of indices have been developed to quantify the deviation of responses from the Guttman pattern.

Bond and Fox (2001, p.170) reported that Rasch had proposed the use of a chi-square fit statistic to identify how well a data set conformed to the simple logistic measurement model. Once the item difficulty and person location have been estimated from the data set, the expected response for each person to each item can be calculated using an extension of the basic Rasch formula (Wright and Masters, 1982, p.42). The difference between the expected and observed responses is the response residual and is used to compute a chi-square statistic.

Two fit indices are common. The unweighted mean square index, commonly called the Outfit Mean Square (OMS), is the mean of the squared standardised residuals. To calculate the OMS for items, the squared residuals are summed over all persons, and for cases the squared residuals are summed over all items. The information weighted mean square, commonly called the Infit Mean Square (IMS), is the sum of standardised residuals weighted by the variance of the item-person response. For items close to the person location, the variance is at a maximum, while for items that are remote from the person location, the variance is low. Thus, the residuals for well targeted items and persons are weighted up, and for more remote items and persons, the residuals are weighted down. The IMS is therefore less sensitive to unexpected responses for extreme observations and more sensitive to deviations from expectation for well targeted items and persons. These indices are described fully in Wright and Masters (1982, pp.94-105).

Li and Olejnik (1997) compared the performances of five misfit indicators, examining their ability to detect underfit and overfit in unidimensional and two dimensional data sets, and they investigated the influence of test length on misfit detection. They found no correlation between trait estimate and misfit with any of the indicators, which suggests that the concerns expressed by Keeves and Masters (1999) about misfit and trait range (see below) are not a matter of great concern. They also found that the misfit indicators investigated performed equally well under most conditions, although one, L_z was better in detecting underfit in scales that revealed multidimensionality. Li and Olejnik reported that all indicators investigated deviated substantially from a normal distribution. This raises a question about the transformation that is used as a basis for computing *t* statistics for the indicators.

Karabatsos (2000) has been less supportive of the range of misfit indicators that have been used in Rasch analyses. He expressed dissatisfaction with the use of residual based misfit indicators, arguing that misfit indicators based on residuals have unsatisfactory distributional properties. The distributional problem arises from the fact that the residual is the difference between an integer observed score and a non-integer expected score. Karabatsos showed that score residuals are non-linear functions of $(\beta-\delta)$ (cf. Li and Olejnik, (1997) above) and therefore that residual-based fit indices may not indicate the same degree of misfit for different regions of the $(\beta-\delta)$ range. He also argued that the person-item response is used to estimate both β and δ, and as these are used to compute expected values and therefore residuals, it may understate misfit. Karabatsos also showed that the distributions of residuals, IMS and OMS vary with sample size, test length, the person ability distribution, and the item difficulty distribution. With such variations between instruments, and even between applications of the same instrument, different critical values of misfit indicators would be required in order to identify cases of misfit. Further, there are no *a priori* guidelines on what these critical values might be.

Karabatsos also argued that the use of *t* statistics for IMS and OMS is illogical. He cited work by Smith (1991) who showed that the distributions of IMS, OMS, and the corresponding *t* distributions are sensitive to sample size, test length, and person ability and item difficulty distributions. Karabatsos (2000, pp.167-169) went on to show that *t*(IMS) was sensitive to sample size. However, he did this by repeatedly duplicating a data set and producing a set of *t* statistics for each item and each N and showed that the *t* values rapidly diverged. In the original data set, all items had a *t*(IMS) $<|2|$, but with N>8,000 no items were within this range. Unfortunately, the method that Karabatsos used is flawed, because it does not simulate large samples of independent observations drawn from a population. The technique of repeating observations results in no change in the deviation from the mean but with an increase in N leads to reduced error variance and therefore artificially inflated *t* values. A better alternative would have been to identify the ability and difficulty distributions and to simulate data sets of increasing size based on those distributions, and then to look at the *t* distributions. Nonetheless, there is a problem of *t* statistics being sensitive to sample size and test length, and possibly other variables, and this makes the use of the *t* statistic in setting acceptance criteria for items or persons questionable.

Reise (2000) has proposed the use of a multilevel modelling approach in which item responses are thought of as being nested within persons. In this approach, the slope of the person response function is used to indicate response consistency. The person response function slope can also be used as a criterion variable to investigate the effects of between person variables and therefore to investigate the causes of person misfit.

Many others have contributed to the literature on person misfit (Bell, 1982; Linacre, 1998; Meijer, 1996, 1997; Meijer, Muijtjens, and van der Vleuten, 1996; Smith, 1991; Wright, 1995). In particular, Meijer and his colleagues have investigated alternative misfit indicators and the distributional properties of a range of fit statistics. Rudner, Bracey and Skaggs (1996) used person fit indices in an investigation of an achievement test (the National Assessment of Educational

Progress), and found that using person fit indices to identify and remove improbable responses did little to improve an already sound instrument. However, as Karabatsos (2000, p.170) pointed out, most of the work that has been done on person misfit has been directed at the dichotomous responses of achievement tests rather than the more complex situation of attitude survey instruments.

This study was not designed to be a technical evaluation of misfit indicators. Nor was it designed to find alternative indicators of misfit. Rather, it was designed to use readily available fit statistics and to examine some problems that had arisen in practice in the analyses of attitude survey instruments, to explore options for analysts in detecting person misfit when it occurs, and to suggest strategies for managing the analysis of data sets in which person misfit is apparent. However, understanding the technical limitations of misfit indicators is essential in interpreting their operation in practice.

Practical Aspects of Misfit

Keeves and Masters (1999) argued that current practices for the detection of misfit are rather *ad hoc*, and that better procedures are required. They suggested that many misfitting persons are those at the extremities of the trait distributions, and that where $|\beta-\delta|>2$, and they misfit, these cases should be removed from analyses. They also suggested that in analyses, these extreme cases should be weighted down, and those closer to $(\beta-\delta)=0$ should be weighted up to improve estimates. The IMS does place greater weight on the more informative person item interactions that are closer to $(\beta-\delta)=0$.

The issue of person location and fit on a trait measure is an interesting one. If it is argued that an instrument will only have sufficient precision over a limited range ($|\beta-\delta|<2$), then either a range of instrument forms will be required to tap the full extent of the trait range in a population or a form of adaptive measurement, with the attendant concerns of item independence, will have to be pursued. With the common use of polytomous responses in attitude survey instruments, the $|\beta-\delta|<2$ range restriction can be extended to $|\beta-(\delta+\tau)|<2$ since the thresholds show considerably greater spread than the item locations. The influence of person location on fit parameter estimates warrants attention, and at the instrument level, the influence of targeting (or mistargeting) also warrants investigation.

Bond and Fox (2001, pp177-183) suggested ranges of acceptable fit statistics for various test and survey instruments and provide some discussion of the meanings that might be attached to misfit. However, given the concerns raised by Karabatsos (2000) about the distributional properties of residual based fit statistics and about factors that influence them, there is a need to explore their distributions and the sample and item characteristics that might shape them in order to develop advice that is both soundly based and that is useful to practitioners.

METHOD

Two main approaches are followed in this analysis of misfit indicators and of the factors associated with cases being identified as misfitting. First, two data sets that had previously been analysed by the author are reanalysed in order to reveal the numbers of cases that are identified as misfitting. In the discussion below, they are referred to as real data sets. Second, two series of simulation exercises are employed to generate data sets with controlled characteristics.

Analysis of Real Data Sets

The two real data sets selected for the study were the Course Experience Questionnaire (CEQ) that had been administered in 1996 (Johnson, 1997) and the Multidimensional School Anger Inventory (MSAI) (Smith, Furlong, Bates, and Laughlin, 1998) that had been administered in

secondary schools in Adelaide in 2000.[1] Summaries of these data sets are shown in Table 1. A third data set had been selected for the study, but in analyses many items were found to be skewed, some item response categories had quite low frequencies, and many showed threshold reversals. When misfitting cases were removed, item estimates became unstable, and this made the data unsuitable for close simulation (described below). For this reason, no results are reported for it.

Table 1: Summary of real data sets

	CEQ	MSAI36
No. of respondents (N)	51,631	1,400
Number of Items (L)	17	36
Response Categories	5	4
Item Std Dev	0.41	0.76
Person Mean	0.58	-0.25
Person Std Dev	0.94	0.43

The data sets were refined under the partial credit variant (Wright and Masters, 1982) of the Rasch logistic measurement model using Quest (Adams and Khoo, 1999). For the CEQ, eight items were found to misfit and were removed, one at a time, leaving a final set of 17 fitting items. For the MSAI, no items were removed.

In the Rasch analysis, person estimates were generated and exported to an Excel file in which cases were sorted by their misfit parameters. In this way, the numbers of overfitting, fitting, and underfitting cases could be counted easily.

Using the complete data sets, that is without removing cases identified as misfitting, confirmatory factor analyses (CFAs) were undertaken. Subsequently, cases that were identified as misfits were removed and the CFAs repeated in order to provide an indication of data fit to the hypothesised structure with and without the misfitting cases, independent of the Rasch method used to identify case misfits.

Further Rasch analyses were undertaken following the removal of underfitting, overfitting, and finally all misfitting cases. In these analyses, item parameters were tabulated in order to examine the influences on item parameter estimates of the removal of the different types of misfitting cases.

Generation and Analysis of Simulated Data Sets

Two forms of data simulation were used, namely close simulation of real data sets and constrained simulation in which sample and item parameters were controlled.

Close Simulation

In close simulation, the real data sets were analysed and the item parameter estimates (locations and category thresholds) and person estimates were used to generate data sets that were close analogues of the real data. Using the trait level for each person in the original data set, a set of responses to items with parameters identical to those in the real data set were generated using the ConQuest generate command (Wu, Adams, and Wilson, 1998). The data set produced in this way is an analogue of the original real set and conforms to the Rasch model with what may be referred to as an 'expected' amount of noise. The misfit parameters of the closely simulated sample should follow a null distribution, given the item and person sample characteristics, and therefore model

[1] These data were collected by Boman (2002) as a component of his PhD research. Permission to use this data set is gratefully acknowledged.

the proportions of cases that can be expected, under the Rasch model, to overfit, fit and underfit. Such closely simulated data sets provide a useful reference standard for the real data sets with their mixture of fitting cases and those cases that reflect aberrant responses.

Following Rasch analysis, the closely simulated data sets were contaminated with deliberately overfitting and underfitting (extreme) cases and the contaminated data sets were reanalysed. The overfitting cases were generated in Excel using the extended (polytomous) Rasch formula to calculate a set of Guttman patterned responses for a range of abilities from -3.0 to +3.0 logits. (Beyond this range, scores are zero or perfect, carry no information, and parameters cannot be estimated). The overfitting cases follow a deterministic pattern and show minimum noise and maximum signal. The underfitting cases were also produced using Excel and were randomly generated responses to each item. The random responses were noise only and had no signal content, except by chance. The IMS and OMS distributions of the extreme overfitting and underfitting cases were examined. This was done in order to locate optimum critical values for the IMS and OMS statistics to retain as much of the distribution of fitting cases, but to exclude as many misfitting cases as possible.

Constrained Simulation

The real data sets varied in sample size, instrument length, the number of response options, item variance, person variance and the targeting of the instruments. In order to explore the influences of these variables on both scale measurement properties and the proportion of cases identified as misfitting, two constrained simulation series were conducted. In the first, item and person variance and instrument targeting were controlled. Five levels of item variance, from 0.04 to 1.00, were chosen and seven levels of person variance, from 0.04 to 1.96, were chosen. This resulted in 35 combinations of item and person variance. In addition, three levels of instrument targeting were tested by using mean person locations of 0.25, 0.50 and 1.00. In all, there were 105 combinations of the three variables. One data set was generated for each condition. For each data set, the number of cases was set to 500 and the number of items to 20, with five response categories for each item.

In the second constrained simulation series, sample size, instrument length and the number of response options were varied. Samples of size 20, 50, 100, 200, 500, 1000 and 10,000 and with 10, 20, 30, 50 and 70 items were simulated. For each combination of sample size and instrument length, items with three, six, and nine response options were simulated. In all data sets item and sample variance were set at 0.36 and 0.64 and the person mean was set to 0.00. Again, 105 data sets, one for each combination of sample size, instrument length and number of response categories, were generated.

All simulated data files were produced using the ConQuest generate command (Wu et al., 1998).

RESULTS AND DISCUSSION

Because of the large number of data files that were analysed and the many different analyses that were conducted, the detailed results of this study are quite extensive. Only very brief summaries of these results are reproduced in this paper. The simulated data sets, command files and detailed output files are available from the author.

Analyses of Real Data Sets

The Effects on Item Parameter Estimates of Removing Misfitting Cases

Following refinement of the instruments, case parameters including fit statistics, were generated. The proportions of cases that were found to misfit are shown in Table 2. Using criteria modified

after Bond and Fox (2001, p.179), cases were identified as underfitting if the IMS was greater than 1.5 and as overfitting if IMS was less than 0.60. Despite differences in some characteristics of the two instruments, similar proportions of cases were identified as underfitting and overfitting.

Table 2: Summary of cases identified as misfits in real data sets

Data set	Total cases	Underfitting cases	Overfitting cases	Misfitting cases	Fitting cases
CEQ	51,631	5,449	7,093	12,542	39,089
		10.55%	13.74%	24.29%	75.71%
MSAI	1,400	164	181	345	1055
		11.71%	12.93%	24.64%	75.36%

After removing underfitting cases only, overfitting cases only, and then all misfitting cases, item parameters were estimated. Both the dispersion of item locations, that is between item dispersion, and item threshold ranges, within item dispersion, increased following the removal of underfitting cases and decreased following the removal of overfitting cases. The removal of underfits has a stronger influence on parameter estimates, and this is shown when all misfits are removed, as within and between item parameter dispersion increased. These trends are illustrated in Table 3 for item locations and in Table 4 for within item threshold ranges.

Table 3: Summary of the influence of case removal on item locations for real data sets

Data Set	Location	All cases retained	Underfitting cases removed	Overfitting cases removed	Misfitting cases removed
CEQ	Minimum	-0.53	-0.66	-0.50	-0.63
	Maximum	0.64	0.77	0.60	0.70
	Range	1.17	1.43	1.10	1.33
MSAI	Minimum	-1.30	-1.53	-1.23	-1.46
	Maximum	1.13	1.18	1.08	1.12
	Range	2.43	2.71	2.31	2.58

Table 4: Mean Thurstone threshold range under various case deletion conditions for real data sets

Data Set	Threshold Range	All cases	Underfitting cases removed	Overfitting cases removed	Misfitting cases removed
CEQ	$\tau 4$-$\tau 1$	4.05	4.87	3.70	4.46
MSAI	$\tau 3$-$\tau 1$	2.09	2.47	1.92	2.28

The greater dispersion of thresholds within items can be explained with reference to a plot of category probability curves. A sample set of curves is depicted in Figure 1 (produced using RUMM (Sheridan, Andrich, and Luo, 1997) for an item from the MSAI data set). The responses of persons who underfit reveal a higher than expected amount of noise. When they have low trait levels, their expected response would be category '0', but any noise must involve choosing a category greater than this. Thus, the inclusion of underfitting cases must move the threshold up the scale, and the removal of these cases must move it down the scale. The converse holds for misfitting persons with high trait estimates. Thus, the removal of misfitting cases must lead to greater differences between the extreme category thresholds. To a lesser extent this also holds for most intermediate thresholds. For the item shown in Figure 1, which has two intermediate categories, for trait levels where a '1' is the expected response, a noisy response may involve selecting a lower or higher category. But since there are two higher categories and only one lower option, it is likely that the threshold for the expected category will be moved up the scale by the inclusion of misfits and down the scale by their removal. However, such threshold movement should be less than in the case of the extreme categories.

A similar explanation can be invoked for the movements in item locations. When persons respond to items with low locations, most respondents can be expected to select the higher category

options. However, underfitting persons show a greater tendency to select other response categories and as a result the inclusion of their responses leads to a higher estimate of the item location. Their removal leaves the location estimate at a lower position on the scale. The converse argument explains the higher location estimate of the more difficult to endorse items that are located at the positive end of the scale.

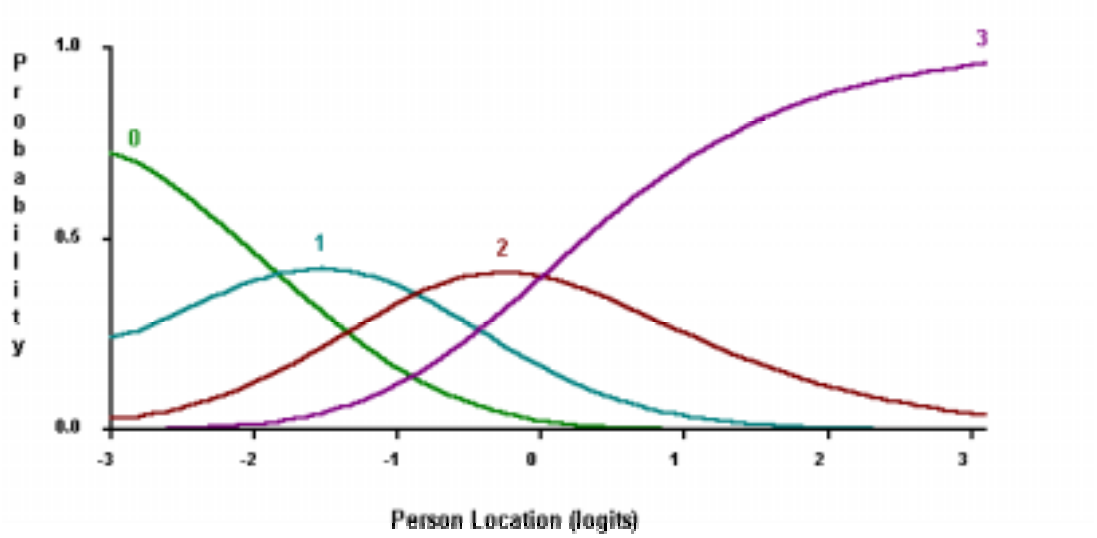

Figure 1: Category probability curves for a four-response polytomous item

Overfitting cases show less than the expected noise. When they are removed, item parameters are estimated using data from the remaining cases which include those that show both an expected amount of variation and those that show greater than expected variation. For the lowest response categories, noise must move the estimated parameters up the scale, and for highest response categories it must shift the estimates down the scale. Thus the removal of overfitting cases results in a compression of item parameter estimates.

The Influence of Misfit on Scale Properties

Wright and Masters (1982, pp.90-91) argued that effective measurement depends upon separation of items along a scale. This evokes the Guttman requirement of having items placed uniformly along a scale and for items to discriminate consistently among respondents. The effect of increasing the dispersion of parameters both within and between items suggests that the removal of misfitting, and especially underfitting, cases should enhance the effectiveness of the scale for measurement. In order to test this, summary scale parameters for data subsets under various deletion conditions were generated and are shown in Table 5.

The item standard deviations show effects consistent with the greater dispersion of between and within item parameters noted above. Item standard deviations increased following the removal of underfitting cases, and decreased after the removal of overfitting cases. In accordance with these changes, person estimate standard deviations increased as item dispersion increased. The item estimate reliability for the CEQ data set was at a maximum value of 1.00. This statistic appears to be influenced by sample size and, with a sample size over 50,000 cases, there is little scope for change. The removal of under- and overfitting cases has little influence on it. Similarly, the case estimate reliability is little changed by the removal of misfitting cases.

Confirmatory Factor Analyses of Real Data Sets

The variances of items and cases carry the statistical information of a data set. In deciding to remove cases identified as misfits, the assumption is made that the level of under- or overfit

apparent in the case, that is the deviation from expectation, makes the case either an outlier or suggests that it does not belong to the population of observations that are consistent with the Rasch measurement model. Setting very rigorous acceptance criteria, such as 0.91<IMS<1.10, is likely to result in the removal of observations whose variances contribute information to the model. Setting very lenient criteria, such as 0.10<IMS<5.00, would lead to the inclusion of random observations with little or no information content. The issue is to decide where to set acceptance criteria. In order to know whether the acceptance criteria used in the analyses of the real data sets were useful, confirmatory factor analyses (CFAs) were carried out on the complete data sets and again on the data sets from which cases, identified in the Rasch analysis as misfitting, had been removed. If the CFA model fit statistics show an improvement it can be assumed that the removal of cases identified as misfitting has resulted in the removal of noise from the data. If the CFA fit indicators are worse, it suggests that cases carrying useful information have been removed.

Table 5: Summary of scale parameters for real data sets under different case deletion conditions

Data Set	Cases	Mean item location (sd)	Item reliability	Mean person estimate (sd)	Case reliability
CEQ	All cases retained	0.00 (0.35)	1.00	0.49 (0.87)	0.88
	Underfits removed	0.00 (0.43)	1.00	0.59 (0.99)	0.89
	Overfits removed	0.00 (0.33)	0.99	0.48 (0.83)	0.87
	All misfits removed	0.00 (0.41)	1.00	0.58 (0.94)	0.89
MSAI	All cases retained	0.01 (0.67)	0.97	-0.21 (0.42)	0.76
	Underfits removed	0.01 (0.87)	0.97	-0.27 (0.45)	0.77
	Overfits removed	0.01 (0.63)	0.97	-0.20 (0.40)	0.76
	All misfits removed	0.00 (0.76)	0.96	-0.25 (0.43)	0.76

A summary of the results of the CFAs is shown in Table 6. The results are mixed. For the CEQ data set, improvements in all fit indices follow the removal of cases identified as misfitting (reduced data sets). However, for the MSAI data set, the reverse is true. The same critical values of IMS were used for both data sets, but for the MSAI set, the CFA suggests that information has been lost while for the CEQ set, it suggests that random variation has been reduced. These results suggest that it may not be sensible to use the same criteria to decide case fit for data sets of difference characteristics.

Table 6: Summary of comparisons of CFA analyses of complete and reduced data sets

Data set	Cases	GFI	PGFI	RMSEA	RMR
CEQ	Complete	0.982	0.629	0.041	0.028
(I factor)	Reduced	0.983	0.630	0.039	0.025
MSAI	Complete	0.937	0.777	0.037	0.032
(4 factor nested)	Reduced	0.931	0.771	0.038	0.032

GFI = Goodness of Fit Index; PGFI = Parsimonious Goodness of Fit Index;
RMSEA = Root Mean Square Error of Approximation; RMR = Root Mean Square Residual

Finding Critical Misfit Values

In order to decide on critical values to separate fitting cases from those that substantially fail to fit the measurement model, it is necessary to explore the distributions of IMS and OMS misfit indicators. The two real data sets were analysed and the case parameters exported to an Excel file

for closer examination. Item parameters were also exported to a file for later use as anchor values. The item parameters and case estimates were used to generate a closely analogous data set that fitted the Rasch model. In addition, two sets of contaminating values were then generated for each real data file. One set conformed to a strict Guttman pattern and the other set were random responses. The former should reveal the IMS and OMS distributions expected of strictly overfitting data and the latter should have distributions representing severely underfitting cases.

The closely simulated data set provides a null distribution of fit indicators, given the characteristics of the instrument and the ability distribution of the respondents, as the data set includes Rasch modelled responses with expected deviations from the ideal deterministic Guttman pattern. The two constructed data sets, the Guttman and random response patterns, provide distributions of fit indicators for worst-case overfitting and underfitting responses respectively. The real data sets include a mixture of fitting and misfitting responses. Critical values of IMS and OMS ascertained in the analysis of the closely simulated and constructed response data sets can then be applied to the real data set in order to find the optimal IMS and OMS values that retain the highest proportion of fitting cases, and therefore retain the maximum amount of statistical information, and exclude the greatest proportions of overfitting and underfitting responses.

The data sets with the contaminated cases were analysed using anchored item parameters derived from the original Rasch analyses. Summary statistics for the distributions of IMS and OMS misfit indicators are shown in Table 7.

Table 7: Summary statistics of distributions of IMS and OMS misfit indicators for real data sets and 'constructed' responses

Data set	Cases	IMS		OMS	
		Mean	Sd	Mean	sd
CEQ	Real	1.02	0.63	1.03	0.65
	Close Sim	1.00	0.33	1.00	0.33
	Guttman	0.23	0.21	0.21	0.15
	Random	2.63	0.64	2.66	0.66
MSAI	Real	1.04	0.47	1.04	0.49
	Close Sim	1.00	0.22	1.00	0.25
	Guttman	0.30	0.20	0.24	0.09
	Random	2.07	0.39	2.32	0.47

Critical Misfit Values for the CEQ Data Set

If the distributions of the misfit statistics were normal, it would be possible to use the means and standard deviations to identify positions on the scale at which optimum separations between overfitting and fitting cases at one end and between fitting and underfitting cases at the other. However, the distributions are not normal. Figure 2 shows the observed IMS distribution for the CEQ data set. It can be assumed that this distribution includes overfitting, fitting and underfitting cases.

In a related study (Curtis, 2003) it has been shown that the distribution of IMS depends upon factors such as item and person variance and the number of response options. Thus, a 'standard' null distribution for IMS under all circumstances cannot be assumed. The distribution of simulated fitting cases (see 'Fits' in Figure 3) may be taken as a null distribution of the statistic. This particular null distribution has been modelled using the person and item parameters estimated in the analysis of the data set and is therefore the best estimate of the null distribution for the conditions under which these data were collected. For this distribution, the points at which 2, 5, and 10 per cent of cases are cut at each end of the distribution are shown in Table 8. The IMS values at any of these cut points could be used to set critical values for accepting responses as fitting. However, it would be much more satisfactory to look also at the characteristics of misfitting cases before deciding on critical values for fit statistics.

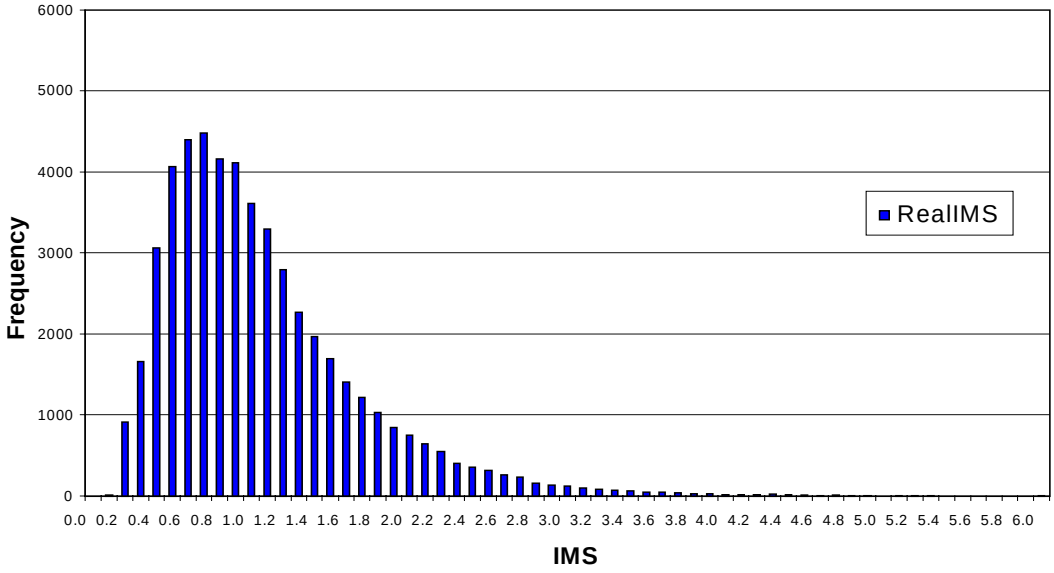

Figure 2: The observed IMS distribution for the CEQ data set

Table 8: Cut points for the IMS null distribution for CEQ data

Distribution	CEQ		MSAI	
tails	Overfits	Underfits	Overfits	Underfits
2%	0.46	1.76	0.56	1.48
5%	0.52	1.58	0.64	1.38
10%	0.59	1.42	0.72	1.28

Figure 3 shows the modelled IMS distributions for simulated overfitting, fitting and underfitting cases for the CEQ data set. In a modelling exercise conducted using Excel, a mix of 7 per cent overfitting, 76 per cent fitting, and 17 per cent underfitting cases most closely approximated the IMS distribution of the real data set. Those proportions of the three categories of cases are reflected in Figure 3.

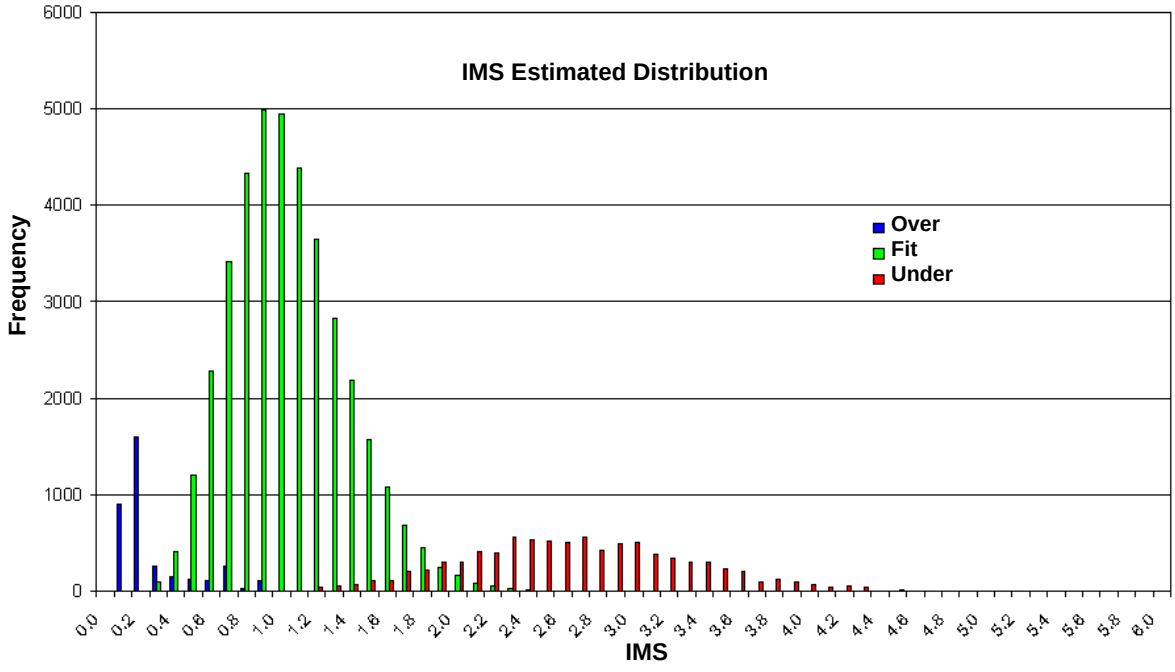

Figure 3: Modelled IMS distributions for overfitting (Guttman), fitting and underfitting (random) responses for simulated CEQ data

The distribution of overfitting cases is bimodal. Inspection of these constructed cases revealed that, while most Guttman responses have IMS values below 0.5, those cases with scores close to zero and perfect have IMS values of between 0.6 and 0.8 and therefore in a range that is generally acceptable. However, most of these cases have OMS values below 0.5. Thus, seriously overfitting cases can be discriminated from closely simulated fitting cases by using both IMS and OMS values. Values of 0.5 for both misfit indicators would remove all but approximately five per cent of Guttman modelled responses, and since overfitting cases make up a modest percentage (seven per cent) in the two data sets investigated in this study, setting critical IMS and OMS values at 0.5 would result in the inclusion of approximately 0.04 per cent of all cases being overfits. This critical value (0.5) would exclude approximately four per cent of modelled fitting CEQ cases and approximately one per cent of fitting MSAI cases. It is worth noting that the use of the two misfit indicators, IMS and OMS, together optimises discrimination between fitting and overfitting cases.

In order to discriminate fitting and underfitting cases, Bond and Fox (2001, p.179) recommended a critical IMS value of 1.4. However, the IMS distribution has been shown to be influenced by several instrument and sample variables, and it may not be useful to propose a single critical value of this misfit indicator. With the CEQ data set, the observed IMS distribution can be modelled best using a combination of 7, 76, and 17 per cent of Guttman, fitting, and random cases. In Figure 3, the distributions of fitting and random cases cross at an IMS value of about 2.0. This may be one convenient point at which separate the two distributions. However, the null IMS distribution for the CEQ data set characteristics revealed that rather lower values of IMS would exclude relatively small proportions of fitting cases, and that a critical IMS value of 1.76 (see Table 8) would exclude only two per cent of fitting cases. Inspection of the distribution of random data revealed that setting this critical value would admit 9.7 per cent of randomly generated cases. But underfitting cases are thought to account for 17 per cent of the observed IMS distribution for the CEQ data, and so this criterion level would lead to a contamination rate of 1.6 per cent. The contamination rates (percentages of random cases that would be admitted) for critical IMS values of 1.58 and 1.42 would be 0.8 per cent and 0.4 per cent respectively.

In seeking to optimise the discrimination of overfitting from fitting cases, it was possible to use both IMS and OMS misfit indicators. However, this is not a useful strategy for underfitting cases as the OMS distributions for fitting and underfitting cases both have greater variance than do the IMS distributions and there is a high correlation between IMS and OMS values above 1.5. Thus, although a clean separation of fitting and underfitting cases is not possible, the use of critical IMS values in the range 1.4 to 1.8 do provide a range of acceptable discriminations. Precisely where to locate the critical value depends upon the proportion of fitting cases that can be eliminated and the proportion of random cases that are accepted. The exclusion of fitting cases represents a potential loss of information, while the inclusion of random cases represents an acceptance of 'noise' that must inflate the standard errors of parameter estimates.

Critical Misfit Values for the MSAI Data Set

The IMS distribution for the MSAI data set is shown in Figure 4. This data set shows less variation than is the case for the CEQ data set (sd=0.47, cf 0.63 for the CEQ data). It is assumed that the observed MSAI data set includes some underfitting and some overfitting cases.

Figure 5 shows the modelled IMS distributions for simulated overfitting, fitting and underfitting cases for the MSAI data set. In a modelling exercise conducted using Excel, a mix of 7 per cent overfitting, 70 per cent fitting, and 23 per cent underfitting cases most closely approximated the IMS distribution of the real MSAI data set. Those proportions of the three categories of cases are reflected in Figure 5.

As was observed for the CEQ data set, the distribution of overfitting cases is bimodal. And, also similarly, most of these generated overfitting cases that have acceptable IMS values, have OMS values below 0.5. Thus, using a combination of critical IMS and OMS indices set at 0.5, it is possible to detect all but approximately 0.15 per cent of these serious cases of overfit. Since overfitting cases make up a only seven per cent of the modelled data, setting critical IMS and OMS values at 0.5 would lead to the inclusion of fewer than one overfitting case in 1,000 and would exclude approximately four in 1,000 modelled fitting cases.

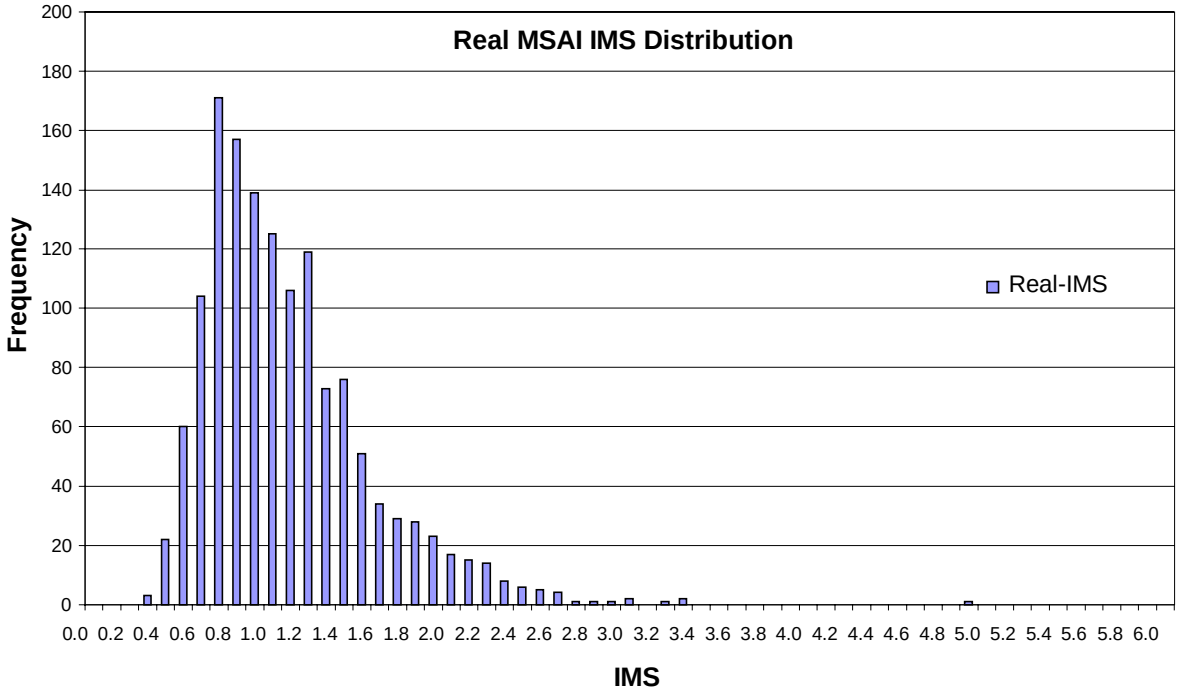

Figure 4: Observed IMS distribution for the MSAI data set

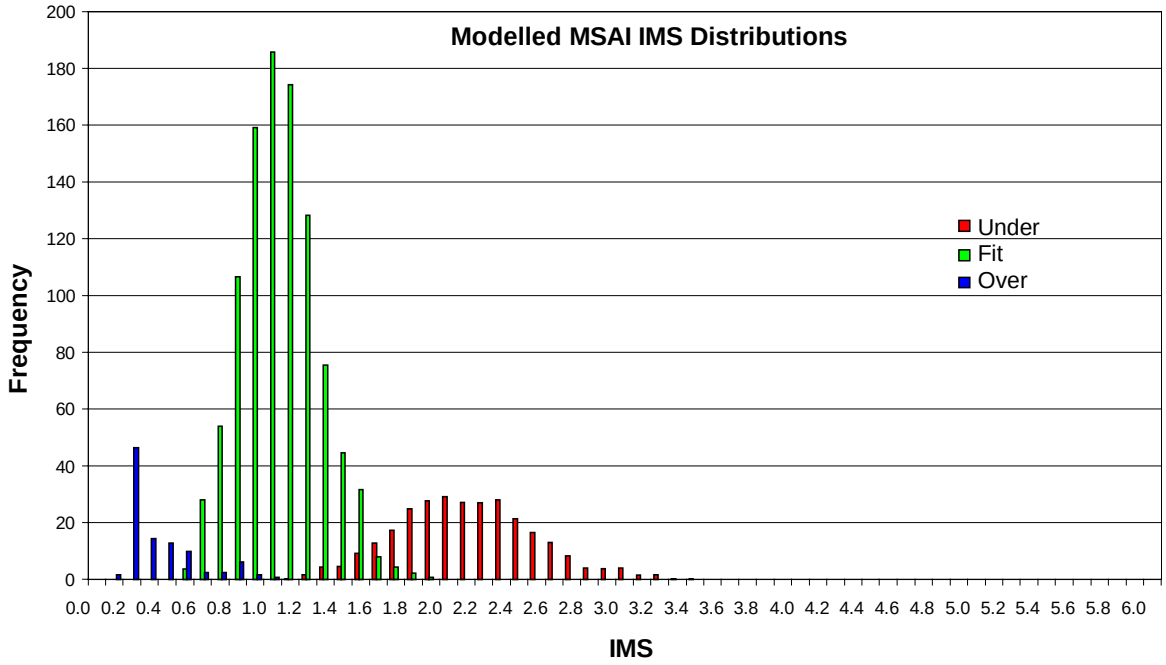

Figure 5: Modelled IMS distributions for overfitting (Guttman), fitting and underfitting (random) responses for simulated MSAI data

The OMS statistic does not assist in the discrimination of fitting and underfitting cases, and the IMS distributions of these two data sources overlap. In Figure 5, the IMS distributions of the

modelled fitting cases and the randomly generated cases cross at approximately 1.6. This appears to be the optimal value at which to discriminate fitting from underfitting cases. At this value, 11.4 per cent of the 27 per cent of randomly generated cases in the sample or 3 per cent of the accepted sample would be contaminated with observations that were mere noise, and 0.7 per cent of the 70 per cent of modelled fitting cases, or 5 per cent of valid cases would be excluded.

Thus critical values for both the IMS and OMS of 0.6 would provide very good discrimination of fitting from overfitting cases. Setting a critical value for the IMS of 1.6, and perhaps even a little higher, would appear to provide the best available discrimination between fitting and underfitting cases for the MSAI data set.

CONCLUSIONS

The research had three purposes. The first was to investigate the influence on item parameters of the inclusion of misfitting cases. The second was to identify the characteristics of samples of both items and respondents that influence the distributions of person fit statistics. A third objective was to attempt to suggest a sound basis for establishing critical values of misfit indicators for attitude survey data.

The analyses undertaken on two real data sets in this study have shown that the inclusion of responses that underfit the Rasch measurement model, and that may reflect carelessness in responding, increase the standard errors of item estimates, reduce the range of item locations on the scale, and reduce the inter-threshold range within items. Thus, the inclusion of misfitting cases compromises the measurement properties of the scale formed by the instrument. Close simulation of the two real data sets, using the item parameters and the distribution of person estimates obtained from the real data sets, has shown that the real data sets appear to include approximately seven per cent overfitting cases and from 17 to 23 per cent of underfitting cases. Together, these findings suggest that it is important to examine person fit as well as item fit in the analysis of data sets and to remove, at least for the purposes of calibration, those cases as well as items, that reveal substantial misfit.

The analyses of constrained simulation data sets has shown that instrument mis-targeting, item and person variance, instrument length, and the number of response options all influence the distributions of the IMS and OMS misfit statistics for persons. This finding suggests that it is possible to provide only broad guidelines about the critical values that might be used in order to discriminate fitting from misfitting cases. From the data sets analysed, it would appear that relatively lenient critical values can be set for the IMS and OMS misfit statistics for persons. The recommendation of an acceptable range from 0.6 to 1.5 (Bond and Fox, 2001, p.179) might be relaxed for attitude survey instruments to 0.5 and 1.6, but that to discriminate well between fitting and overfitting cases, both the IMS and OMS statistics should be used.

In the development of new instruments, it is desirable to establish optimum critical values for these misfit statistics, in order to eliminate as many misfitting cases as possible but to retain the variance of the greatest proportion of fitting cases. The close simulation technique demonstrated in this study provides a method for establishing optimum critical values for misfit statistics. However, these statistics are not able to completely discriminate between fitting and misfitting cases. The effectiveness of alternative misfit statistics that may be developed could be judged on their discriminating power, and the use of real and closely simulated data sets would assist in demonstrating that power.

Before analysts remove cases from data sets, the meanings attached to over- and under-fitting must be understood. Randomly generated responses reveal underfit. In a separate study (Curtis, 2003) pattered responses, the equivalent of so-called 'doodling', also lead to underfit and carelessness may also produce somewhat random responses. Thus underfit, as indicated by high

IMS values, should lead analysts to examine the returns of individuals who evince it. The inclusion of these cases in instrument calibration has been shown to compromise the measurement properties of the instrument. However, in using an established instrument, and especially if anchored item parameters are being used, underfitting cases should be examined closely. It is possible that these individuals are revealing differential item function in the instrument, and this possibility warrants investigation. If the cases are to be excluded from trait estimation, a sound case must be made. This is analogous to the removal of outliers from more common forms of analysis.

Overfit is a clear statistical construct in that it applies to cases that reveal much less variance than is expected in a stochastic response model. However, its practical meaning is less obvious. Random responses that may be attributed to doodling or carelessness and that lead to underfit can be expected. However, for candidates to deliberately set out to overfit the model would require them to apprehend which items were low on the trait and which were high and to generate responses that were overly consistent with this pattern of item locations. Acquiescence and social desirability, identified by Anderson (1997), may also lead to overfit. Another possible source of overfit lies with persons who select intermediate response categories for all items. This might occur if the candidate had decided, without reading the items, to check the central response options. However, it is feasible for candidates to choose these options thoughtfully as the most indicative of their views. Given these conditions, there can be no basis for removing cases that show overfit and that also have a consistent middle-category set of responses. This problem can be ameliorated by ensuring that there are substantial differences in item locations, so that the middle category of one item is located at a trait level that corresponds to either a low or a high response category in other items.

If candidates check all the left-most or all the right-most options, and if there are some reversed scored items, then these returns will reveal underfit. With items that are all worded in the same sense, these response patterns would yield overfit. Thus the inclusion of reverse-scored items in instruments is advantageous for analysts.

The use of information about person fit in Rasch analyses is informative, especially during the instrument development phase. In the analysis of data sets collected using established attitude survey instruments, it is desirable also to examine person fit. Unlike achievement tests, attitude surveys are often anonymous and even if individuals are identified, they are most often low stakes activities for participants. For this reason, researchers might expect that some respondents will be careless and that such data may compromise the effectiveness of the instrument as a measurement tool. Deleting these cases from the analysis may improve the instrument's measurement properties, and removing misfitting cases may lead to more precise scaled data that may then be used as inputs in other forms of analysis.

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Education in the Middle East and North Africa: The Current Situation and Future Challenges

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This paper investigates the educational development in the Middle East and North Africa, drawing on data from different international and national institutions. The paper begins with a review of similarities between countries within the region, and continues by investigating the situation of basic education, literacy rates and quality of education. In the third section, issues of inequality between public and private education are discussed. The paper concludes by outlining future educational challenges in the region.

Comparative education, Middle East, North Africa, development, literacy, basic education

INTRODUCTION

Human capital formation is receiving increased attention from policy makers and scholars interested in promoting economic development in Third World countries. Models of endogenous economic growth stress the importance of investment in knowledge, including basic education, as a critical factor in economic expansion. Specialists have long argued that education should form a principal component in any development strategy.

The Middle East and North Africa form a vast region stretching from the Atlantic Ocean to the Arab- Persian Gulf. The historical and cultural experiences of the region's countries share many common themes. First, Islam as the main religion and Arabic as the language are key factors in the identity formation of the region. In the nineteenth and the first half of the twentieth centuries, most of the region was under European colonization. When colonization ended, a strong economic, cultural and political dependence on developed countries remained.

Each country's educational past and current experiences are different, but several important similarities exist. These similarities provide a starting point for a country-to-country comparison, and for a better understanding of some of the problems that must be solved if the educational systems are to be structurally improved.

In the Arabic region, colonial authorities initiated compulsory modern education. However, native access to formal education was limited for two main reasons: for one thing, the colonial powers did not want to equip indigenous people with the skills and knowledge to challenge their power. Restricting modern schooling and especially European-language education to a minimum of students would simultaneously strengthen the colonial administration and weaken nationalist tendencies.

Secondly, the existence of a local formal education system was represented by Koranic schools. This alternative system was in competition with the colonial one not only because of its religious reference but also because of its opposition to western cultural hegemony. In the late nineteenth century, colonial European powers were promoting compulsory education and at the same time

seeking territorial and colonial conquests. In France, Jules Ferry was both the founder of the French public education system and the supporter of more colonialism.

For Muslim societies, there is a clear division between the role of school for religious education and the role of school for modern development. The Koranic school, with lessons in Arabic by a teacher of religion [maallam, Fkih], is an essential part of the upbringing of a Muslim child. All children are exposed to Koranic recitation, and many progress to higher religious studies. However, the debate on Koranic education and modern formal education existed even before European colonization in some Arab countries.

During the first half of the nineteenth century, the Egyptian and the Tunisian governments sent missions to Europe to try to emulate European ways; to modernize according to what was perceived as European technological and military advancement. The primary purpose of these early missions to the West was to learn the ways of the advanced white man, to translate his works, and to pick up his habits (Saïd, 1993). Modern schooling was one of the ways to develop this European modernism. In Tunisia, the polytechnic school of Bardo was created in 1830 as a local version of *l'école polytechnique* in France to give the country the possibility of absorbing new technologies.

During the second half of the twentieth century, education has been taken very much as an investment in human capital, with long-term benefits both to the individual who is educated and to the public at large. The story of education has been also the story of post-colonial government control of education for purposes of nation building and economic development (Akkari, 1999).

EVOLUTION OF EDUCATION SYSTEMS

Access to basic education

Free, publicly provided education has been a central tenant of the social contract in every country in the Middle East and North Africa since independence. Post-independence governments significantly expanded their education systems, driven by rapidly expanding youth populations, the need to build nationhood and to establish political legitimacy and popular support for new regimes through making education a fundamental right of citizenship.

It is well known that population growth in the Arab countries is among the highest in the world, which makes providing basic education a major challenge. However, education systems in the region, with few exceptions, now provide basic education to most children. Opportunities for secondary education, vocational training and tertiary education are also provided to many students, particularly in urban areas. Education is compulsory through the primary grades everywhere, and through lower secondary grades in some countries. Most countries have achieved universal primary enrolment and significant secondary enrolment increases. Growth in tertiary enrolment rates has been less dramatic and a few countries even saw slight declines in the 1990s. However, given expanding tertiary populations, even a constant rate implies a large increase in students.

Educational outcomes have improved. Primary enrolment shot up from 61 per cent in 1965 to 98 per cent in 1990, with particular progress in oil-exporting countries. The economic growth as well as oil incomes facilitated the task of the Arab States in expanding basic education. The World Bank pointed out that during the period 1960 to 80 the Middle East and North Africa outperformed all other regions except East Asia in income growth and the equality of income distribution:

> By 1990 only 5.6% of the population in Arab countries lived on less than $1 a day-the global benchmark of absolute poverty- compared with 14.7% in East Asia and 28.8% in Latin America. And whatever the wealth, poverty was lower in Arab States countries than elsewhere. (World Bank, nd p. 3)

Consequently, the social outcomes have been enormous. Infant mortality more than halved, and life expectancy rose by more than ten years. In Tunisia, for example, life expectancy rose from 51 years in 1961 to 72 years in 1998 (Institut national d'études statistiques, 1999).

Yemen, Egypt and Morocco struggled to achieve universal public education mainly because a demographic explosion and a large rural population characterized these three countries. According to the 1986 census, 41 per cent of the Egyptian population was below 15 years of age, and nearly 11.33 million were between the age of 6 to14 years, the age range of compulsory basic education. With a relatively young and growing population, pressures on the education system in recent years have been enormous (Zibani, 1994).

A significant number of people live in the mountain regions in Yemen and Morocco, where access to schools and their limited number are problematic. In Morocco, the construction of 511 classrooms every month in the 1980's would have made it possible to meet the needs, but for the years 1980 to 85, despite rising expenditure, only 271 classrooms were completed (De Lavergnée, 1991).

In Yemen during 1998 and 1999, as many as 2000 women teachers were trained for work in rural areas. The Community Schools Project, which began in 1994 with approximately 1,000 girls in 120 villages, have now reached more than 11,000 girls who would not otherwise have received primary education. While communities have provided classroom space in most of the villages, in some cases the classes meet under trees. More than 50 new classrooms have been constructed and another 25 classrooms repaired for the girls' schooling (UNICEF, 2000).

Access to basic education is widening in the Middle East and North Africa. Still, demographic pressure imposes intensive use of school facilities. Double and sometimes triple shifts are used. A lack of qualified teachers also contributes to the limited quality of basic education. Rural schoolchildren must sometimes walk for hours to reach schools. The scarcity of schools, poverty and the use of children as workers are some of the key factors of low schooling achievement in the Middle East and North Africa.

Literacy rates

Literacy improved dramatically from 1960 to 1995, more than doubling in every country, each starting from a very low base-rate. Improvement in literacy was larger than in any other region in the Third World. However, because literacy increases more rapidly in urban areas, countries with very significant rural populations (Morocco, Yemen and Egypt) also have lower adult literacy rates: around and above 50 per cent. Moreover, because literacy in the region (everywhere except Lebanon) is at least 20 per cent lower among women, females in predominantly rural countries such as Morocco and Yemen are at a distinct disadvantage: only one in ten rural women can read and write in Morocco, and only one in nine can read in Yemen (World Bank, 1999).

Illiteracy is still widespread all over Egypt, but especially in rural Upper Egypt. Fergany (1995b) argued that the concept of illiteracy must be redefined in order to encompass those who attend school but are not adequately educated and not fully literate. Fergany (1995b) has also established that illiteracy is significantly higher in rural areas (61%) than in urban areas (35%). Similarly, women and the poor suffer the most from high illiteracy rates, particularly in rural areas. The

illiteracy rate among women in rural areas reaches 76 per cent as compared to 45 per cent in urban areas.

If we also take into account regressive illiterates, who have lost their ability to read and write through disuse, and functional illiterates, who are incapable of grasping a minimum amount of information for daily use, the figures of illiteracy in all Arab States will be different than the statistical picture. Furthermore, access to newspapers, books and libraries is still limited in the region not only for lack of resources or readers, but also because of a strong political control on printed materials. Access to newspapers varies widely in the region from 15 copies per 1000 inhabitants in Yemen to 110 copies per 1000 inhabitants in Lebanon (UNESCO, 1998a).

Quality and international comparisons

Special consideration is given in this section to the relative position of Arab countries vis-à-vis the rest of the developing world. Some international comparative studies on the quality of education in terms of the acquisition of knowledge, attitudes and skills are available, yet only Jordan has participated in recent international assessment studies. Jordan, Morocco and Tunisia have decided to participate in the repeat of The Third International Mathematics and Science Study (TIMSS) for 1999. Jordan was near the bottom in mathematics and science in the international assessments and a national Jordanian assessment found that students were not meeting learning objectives in Arabic, mathematics and science (World Bank, 1999). However, we observe that most of the countries participating in international comparative studies are industrialized countries. Thus it may be misleading to compare educational performance of countries with different levels of economic development.

International comparisons of quality, of both inputs and outputs, are extremely difficult. This is because education systems differ substantially not only in the structure and content of their learning, but also in their objectives. The cultural component of education, its social objectives, is least susceptible to comparison, indeed to any form of quantitative measure.

If we consider completion, the Middle East and North Africa have one of the best rates among the developing countries. Almost 93 per cent of all youngsters who enter primary school are able to complete the cycle and move to the secondary level compared to a percentage below 70 in Sub-Saharan Africa and Latin America (UNESCO, 1998b).

A mean year of schooling is an indicator used to reflect the level of educational development of a country. It reflects the cumulative impact of previous and current investments in education. It is important to point out here that this gross indicator does not directly show quality of education. However, high mean years of schooling usually correlate with good quality and it is a basic condition to build an efficient education system.

Mean years of schooling is lower in the Arab countries than the rest of the developing world. Even for Gulf countries, mean years of schooling is lower than the rest of the Third World in spite of the per capita GDP being much higher.

The standard indicator of expenditure on education as a percentage of GNP shows that Arab countries spend over 5 per cent on education, the highest percentage of GNP among all countries. Education costs, largely supported by the public sector, have been rising because of population growth and the expansion of schooling.

OXFAM 's Education Performance Index (EPI) was created by to measure some aspects of educational inequality between developing countries. It concentrates on three dimensions of basic education, which have a critical bearing on the performance of education systems:

- the net enrolment rate, which shows the proportion of children aged between 6-11 years who enrol in school;
- gender equity in net enrolment expressed in terms of the enrolment gap between girls and boys;
- the school completion rate, which represents the proportion of students who progress beyond Grade 4 (Watkins, 1999).

Comparing the EPI ranking for the Arab countries, analysed with their income ranking, confirms that in education as in other areas of human development, some countries have been better than others in converting economic potential into benefits for people. Several countries have achieved a high level of success in overcoming income constraints. Among the success stories is Tunisia, which ranked 20 places above its income ranking. Syria and Iraq, whose EPI ranks at least 10 places above their average income rank, are also considered by OXFAM as good performers. In Tunisia, more than 6 per cent of the country's GNP is dedicated to public education, which is free at all levels. School attendance has also been compulsory since 1991 for the 1.4 million basic education students (Institut national d'études statistiques, 1999).

Despite their financial resources, several countries in the Middle East have been unable - or, more accurately, unwilling - to convert national wealth into extended opportunities for basic education. In some cases, the gap between EPI ranking and income ranking is of extraordinary dimension. Among the bad performers are Kuwait (54 places lower), Saudi Arabia (48 places lower), Qatar (38 places lower), and Oman (36 places lower). Kuwait and Saudi Arabia respectively account for the largest and second largest differential between EPI rank and income rank.

The underlying reasons for the discrepancies vary. In the cases of Kuwait and Saudi Arabia, the central problem is a relatively low net enrolment rate. Completion rates for both countries are high and the gender gap in enrolment small. In Qatar, the gender gap in enrolment (20%) is the primary problem (Watkins, 1999).

Education and labour

Despite a significant improving of formal education in the Arab countries during the last decades, the connection between education and employment is still lacking. In Egypt, Fergany (1995a) argued that the rewards of education in terms of access to more productive and remunerative employment is becoming increasingly precarious. He argues that open-unemployment has been steadily rising in the last two decades to reach 14 per cent of the labour force in late 1992 and that unemployment has been concentrated among young, new entrants to the labour market with secondary vocational degrees. The next highest rate of unemployment is among university graduates. In general, women are those who suffer the most from unemployment.

In this context, the education system does not contribute to improving the average Egyptian's earnings prospects in the labour market. Only university education results in a sizable return over the previous stage of education. Schools, specifically primary and preparatory levels, do not produce marketable skills, hence the high rate of unemployment among this category. According to Fergany (1995a), the conditions of schooling, in conjunction with the socio-economic situation of the pupils in these levels, do not allow them to pursue further their education and to acquire a higher level of training in formal education. Therefore, education appears to have low private returns.

Clearly, we may extend Fregany's analysis to most countries in the region. Investing in education must be accompanied by massive investment in economic sectors where the skills mastered can be used to provoke more economic growth.

Inequalities within each country

The least privileged and the poor are those most strongly affected by the precarious situation of the education system in the Middle East and North Africa. In Egypt, The number of working children between 6-14 years of age is estimated to be 1.5 million children, representing an average of 12.5 per cent of the population in question. Furthermore, the rate of working boys is 13 per cent while that of girls is 12 per cent (Zibani, 1994). The alarming dropout rates from basic education are a symptom of the declining quality of education. A large number of pupils attend double and triple shift schools, in over-crowded classrooms, with no sanitary facilities, with poor educational materials, low quality of teaching, and poor future returns. All these factors cannot render education attractive even to the most ambitious pupils (Fergany, 1995a).

In the whole Middle East and North Africa, nearly 5 million children aged 6 to 10 years and another 4 million children aged 11 to 15 years were out of school in 1995; by 2015, these numbers are expected to grow by over 40 per cent, to 7.5 million and 5.6 million respectively. Over 70 per cent of these out of school children were in Egypt, Morocco and Yemen. Many children drop out before completing compulsory education. In Tunisia, about a third of those who entered first grade dropped out before completing the seven-year basic cycle in the early 1990s (World Bank, 1999).

In Yemen, higher dropout rates among girls reduce their share of total enrolment from 31 per cent in first grade to only 25 per cent in sixth grade. A disproportionate share of schoolchildren are poor rural children and girls.

In Egypt, poverty affects access dramatically. Net enrolment rates for children in the top quintile of household wealth remains above 80 per cent until they reach age 15 years, and even those of the third and fourth quintiles remain at 75 per cent until age 16 years. In sharp contrast, enrolment s of children in the poorest one fifth of the households drops to 70 per cent at age 11 years and below 50 per cent at age 14 years. In 1994, Moroccan net primary enrolment s were 58 per cent in rural areas and 85 per cent in urban areas, and Tunisian secondary enrolment s in rural districts were as low as 19 per cent while in Tunis they were 78 per cent (World Bank, 1999).

Several factors contribute to the dropout phenomenon in the Middle East and North Africa:

a) the inadequate quantity and quality of elementary and secondary schools;

b) the excessively long distance from home to school, which is a particularly important obstacle for girls in rural areas;

c) the lack of parent responsiveness to the laws mandating compulsory schooling, in light of the low private economic returns of schooling;

d) the inability of schools to offer an attractive environment to children;

e) the economic difficulties of some families who are forced to put their children to work early.

Gender inequalities

Dispelling the myth that there is an automatically negative correlation between Islam and gender representation in schools, Islamic states increased the share of girls in school by about 2 per cent in the first half of the 1990s, four times the overall rate for developing countries (Watkins, 1999).

In the Islamic Republic of Iran, a high-level political commitment, backed with adequate resources, improved gender parity in primary schools: since 1986, the primary school enrolment rate of girls has climbed from 80 to 96 per cent nationally. Even in rural areas – where enrolment rates are lowest for all children – girls' enrolment rate has gone from 60 to 80 per cent in the past five years (UNICEF, 2000).

The female literacy rate in Arab countries is only 44 per cent, compared to 68 per cent for males. Still, most Arab countries have succeeded in reducing gender gaps in enrolment and completion rates far more successfully than South Asia or sub-Saharan Africa, and are projected to achieve gender equity in literacy, with a literacy rate of 70 per cent, in about 2010 (Watkins, 1999).

One example is Tunisia, where the government supported a liberal version of Islam, making it the Tunisians' Faith without ever proclaiming it the state religion. Tunisia adopted, at an early stage (1956), the most progressive policies in the Arab world toward women, achieving great advances regarding gender inequalities (Zaimeche, 1994).

In Syria, girls were only 44 per cent of primary enrolments in 1960, well below the developing countries average, but this was 94 per cent by 1987/88. Equivalent figures are 26 to 90 per cent for Libya and 38 to 88 per cent for Iraq (Gould, 1993).

Gender gaps are significant in three countries. In Yemen they are wide, with just over four girls for every ten boys in primary education and fewer than three girls for every ten boys at the secondary stage. In Morocco, there are about seven and a half girls for every ten boys at both stages, while in Egypt a little over eight girls are enrolled per ten boys at both stages (World Bank, 1999). In Egypt, the consequence of poor national educational services at the basic level, combined with poor socioeconomic conditions, are increasingly excluding girls from basic education. It is estimated that about 600,000 girls in the 6 to 10 year age group do not attend school. Nearly 81 per cent of the excluded girls are in rural areas with the majority from Upper Egypt (Fergany, 1995b). Gender and social class inequality in access to education is not a recent phenomenon in Egypt. However, recent conditions and recent figures confirm the steady intensification of inequality over the years. Gender discrepancy in education widens the socio-cultural gap between the two sexes. Under such economic conditions, with the increasing rate of dropouts, and the lack of credibility of the educational system, a further gap between formal and informal education is created. Pupils who are not attending schools, mostly the poor, are educated outside the formal establishment where they acquire the values and norms or their immediate social environment. The cultural and social gap that is thus created between those with formal schooling and those without it further contributes to the exclusion that is experienced by the poor (Rouchdy, 1996a, 1996b)

PRIVATE AND FUTURE CHALLENGES

Private participation includes both provision and finance. Private provision of education varies widely within the region. Private schools outnumber public ones in Lebanon but are very limited in others countries, particularly in North Africa. On average, private primary and secondary enrolment s are lower than the world average for lower-middle income countries. As in most developing countries, pre-university private education caters mainly to a high and middle-income urban clientele. In Jordan, Lebanon, and West Bank–Gaza, the private sector plays a substantial role in higher education (World Bank, 1999).

In Tunisia, despite a very liberal economic policy supported by the World Bank and the International Monetary Fund, private provision and financing of formal education is very limited. The private sector represents only 0.6 per cent of enrolment in primary education and 10 per cent

for secondary education where it is considered as a stopgap system for dropout students. The private sector share is about 3 per cent of enrolment in higher education (Gharbi, 1998).

It is necessary to note the presence of different missions and foreign embassies, which run their own schools, principally serving the children of the specific community. Many are open, however, to certain social, local categories. French schools in North Africa, for example, welcome a number of local children and provide them with an education quite close to what is provided in France. The religious system has mostly been developed by minority communities: Jews in North Africa and Christians in the Middle East. This system is particularly efficient, mostly thanks to external financial contributions.

The system of Koranic schools is well developed in many countries, notably Morocco, either to begin literacy instruction for preschool children, or to make up for the absence of the public sector in the rural regions. The village community directly recruits the schoolteacher, who they often can only pay in room and board, to teach their children the Koran and the basics of reading and writing.

Compared to other Third World regions like Latin America or East Asia, it is still premature to speak, in the case of the Middle East and North Africa, of a two-tiered educational system with private education opened to higher income children and lower income children gathered in public education. However, structural changes toward more inequalities in schooling are in work, particularly in the Middle East.

Regarding this issue, the position of the World Bank is ambiguous. On the one hand, this institution recognizes that public education has contributed to raise literacy rates and mean years of schooling in the Arab countries. On the other hand, the World Bank is pushing toward a massive privatisation and deregulation.

> All private educational institutions will likewise need a clearly defined sphere of authority over curriculum and materials choice. Regulation which so closely controls curricular choice as to mandate subjects, sequencing and hours by subject would eliminate a significant potential for the differentiation which can drive demand for and growth of non-public provision…(World Bank, 1999, p. 28)

In Morocco, when private schools using the French curriculum were obliged to teach the national curriculum, they chose instead to use both curricula to maintain the differentiation which supports the demand for their services. At the same time, the absence of regulation can create a bifurcated market in which well-to-do students enjoy very high quality and everybody else suffers from a "race to the bottom" among providers (World Bank, 1999, p. 28).

Privatization and market-oriented reforms, particularly in primary and secondary education will not contribute to improve the performances of the educational system in North Africa and the Middle East. However, many of the countries of the region have experienced decades of educational centralism combined with little concerns with socio-cultural productivity of schooling. Many educational systems in the region suffer from bureaucratic structures that emphasize a top down approach to learning. Through the production and diffusion of textbooks, Ministries of education implement rigid curriculum centered on memorization and dictation as everyday activities.

It is important to stress that the need for further and broader educational reform in the Middle East and North Africa is inextricably linked to continued economic and political reforms. Today's students must be taught the technical skills that are needed to function effectively in tomorrow's world. Moreover, they must be taught the problem solving, cooperation and critical thinking skills that are needed to build democracy and citizenship. Several countries in the Middle East and

North Africa are failing in granting educational access to all their social groups. They include the poorest countries in the region, as well as some of the richest. By present trends, approximately 2.6 million Yemeni children will not be in school in 2015. Enrolment levels have also fallen in Saudi Arabia and Iraq (Watkins, 1999).

In his report on population growth and the "Youth Explosion" in North Africa, Cordesman (1997) pointed out the following picture:

- projected future declines in the rate of growth will not affect the region for a decade or more;
- nearly 40 per cent of the population is under 14;
- education is breaking down and often irrelevant;
- 15-20 per cent of the population must leave home in the next five years; and
- direct and disguised unemployment of youth averages 25 to 40 per cent, with little improvement in sight.

The Middle East and North Africa region is at a crossroads in its educational development. The region is characterized by inadequate research and development for knowledge creation and limited communications infrastructure. It accounts for only about one tenth of one per cent of the world's research and development spending, less than any other region save sub-Saharan Africa (World Bank, 1999).

Educational research is particularly limited in the region and not integrated within the international research networks. Recent reports from the SERI (Southern Educational Research Initiative) have reviewed educational research activities in all Third World regions except the Middle East and North Africa (SERI, 1996).

Regional organizations, such as ALESCO (the Arab League Education, Culture and Science Organization) or ISESCO (the Islamic Education, Science and Culture Organization) must work to establish strong research programs as well as to build partnerships with international organizations.

Since each country's experiences, culture, and history are different, each country of the Middle East and North Africa will have to devise its own plan for educational reform. No one model is likely to work everywhere. Nevertheless, there are some issues which all countries must deal with: Gender, regional and social inequalities in schooling, illiteracy, weak relationships between education and economic, community involvement and the role of the private sector.

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Examining the Validity of Different Assessment Modes in Measuring Competence in Performing Human Services

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This article addresses an important problem that faces educators in assessing students' competence levels in learned tasks.

Data from 165 students from Massachusetts and Minnesota in the United States are used to examine the validity of five assessment modes (multiple choice test, scenario, portfolio, self-assessment and supervisor rating) in measuring competence in performance of 12 human service skills. The data are examined using two analytical theories, item response theory (IRT) and generalizability theory (GT), in addition a prior, but largely unprofitable examination using classical test theory (CTT) was undertaken.

Under the IRT approach with Rasch scaling procedures, the results show that the scores obtained using the five assessment modes can be measured on a single underlying scale, but there is better fit of the model to the data if five scales (corresponding to the five assessment modes) are employed. In addition, under Rasch scaling procedures, the results show that, in general, the correlations between the scores of the assessment modes vary from small to very strong (0.11 to 0.80). However, based on the GT approach and hierarchical linear modelling (HLM) analytical procedures, the results show that the correlations between scores from the five assessment modes are consistently strong to very strong (0.53 to 0.95). It is argued that the correlations obtained with the GT approach provide a better picture of the relationships between the assessment modes when compared to the correlations obtained under the IRT approach because the former are computed taking into consideration the operational design of the study.

Results from both the IRT and GT approaches show that the mean values of scores from supervisors are considerably higher than the mean values of scores from the other four assessments, which indicate that supervisors tend to be more generous in rating the skills of their students.

item response theory, generalizability theory, classical test theory,
self assessment, portfolio assessment, supervisor scaling,
scenario assessment, competences, measurement

INTRODUCTION

The general purpose of this study is to examine the validity of different assessment modes in measuring competence in the performance of human service workers, who supported people with disabilities. The data for this study were collected from 165 students in Massachusetts and Minnesota in the United States. Five assessment modes (to be called Multiple Choice, Scenario, Portfolio, Supervisor and Self-Assessment) were employed to measure the students' skill levels in performing 12 human service skills (to be called Competency 1 through to Competency 12). Except for the Multiple Choice, score values 1 to 4 were used to rate the students' skill level, with a low value denoting a less skilled student and a high value denoting a more skilled student. For the Multiple Choice mode of assessment, 10 items were included in the multiple-choice test to measure each competency, making a total of 120 items in the test. In order to make the scores on the Multiple Choice mode of assessment comparable to the other four modes of assessment, the scores from the multiple-choice test were collapsed into score values of 1 to 4. The multiple-choice items for each competency were checked to determine whether the items could be meaningfully added together, and then only those items with adequate fit were combined prior to the collapsing of the Multiple Choice scores.

In the planning stage of this study, it was recognized that it would be expensive (in terms of money and time) to collect data from each student using all the five assessment modes and for all the 12 competencies. Moreover, it was recognized that with a too extensive response task required of both students and assessor, there would be a serious risk of only partial completion of the assessment schedules. As a way of overcoming these problems, an overlapping design was carefully formulated for data collection. This overlapping design was such that common students linked the five assessment modes and the 12 competencies. Generally, data were collected for a majority of the students using at least two of the assessment modes and for at least three of the 12 competencies.

Table 1 provides a summary of the number of students who were assessed using each of the five assessment modes and the number of common students linking the five assessment modes, and Table 2 presents the corresponding information, but for the 12 competencies. In Table 1, the numbers given in bold are the total numbers of students assessed using each of the assessment modes while in Table 2, they are the total numbers of students assessed for each of the 12 competencies. For example, Table 1 shows that a total of 90 students were assessed using Scenario, a total of 94 students were assessed using Portfolio and so on. Likewise, Table 2 shows that a total of 134 students were assessed in Competency 1, a total of 138 students were assessed in Competency 2, and so on. By way of further examples, the meaning of the second entry in the first column of Table 1 is that a total of 81 students were assessed using both Scenario and Portfolio. The meaning of the corresponding entry in Table 2 is that a total of 121 students were assessed in both Competency 1 and Competency 2, and so on.

Table 1. Number of students assessed using the five assessment modes

	Number of Students				
	Scenario	Portfolio	Multiple Choice	Supervisor	Self-Assessment
Scenario	**90**				
Portfolio	81	**94**			
Multiple Choice	89	87	**153**		
Supervisor	78	86	106	**114**	
Self-Assessment	83	91	103	98	**113**

Table 3 gives the total numbers of students assessed for each of the 12 competencies using each of the five assessment modes. For example, Table 3 shows that the total number of students assessed for Competency 1 using Scenario, Portfolio, Multiple Choice, Supervisor and Self-Assessment

were 26, 33, 48, 82 and 106 respectively. When reading Table 3 it is important to recognize that the same student could be assessed for a particular competency using more than one of the five assessment modes.

Table 2. Number of students assessed in the 12 competencies

	Number of Students											
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Competency 1	**134**											
Competency 2	121	**138**										
Competency 3	126	128	**140**									
Competency 4	123	126	131	**140**								
Competency 5	126	127	132	130	**142**							
Competency 6	120	124	123	122	122	**133**						
Competency 7	124	124	131	128	130	125	**140**					
Competency 8	121	123	127	130	127	127	127	**138**				
Competency 9	125	127	133	130	132	125	131	128	**141**			
Competency 10	125	128	131	129	131	122	132	129	131	**140**		
Competency 11	125	122	127	126	130	120	126	124	124	125	**136**	
Competency 12	127	123	127	124	125	124	123	126	127	128	123	**137**

Note: C1 to C12 - Competency 1 to Competency 12.

Table 3. Number of students assessed in each competency using the five assessment modes

	Mode of Assessment				
	Scenario	Portfolio	Multiple Choice	Supervisor	Self-Assessment
Competency 1	26	33	48	82	106
Competency 2	32	31	50	95	107
Competency 3	29	27	53	96	110
Competency 4	35	28	46	93	109
Competency 5	27	38	49	99	107
Competency 6	27	32	53	52	107
Competency 7	23	35	51	103	111
Competency 8	29	31	50	92	109
Competency 9	30	35	48	93	108
Competency 10	34	25	52	111	109
Competency 11	25	27	56	64	105
Competency 12	36	31	46	72	110

RESEARCH QUESTIONS

The specific research questions addressed in this study within the general investigation of the validity of different assessment modes in measuring competence in the performance of human services are listed below.

1. Can the five assessment modes be used to obtain reliable measures?
2. Do the five assessment modes differ in their mean values and spread of scores?
3. Do the 12 competencies differ in their mean values and spread of scores?
4. Can the data be effectively combined? More specifically, do the data form a single underlying dimension, five underlying dimensions (corresponding to the five assessment modes) or 12 underlying dimensions (corresponding to the 12 competencies)?
5. What are the correlations between (a) the five assessment modes, and (b) the 12 competencies?
6. Are there significant interactions between the assessment modes and the competencies?

METHODS

In order to answer the above research questions, three data analysis theories were considered, namely: (a) classical test theory (see Keats, 1997, pp.713-719) (b) item response theory (see Stocking, 1997, pp. 836-840), and (c) generalizability theory (see Allal and Cardinet, 1997, pp 737-741).

Classical test theory (CTT) involves the examination of a set of data in which scores can be decomposed into two components, a true score and an error score that are not linearly correlated (Keats, 1997).

Under the classical test theory (CTT) approach, only correlations can be calculated between the item-case pairs. Thus, this approach yields a large number of correlations, which makes the results difficult to interpret and difficult to summarize. In addition, the correlations under CTT suffer from the small number of cases. Importantly, under this approach, using the small number of cases on which the correlation is based, there is no test of whether the combination of the items is admissible and no adjustment is made for differences in item difficulties. Moreover, the CTT approach does not take into consideration the operational design of this study (that is, assessment modes nested under competencies, see Figure 1). Consequently, it is found that the results based on the CTT approach do not provide a sound and meaningful picture of the relationships among the assessment modes (or competencies), and consequently this approach is not reported in this article.

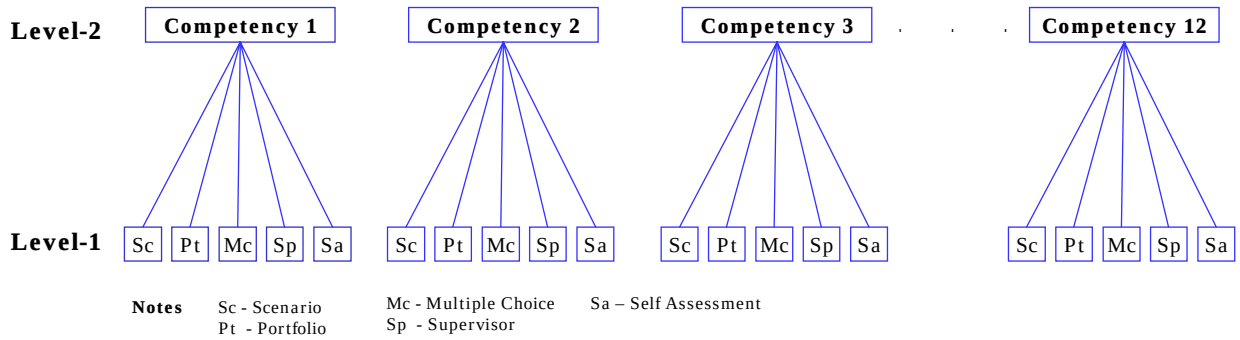

Figure 1. Operational design of the study

Rasch scaling is a procedure within item response theory (IRT) that uses a one-parameter model to transform data to an interval scale with strong measurement properties. It is a requirement of the model that the data must satisfy the conditions of unidimensionality in order for the properties of measurement to hold, namely to be independent of the tasks and the persons involved in providing data for the calibration of the scale (Allerup, 1997).

Under item response theory (IRT), a test is applied to indicate whether it is meaningful to combine the different components of interest in this study (that is modes, competencies and items). For example, under the one-parameter IRT (Rasch) model, the fit of the items and the fit of persons can be examined to test if it is appropriate to combine the data to form a single scale (see Keeves and Alagumalai, 1999, pp.23-42). If a single scale is admissible, then the components (assessment modes or competencies) can be compared and their mean values and spread of scores examined on common (and therefore meaningful) scales.

In addition, under the Rasch model, the scores are adjusted for the differences in difficulty levels of methods and items, which makes it possible to compare the different components. Thus, the IRT approach provides adjusted estimates and larger numbers of cases for the calculation of

correlations. In addition, the IRT approach yields fewer correlations compared to the classical test theory (CTT) approach, which makes the results easier to interpret and summarize.

Despite the advantage of the IRT approach in transforming the scores to an interval scale, the approach does not take into consideration the operational design of this study (that is, assessment modes nested under competencies). Consequently, it is unlikely that the results based on the IRT approach would provide a complete picture of the relationships among the assessment modes (or competencies). However, it should be remembered that, based on the IRT approach, it is meaningful to compare the properties of scores from the different assessment modes (or competencies), and therefore this approach is examined in this article.

An alternative approach uses generalizability theory (GT). Generalizability theory (GT) employs a framework based on analysis of variance procedures to estimate the sizes of effects, variance components, and reliabilities associated with the major sources of variation in a set of measurements made in education and the behavioural sciences (Allal and Cardinet, 1997).

Under the generalizability theory (GT) approach used in this article, the scores are not transformed to an interval scale, but the raw scores can be adjusted for differences in difficulty levels of the modes and competencies. It should be noted that, based on the GT approach, a nested ANOVA analytical procedure is capable of taking into consideration the operational design of the study. However, the complexity and highly unbalanced nature of the design prevents traditional ANOVA analytical procedures being used, but a hierarchical linear modelling (HLM) analytical procedure can be employed.

HLM is designed to analyze nested designs that are unbalanced and provides an empirical Bayes estimation procedure to adjust for imbalance, and for the relatively large number of empty cells or cells with small numbers of cases. There are, however, sufficient numbers of cases in a sufficient number of cells for satisfactory maximum likelihood estimation to be employed where traditional least square estimation procedures would probably fail to provide meaningful estimates. Based on the GT approach and HLM analytical procedures, correlations between the assessment modes are computed taking into account the variability between the competencies. Thus, the HLM analysis is not expected to give identical results to the IRT analysis since the assumptions made and the scales constructed differ.

In the sections that follow, analyses of the data using the IRT (Rasch) and GT (HLM) approaches are described, and the results of the analyses presented and discussed.

IRT APPROACH

In the Rasch analysis, the student scores obtained using the five assessment modes for all the 12 competencies were examined for their fit to the Rasch model. The main aim of the Rasch analysis was to examine whether these data form a single underlying dimension, five underlying dimensions (corresponding to the five assessment modes) or 12 underlying dimensions (corresponding to the 12 competencies).

A preliminary task using the Rasch analysis was to merge the data sets of the five assessment modes and 12 competencies so that they could be analyzed as a single data set. In the combined data set, each of the 12 competencies was represented five times (that is, one time for each assessment mode). Thus, for each student, the number of item slots in the combined data matrix that were to be filled with scores was 60 (that is, 5 assessment modes by 12 competencies), which means that the total number of items in the combined data set was 60. For a particular student, scores were entered in the item slots for the assessment modes and competencies the student was involved in, and blank spaces were left in the item slots for assessment modes and competencies

that the student was not involved in. However, it should be recognized that the assessment modes and competencies are linked together by common students, and therefore, these data can be analyzed together.

The first task in the Rasch analysis was to examine whether it was appropriate to combine the data sets from the five assessment modes and the 12 competencies so as to enable measurement of students' skills on a one-dimension scale (to be called 1-dimension model). For comparison purposes, this task was undertaken using two leading Rasch analysis computer programs: CONQUEST (Wu and Adams, 1998) and RUMM (Andrich et al., 2000). The second and third tasks were aimed at examining whether it was more appropriate to combine these data sets so as to enable measurement of students' skills on a five-dimension scale (to be called 5-dimension model) or a 12-dimension scale (to be called 12-dimension model) rather than on a one-dimension scale. The second and third tasks were undertaken using only CONQUEST because the current version of RUMM did not allow multidimensional modelling of data.

Unidimensional Rasch Analysis

In the paragraphs that follow, the results of the Rasch analysis described above are outlined and discussed. However, for reasons of parsimony, only the results obtained from the 1-dimension model using RUMM have been reported in full detail. In the last part of this section, the deviance statistics obtained using CONQUEST are used to compare the fit of the three models (that is, 1-, 5- and 12-dimension models) to these data.

The outputs generated by RUMM and CONQUEST provide information (in the form of fit statistics) that shows the compatibility of the Rasch model to the data and information (item and person estimates) that shows the location of items and persons on a Rasch measurement scale. For the 1-dimension model, summary fit statistics obtained using RUMM show that this model has ‘good’ fit to these data (based on a separation index of 0.76). For the same model, individual item fit and individual person fit results obtained using both RUMM and CONQUEST indicate that a vast majority of the items and persons have adequate fit. For example, using RUMM, 51 of 60 items have adequate fit (chi-square $p>0.05$) and 154 of 165 cases have adequate fit (residual $<|2.00|$). For the items, the results from the RUMM analysis with the 1-dimension model are discussed in greater details in the paragraphs that follow.

Table 4 presents the results of individual item fit and location following the analysis of the 1-dimension model using RUMM. The first four columns of Table 4 provide information regarding the identity of the item and the number of cases involved in that item (data points). The fifth to the eight columns of Table 4 provide information regarding the fit of the item. In Rasch analysis, 'residuals' are the differences between the Rasch-model-predicted response patterns and the observed response patterns obtained from the data. For items, RUMM allows residuals to be examined through a set of fit statistics: chi-square, degrees of freedom and probability, which are assessed in relation to the number of data points used to obtain the item statistics in order to decide whether the Rasch model fits the item or not. In general, for the small number of data points involved in this study (around 100 or less), the chi-square probability value of 0.05 (or higher) indicates that the model has a sufficient fit. Thus, it can be seen from the results presented in Table 4 that most of the items (51 out of 60) are consistent with the Rasch model.

The ninth to the eleventh columns of Table 4 give the estimated difficulty level of the item (location), the standard error of this estimate (SE) and the order of the item from least difficult to most difficult (rank), respectively. It should be noted that Rasch measurement scales are not ratio scales but interval scales, with a zero point that is commonly and arbitrarily located at the mean difficulty level of the items under consideration.

Table 4. Item characteristics based on 1-dimension model

Mode	Compt	Item Code	Data Points	Residual	DF	Chi-Sq	Prob	Location	SE	Rank
Scenario	1	sc01	26	-0.22	23.59	6.89	0.01 λ	0.37	0.33	38
	2	sc02	32	-0.47	29.03	3.42	0.16	-0.31	0.29	23
	3	sc03	29	-0.21	26.31	1.41	0.48	-0.05	0.24	28
	4	sc04	35	-0.37	31.75	3.32	0.17	0.48	0.27	42
	5	sc05	27	0.65	24.50	4.53	0.08	1.57	0.28	57
	6	sc06	27	-0.03	24.50	0.59	0.74	2.14	0.35	59
	7	sc07	23	0.50	20.87	0.13	0.94	0.51	0.27	43
	8	sc08	29	-0.09	26.31	1.47	0.47	2.03	0.30	58
	9	sc09	30	-0.20	27.22	1.01	0.59	0.39	0.32	39
	10	sc10	34	0.06	30.85	0.37	0.83	1.51	0.38	54
	11	sc11	25	-0.26	22.68	2.42	0.28	1.27	0.40	51
	12	sc12	36	-0.56	32.66	0.62	0.73	0.34	0.34	37
Portfolio	1	pt01	33	1.56	29.94	9.08	0.00 λ	0.32	0.22	36
	2	pt02	31	0.25	28.12	3.80	0.13	-0.51	0.20	17
	3	pt03	27	0.30	24.50	0.54	0.76	1.47	0.43	53
	4	pt04	28	1.02	25.40	1.70	0.41	0.98	0.31	47
	5	pt05	38	0.83	34.47	1.26	0.52	1.09	0.21	48
	6	pt06	32	-0.49	29.03	2.52	0.26	0.97	0.28	46
	7	pt07	35	1.31	31.75	2.01	0.35	0.88	0.23	44
	8	pt08	31	-0.45	28.12	1.19	0.54	2.49	0.30	60
	9	pt09	35	1.32	31.75	3.13	0.19	1.22	0.25	50
	10	pt10	25	0.90	22.68	1.23	0.53	1.57	0.33	56
	11	pt11	27	0.46	24.50	0.41	0.81	1.57	0.37	55
	12	pt12	31	0.13	28.12	5.27	0.05	1.37	0.29	52
Multiple	1	mc01	47	1.19	42.64	2.40	0.28	0.43	0.15	40
Choice	2	mc02	48	0.76	43.55	0.63	0.72	0.25	0.16	35
	3	mc03	53	-0.57	48.08	0.07	0.97	-0.46	0.15	19
	4	mc04	45	1.60	40.83	3.16	0.19	-0.04	0.14	29
	5	mc05	47	-0.28	42.64	0.65	0.72	0.03	0.15	30
	6	mc06	50	0.47	45.36	0.77	0.67	0.07	0.14	31
	7	mc07	49	1.63	44.45	1.34	0.50	-0.17	0.14	25
	8	mc08	49	-0.37	44.45	0.63	0.72	1.14	0.19	49
	9	mc09	47	1.55	42.64	4.19	0.10	-0.92	0.16	13
	10	mc10	51	0.66	46.27	4.59	0.08	0.90	0.20	45
	11	mc11	56	-0.03	50.80	0.81	0.66	-0.46	0.16	20
	12	mc12	47	1.54	42.64	5.78	0.03 λ	-0.48	0.16	18
Supervisor	1	sp01	82	-0.12	74.39	1.95	0.36	-2.09	0.21	4
	2	sp02	95	-0.33	86.19	3.08	0.19	-1.80	0.16	5
	3	sp03	96	-0.27	87.09	4.06	0.11	-1.24	0.15	11
	4	sp04	93	2.33	84.37	5.29	0.05	0.11	0.16	32
	5	sp05	99	-0.60	89.82	6.30	0.02 λ	-2.29	0.16	2
	6	sp06	52	-1.24	47.18	5.03	0.06	-2.35	0.26	1
	7	sp07	103	-0.66	93.44	1.78	0.40	-1.80	0.15	6
	8	sp08	92	0.18	83.47	0.93	0.62	-0.90	0.17	14
	9	sp09	93	2.34	84.37	5.95	0.03 λ	-0.13	0.12	27
	10	sp10	111	-0.40	100.70	1.17	0.55	-1.79	0.14	7
	11	sp11	64	-0.51	58.06	0.62	0.73	-1.47	0.20	10
	12	sp12	72	0.40	65.32	0.25	0.88	-2.18	0.21	3
Self	1	sa01	106	0.39	96.17	2.19	0.32	-1.63	0.17	9
Assessment	2	sa02	107	-0.05	97.07	6.56	0.01 λ	-0.43	0.20	21
	3	sa03	110	4.52	99.80	12.79	0.00 λ	-0.25	0.10	24
	4	sa04	109	-0.02	98.89	2.21	0.31	-0.16	0.18	26
	5	sa05	107	-0.63	97.07	5.99	0.03 λ	-0.55	0.21	16
	6	sa06	107	0.18	97.07	3.06	0.20	-1.09	0.18	12
	7	sa07	111	-0.75	100.70	6.73	0.01 λ	0.43	0.17	41
	8	sa08	109	0.23	98.89	0.15	0.93	0.22	0.16	34
	9	sa09	108	2.23	97.98	4.91	0.06	-0.36	0.15	22
	10	sa10	109	-0.38	98.89	1.71	0.41	0.12	0.17	33
	11	sa11	105	0.75	95.26	3.32	0.17	-0.59	0.17	15
	12	sa12	110	-0.52	99.80	4.03	0.11	-1.75	0.16	8

Note: λ - Item fit is suspect (chi-square probability <0.05).

Items with location value equal to zero or close to zero (e.g. mc05 and sc03), are of average difficulty, items with large positive location values (e.g. pt08 and sc06) are so-called 'difficult' items while those with large negative location values (e.g. sp06 and sp05) are so-called 'easy' items.

Thus, the location values and ranks presented in Table 4 show that most of the supervisor items are relatively easy compared to the items in the other four modes of assessment. In other words, supervisors tend to be lenient in rating the skills of their students.

Table 5 displays descriptive statistics for the items in the five assessment modes and for the 12 competencies. For example, for the competencies, the mean locations are obtained by taking the average of the locations of the items (results in Table 4) in each competency.

Table 5. Descriptive statistics of items by assessment modes and competencies (1-dimension model)

	Mean Location	Standard Error	Standard Deviation
Scenario	0.85	0.23 $^{\xi}$	0.81
Portfolio	1.12	0.21 $^{\xi}$	0.73
Multiple Choice	0.02	0.17	0.59
Supervisor	-1.49	0.24 $^{\xi}$	0.82
Self-Assessment	-0.50	0.20	0.69
Competency 1	-0.52	0.55	1.24
Competency 2	-0.56	0.34	0.75
Competency 3	-0.11	0.44	0.99
Competency 4	0.27	0.21	0.46
Competency 5	-0.03	0.68	1.52
Competency 6	-0.05	0.78	1.75
Competency 7	-0.03	0.47	1.06
Competency 8	1.00	0.61	1.37
Competency 9	0.04	0.36	0.81
Competency 10	0.46	0.62	1.39
Competency 11	0.06	0.58	1.30
Competency 12	-0.54	0.65	1.46

Note: ξ - The mean location (taken in absolute terms) is more than twice its standard error (i.e. significantly different from the scale zero).

From the results presented in Table 5, it would seem that it was much easier for students to get higher scores if assessed by their supervisors than if they were assessed using the other four assessment modes. Interestingly, these results also indicate that supervisor ratings are more lenient that are self-assessment ratings.

It also appears that the Multiple Choice assessment mode has a smaller spread of scores than the other four modes, all of which have similar standard deviations. In addition, it should be noted that there are sizeable differences between the mean scores for the different assessment modes, and as a consequences the different modes would not produce a consistent assessment grade, unless further adjustments were made.

For the competencies, it appears that Competency 5 is of near average difficulty (-0.03), Competency 2 is the easiest (-0.56), and Competency 8 (1.00) is the hardest. However, it is also noted that apart from Competency 4 (with a standard deviation of 0.46), most competencies have similar spreads and, all 12 competencies have mean locations that are not significantly different from zero, which seems to suggest that there are only small differences between the mean values of these competencies. Nevertheless, the distribution of the scores for a mode or a competency is best assessed not only in terms of the mean value but also in terms of the spread of the students' scores associated with that mode or competency which are presented in Figures 2 and 3.

Multidimensional Rasch Analysis

In the paragraphs that follow, the results of CONQUEST runs of the 5- and 12-dimension models are outlined.

Figures 2 and 3 display the item map obtained following CONQUEST runs of the 5- and 12-dimension models respectively. In Figure 2, dimensions '1', '2', '3', '4' and '5' are Scenario, Portfolio, Multiple Choice, Supervisor and Self-Assessment respectively, and in Figure 3, dimensions '1' through to '12' are Competency 1 through to Competency 12 respectively.

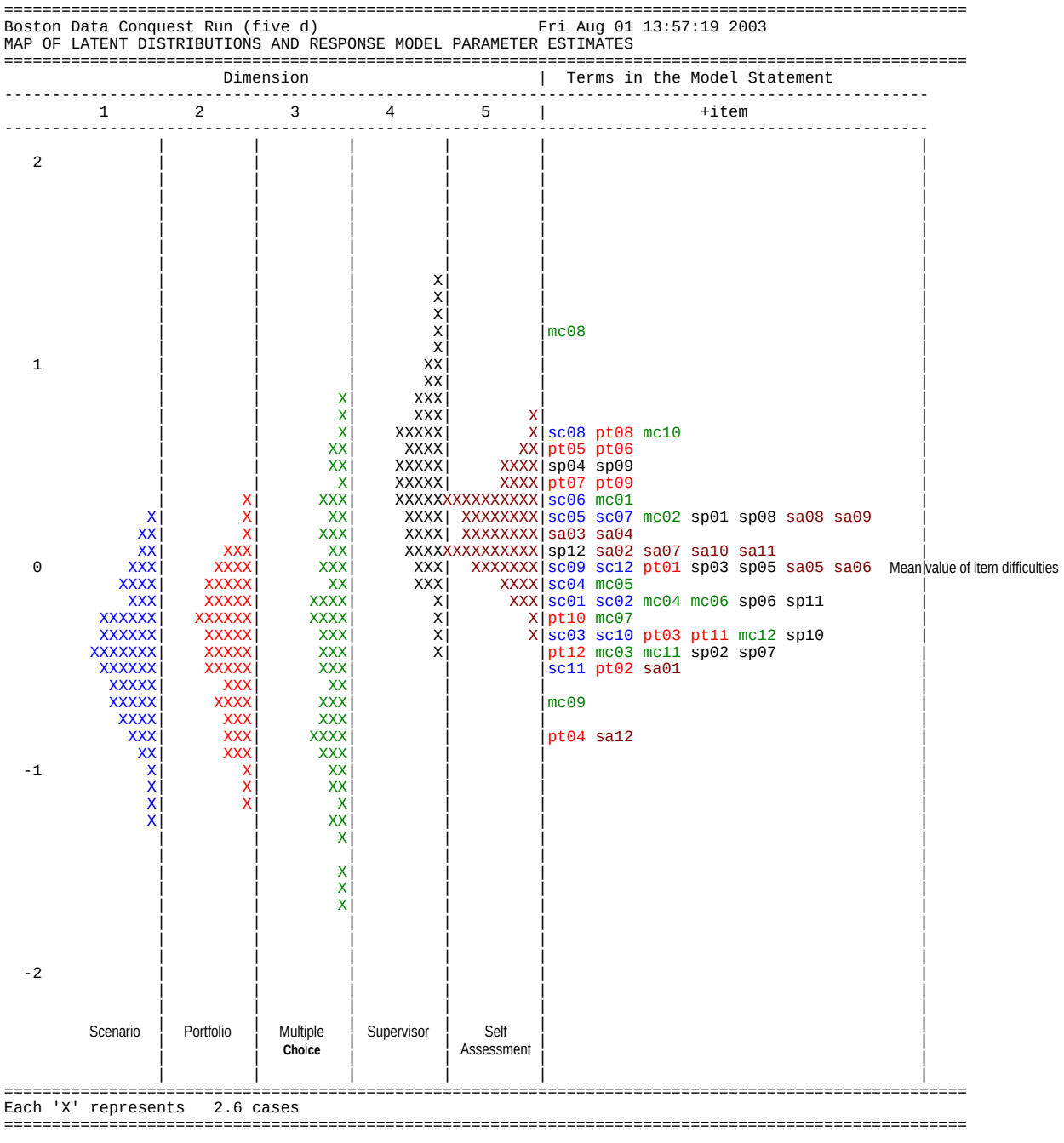

Figure 2. Item map based on the 5-dimension model

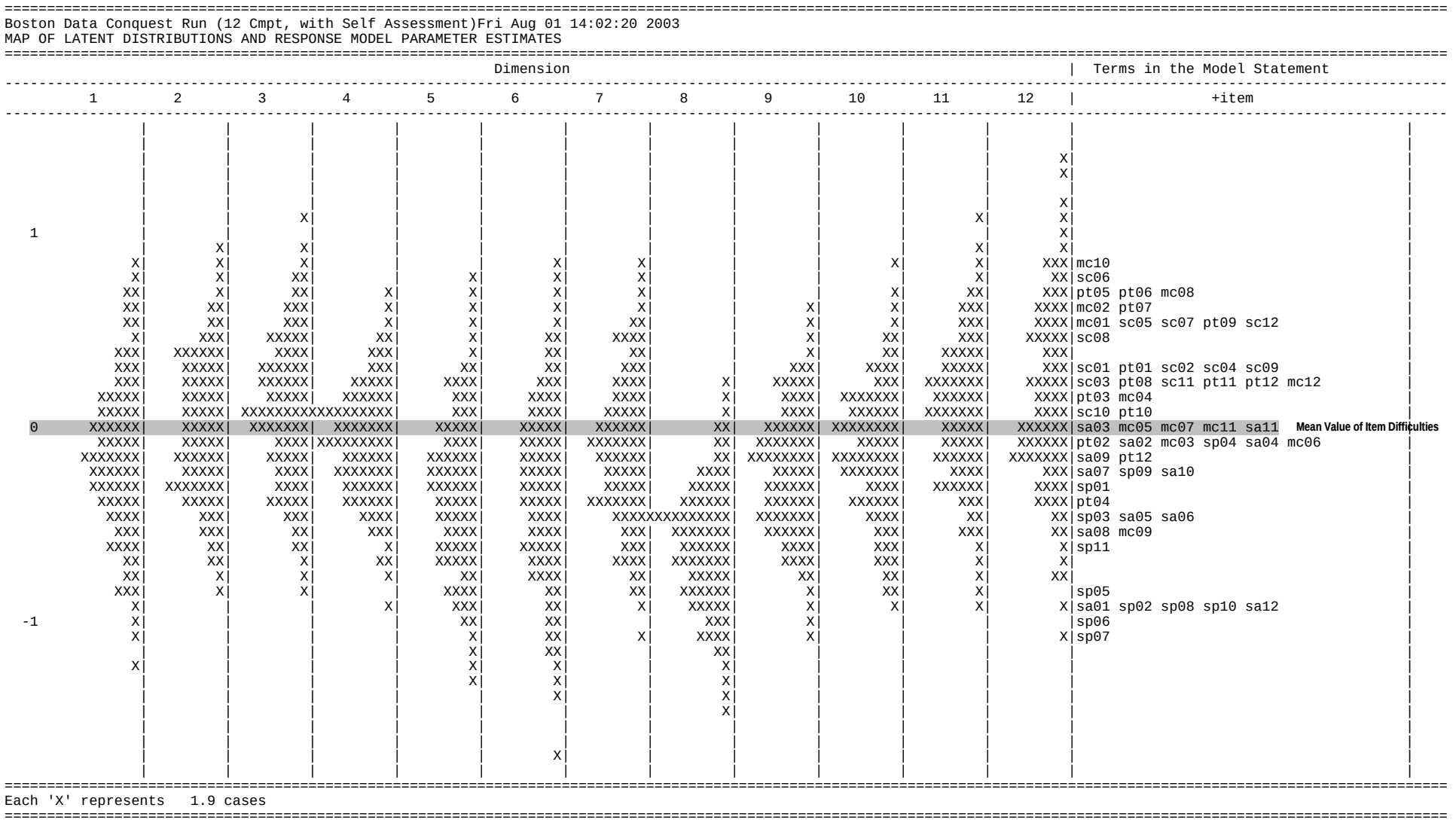

Figure 3. Item map based on the 12-dimension model

From Figure 2, it is evident that the students are more likely to be rated as above average when assessed by their supervisors than when assessed using the other four assessment modes. The spread of the ratings for each dimension gives a graphical indication of the size of the differences in the mean value between the five different modes.

Thus, Figure 2 seems to confirm what is found using the 1-dimension model, that is, supervisors tend to be more generous when rating their students in performing human service skills. In addition, Figure 2 indicates that, in general, Scenario, Portfolio and Multiple Choice yield scores that have almost equal means, and that Supervisor and Self-Assessment yield scores that have similar means.

The item map from the CONQUEST run of the 12-dimension model (Figure 3) indicates that, except for Competency 8 which has a low mean value, all the other competencies yield scores that generally do not differ markedly in terms of mean and spread. Again, this seems to confirm what is suggested following the 1-dimension analysis: there are very small differences between the means of the competencies. It should be noted that the scores plotted in Figures 2 and 3 have been adjusted for the differences between the means of the assessment modes and competencies.

Consequently, Tables 6 and 7 show that the correlations between the students' scores obtained for the five assessment modes and for the 12-competencies from the CONQUEST analyses of the 5- and 12-dimension models respectively. The values of the correlations differ from those that would be obtained with the raw data under classical test theory (CTT), because the differences between the modes and competencies have been removed, prior to the calculation of the correlations that are shown.

Table 6. Correlations of individual scores between assessment modes based on the 5-dimension model

	Scenario	Portfolio	Multiple Choice	Supervisor	Self-Assessment
Scenario	1.00				
Portfolio	0.48	1.00			
Multiple Choice	0.80	0.48	1.00		
Supervisor	0.34	0.42	0.52	1.00	
Self-Assessment	0.17	0.43	0.11	0.23	1.00

Table 7. Correlations between competencies based on the 12-dimension model

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Competency 1	1.00											
Competency 2	0.39	1.00										
Competency 3	0.33	0.42	1.00									
Competency 4	0.28	0.29	0.28	1.00								
Competency 5	0.48	0.50	0.41	0.31	1.00							
Competency 6	0.44	0.49	0.32	0.36	0.59	1.00						
Competency 7	0.41	0.50	0.44	0.34	0.51	0.51	1.00					
Competency 8	0.38	0.35	0.34	0.27	0.45	0.46	0.37	1.00				
Competency 9	0.24	0.25	0.35	0.21	0.36	0.30	0.27	0.33	1.00			
Competency 10	0.38	0.37	0.33	0.30	0.46	0.41	0.39	0.38	0.32	1.00		
Competency 11	0.39	0.42	0.32	0.31	0.49	0.46	0.41	0.38	0.27	0.40	1.00	
Competency 12	0.42	0.39	0.33	0.34	0.47	0.46	0.49	0.38	0.29	0.42	0.44	1.00

Except for Self-Assessment, the results in Table 6 show moderate to strong correlations (Cohen, 1992; p.157) between the scores obtained using the other four modes of assessment. Thus, with the exception of self-assessment, it appears that the ranking of students based on scores obtained from any of the assessment modes does not differ markedly from the ranking obtained using

scores from the other assessment modes. For Multiple Choice and Scenario, the correlation is very strong (0.80), which suggests a high degree of agreement between the ranks obtained using these two assessment modes after allowance has been made for systematic differences between the modes and competencies.

In addition, the results in Table 6 show mostly small correlations between Self-Assessment and the other assessment modes, which suggest small agreement between the ranks obtained using Self-Assessment and the ranks obtained using the other four assessment modes.

For the competencies, the results in Table 7 show mostly moderate correlations between the scores for the 12 competencies. However, it should be noted that a few of the correlations are small (for example, those involving Competency 9) and some are strong (for example, those between Competencies 2, 5, 6 and 7). Nevertheless, it can be concluded that a considerable number of students who are rated highly on one of the competencies are in most cases also rated highly on the other competencies.

In Table 8, the fit of 1-, 5- and 12-dimension models are compared using the deviance statistics (obtained from output generated by CONQUEST) and chi-square tests. In Table 8, the fit of the 12-dimension model is compared to the fit of the 1-dimension model, and the fit of the 1-dimension model is compared to the fit of the 5-dimension model. Chi-square tests presented in Table 8 indicate better fit of the 1-dimension model compared to the 12-dimension model and better fit of the 5-dimension model compared to the 1-dimension model. Therefore, the 5-dimension model has the best fit to these data.

Table 8. Comparison of model fit using difference in deviance statistics

Model	Deviance Statistic	Number of Parameters	Chi-square Statistic	Degrees of Freedom
12-dimension	9201.77	138		
1-dimension	9011.92	61	189.86	77
5-dimension	8950.91	75	61.01	14

GENERALIZABILITY THEORY APPROACH

The design of this study provides data that have a multilevel structure, that is, five assessment modes are nested beneath 12 competencies (see Figure 1). No allowance for this aspect of the design is made using IRT. Consequently, this section examines the relationships between the assessment modes and the competencies taking into consideration the operational design of the study. The computer package used for the multilevel analyses in this study is HLM5 developed by Raudenbush, Bryk, Cheong and Congdon (2000).

The main task before the HLM analysis was to construct dummy variables for the assessment modes and competencies. For the assessment modes, five dummy variables (scenario, prtfolio, mchoice, supvisor and selfasmt) were constructed to denote Scenario, Portfolio, Multiple Choice, Supervisor and Self-Assessment. In coding of the data a ‘1’ was used to indicate a student’s score obtained using that assessment mode and a ‘0’ was used to indicate a student’s score obtained using the other four assessment modes. Similarly, for the competencies, 12 dummy variables (compt01, compt02, compt03, . . . , compt12) were constructed to denote the 12 competencies.

Specification of HLM models

It should be noted that, with the operational design described above and using HLM, only a maximum of four variables denoting assessment modes can be included in an analysis simultaneously, leaving the fifth variable as a dummy for balancing the analysis. For the purposes of this study, it was considered important to examine the relationship between Supervisor and the

other four assessment modes. Consequently, a decision was made to run two models: one model with Self-Assessment as the dummy for balancing the analysis (to be called Model-M), and the other model with Multiple Choice as the dummy for balancing the analysis (to be called Model-S). That is, for Model-M, Multiple Choice was included in the analysis and Self-Assessment excluded from the analysis while for Model-S, Self-Assessment was included in the analysis and Multiple Choice excluded from the analysis.

For example, following the notations and arguments presented by Raudenbush and Byrk (2002), Model-M can be described as follows.

Level-1 model

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{scenario})_{ij} + \beta_{2j}(\text{prtfolio})_{ij} + \beta_{3j}(\text{mchoice})_{ij} + \beta_{4j}(\text{supvisor})_{ij} + r_{ij}$$

Level-2 model

$$\beta_{0j} = \gamma_{00} + \gamma_{0j}C_j + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{1j}C_j + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{2j}C_j + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{3j}C_j + u_{3j}$$

$$\beta_{4j} = \gamma_{40} + \gamma_{4j}C_j + u_{4j}$$

[Equation 1]

where:

Y_{ij} is the score (skill level) of student *i* for Competency *j* (C_j);

β_{0j} is the mean score of Competency *j*;

β_{1j}, β_{2j}, β_{3j}, and β_{4j}, are the regression coefficients associated with Competency *j* for Scenario, Portfolio, Multiple Choice and Supervisor assessment modes respectively;

r_{ij} is a random error or 'student effect', that is, the deviation of the student mean from the competency mean;

γ_{00} is the grand mean;

$\gamma_{0j}C_j$ is the direct effect of Competency *j* on the mean score of the students;

$\gamma_{1j}C_j$, $\gamma_{2j}C_j$, $\gamma_{3j}C_j$, and $\gamma_{4j}C_j$, are cross-level interaction effects between Competency *j* and the assessment modes (i.e. Scenario, Portfolio, Multiple Choice and Supervisor respectively);

u_{0j} is a random 'competency effect', that is, the deviation of the competency mean from the grand mean; and

u_{1j}, u_{2j}, u_{3j}, and u_{4j} are random effects associated with the interaction between Competency *j* and the assessment modes (i.e. Scenario, Portfolio, Multiple Choice and Supervisor respectively).

The indices *i* and *j* denote students and competencies where there are

i = 1, 2, . . . , n_j students assessed for competency j; and
j = 1, 2, . . . , J competencies (in this study J=12).

In simple terms, Equation 1 shows that at Level-1, the student score is modelled as a function of a competency mean, assessment modes and a random error, and at Level-2, each competency mean, β_{0j}, is viewed as an outcome varying randomly around some grand mean. For purposes of parsimony, C_j in Equation 1 is used to model the direct and cross-level interaction effects associated with all the 12 competencies. However, it should be noted that, in the actual analyses, only those competencies that have significant effects ($p<0.05$) are included in the model.

The equation for Model-S is similar to the equation for Model-M (i.e. Equation 1). However, it should be remembered that Model-S has the variable selfasmt (Self-Assessment) instead of the variable mchoice (Multiple Choice).

HLM analysis

The two models described above (Models M and S) are estimated using a four step procedure. The first step involves running a null model in order to obtain the amounts of variance available to be explained at each level of the hierarchy (Bryk and Raudenbush, 1992). The null model is the simplest model because it contains only the dependent variable (for this study, student score) and no predictor variables are specified at any level.

In the second step, the four dummy variables that represent the assessment modes (i.e. scenario, prtfolio, mchoice, and supvisor for Model-M, and scenario, prtfolio, selfasmt, and supvisor for Model-S) are included in the analysis at Level-1 simultaneously. At this second stage, no predictors are specified at Level-2, and therefore, Raudenbush et al. (2000) have referred to this type of model as 'unconditional' at Level-2. It is considered important to keep all four dummy variables in each model in subsequent stages of the analysis regardless of whether or not the variable makes a significant contribution overall because the variables may have significant cross-level interaction effects with Level-2 variables (competencies). Moreover, it is necessary to include these four dummy variables because a major aim of this study is to examine the mean scores of the students obtained using all the assessment modes employed in this study.

The third step of the analysis involves building up the Level-2 intercept model through adding the significant ($p<0.05$) competency-related dummy variables into the model. At this stage, the exploratory analysis sub-routine available in HLM5 is employed for examining the inclusion of potentially significant dummy variables that represent the 12 competencies (i.e. compt01 to compt12) in successive HLM runs. In addition, at this stage, a so-called ‘step-up’ approach is followed to examine which of the competency-related variables have a significant influence on student scores. Bryk and Raudenbush (1992) have recommended the step-up approach for inclusion of variables into the model to the alternative approach, referred to as ‘working-backward’ where all the possible predictors are dumped into the model and then the non-significant variables are progressively eliminated from the model.

The fourth step, which is the final step, involves building up the Level-2 slope models through adding the competency-related variables that have significant cross-level interaction effects using the Level-2 exploratory analysis sub-routine and the step-up strategy.

HLM results

For both Model-M and Model-S, the results of the HLM analysis described above provide reliability estimates at Level-1 of the model for each of the four assessment modes included in that model and the correlations between these assessment modes. The results also provide the estimations of the fixed effects for each variable in the equation, the estimations of the variance components and the deviance statistics of the models. These results are discussed in separate sub-sections below.

Reliability estimates

Table 9 displays the reliability estimates of the assessment modes involved in Models M and S at three stages in the development of the model. The three stages in Table 9 refer to (a) the unconditional model (Unconditional Stage) (b) the final model without cross-level interaction effects (Final Stage 1), and the final model with cross-level interaction effects (Final Stage 2).

For both Models M and S, the results in Table 9 indicate that all assessment modes have high reliability estimate (>0.80) regardless of the stage of the model that is considered. Thus, if the skill level of a student were to be measured based on the five assessment modes, equal degrees of confidence could be placed on the scores obtained using any of the five assessment modes.

Table 9. Reliability estimates at different stages of model development

	Unconditional Stage (with Level-1 variables only)	**Final Stage 1** (without interaction effects)	**Final Stage 2** (with interaction effects)
Model-M			
Scenario	0.825	0.825	0.828
Portfolio	0.868	0.869	0.810
Multiple Choice	0.939	0.939	0.939
Supervisor	0.916	0.915	0.874
Model-S			
Scenario	0.812	0.812	0.816
Portfolio	0.898	0.898	0.863
Supervisor	0.946	0.946	0.892
Self-Assessment	0.939	0.939	0.939

Fit of the model

Table 10 present results of deviance statistics and the chi-square tests carried out to compare model fit in progressive stages in the development of Model-M. In Table 10, the Null Stage (null model) is compared to the Unconditional Stage, Unconditional Stage is compared to the Final Stage 1 (i.e. final model without interaction effects), and the Final Stage 1 is compared with the Final Stage 2 (i.e. final model with interaction effects).

The information presented in Table 10 indicates better fit of the model at Final Stage 2 compared to all the other stages. Therefore, the inclusion of cross-level interactions between competencies and assessment modes improves the overall fit of the model. Importantly, the results in Table 10 appear to warrant the inclusion of the cross-level interaction effects because there is better fit of the model at Final Stage 2 compared to the fit of the model at Final Stage 1.

Table 10. Comparison of model fit in successive HLM runs for Model M

	Deviance Statistic	**Number of Parameters**	**Chi-square Statistic**	**Degrees of Freedom**	**p-value**
Null	9881.95	3			
Unconditional	8646.06	21	1235.90	18	0.00
Final Stage 1 (without interactions)	8602.81	27	43.24	6	0.00
Final Stage 2 (with interactions)	8579.46	31	23.36	4	0.00

The corresponding results for Model-S are basically similar to the results in Table 10, and therefore, it is concluded that the model at the final stage with interaction effects has a better fit to these data.

Fixed effects

Fixed effects estimated from the Unconditional Stage, Final Stage 1 and Final Stage 2 are presented together in Table 11 for Model-M and Table 12 for Model-S. Both the standardized as

well as the metric regression coefficients of the variables are presented in Tables 11 and 12. The metric regression coefficients are obtained from HLM runs using raw scores of the variables while the standardized regression coefficients are obtained from separate HLM runs using standardized scores of the variables. These results at the various levels of hierarchy are discussed next.

In Tables 11 and 12, for a given stage of the models, the metric intercept is an estimate of the overall (grand) mean score (skill level) of the students on the original outcome scale of 1 to 4.

On the other hand, the value of fixed effect for a particular assessment mode is an estimate of the score points (on the original scale) that should be added to (or subtracted from) the student score so as to adjust for the advantage (or disadvantage) associated with being assessed using that assessment mode. Similarly, the value of the fixed effect for a particular competency is an estimate of the score points that should be used to adjust the student score in order to cater for the advantage (or disadvantage) associated with being assessed for that competency.

Thus, from Tables 11 and 12, it can be observed that the grand mean score of the students is estimated to be 2.58 regardless of the model considered (Model-M or Model-S) and regardless of the stage of the model considered (unconditional, final without interaction effects or final with interaction effects). This grand mean score (2.58), when considered on the original scale of 1 to 4, means that the average score is 0.08 points above the average (2.50) of the original scale used to measure the students' skills.

From the results in Tables 11 and 12, it can be observed that, within the same model, the values of the fixed effects for the assessment modes remain unchanged regardless of the stage considered, which shows that inclusion of the competencies whose mean scores are significantly different from the grand mean and significant cross-level interactions in the analysis do not affect these values.

The following examples illustrate the impact of the model coefficients displayed in Tables 11 and 12 on student score.

If all other factors are equal and based on the Final Stage 2 of Model-M, a student of average skill level would be expected to get a score of 1.82 (that is, grand mean plus coefficient associated with the assessment mode, 2.58 + [-0.76]) if assessed using Scenario, and scores of 1.78, 2.06 and 2.97 if assessed using Portfolio, Multiple Choice and Supervisor respectively. The same student but based on Model-S would be expected to get scores of 2.34, 2.31, 3.10 and 3.49 if assessed using Scenario, Portfolio, Self-Assessment and Supervisor respectively. Although the scores based on Model-M do not match exactly those based on Model-S, they nevertheless follow a similar general pattern and seem to confirm what is found in the Rasch analysis. That is, the students are more likely to be rated as above average when assessed by their supervisors than when assessed using the other assessment modes.

For Scenario and Portfolio, the results in Tables 11 and 12 indicate that, regardless of the model considered, the mean of the scores obtained using Scenario follow closely the mean of the scores obtained using Portfolio, which is consistent with what is found using Rasch analysis. In addition, when interpreting the results in Table 12 (Final Stage 2), it should be noted that the estimated values of the fixed effect (-0.24 and -0.27 respectively) are not significantly different from zero at p=0.05. This means that, based on Model-S, the advantages (or disadvantages) associated with being assessed using Scenario or Portfolio are negligible. In other words, using either Scenario or Portfolio and based on Model-S, a student of average skill level would be expected to get a score roughly equal to the grand mean (2.58) that is predicted by the model.

Table 11. Fixed effects estimates at three stages in the development of Model-M

		Unconditional Stage (with Level-1 variables only)				**Final Stage 1** (without interaction effects)				**Final Stage 2** (with interaction effects)			
		Coefficient				Coefficient				Coefficient			
		Std'zed	Metric	S.E	P-value	Std'zed	Metric	S.E	P-value	Std'zed	Metric	S.E	P-value
Level-1	Intercept	2.58	2.58	0.06	0.00	2.58	2.58	0.01	0.00	2.58	2.58	0.01	0.00
	Scenario	-0.23	-0.76	0.11	0.00	-0.23	-0.76	0.11	0.00	-0.22	-0.76	0.11	0.00
	Portfolio	-0.24	-0.79	0.13	0.00	-0.24	-0.79	0.13	0.00	-0.24	-0.80	0.10	0.00
	interaction with Competency 2									0.05	0.59	0.19	0.01
	Multiple Choice	-0.19	-0.52	0.15	0.01	-0.19	-0.52	0.15	0.01	-0.19	-0.52	0.15	0.01
	Supervisor	0.18	0.39	0.11	0.01	0.17	0.39	0.11	0.01	0.17	0.39	0.08	0.00
	interaction with Competency 4									-0.11	-0.86	0.19	0.00
	interaction with Competency 9									-0.10	-0.78	0.19	0.00
	interaction with Competency 12									-0.07	-0.54	0.19	0.02
Level-2	Competency 1					0.04	0.15	0.05	0.03	0.04	0.14	0.05	0.04
	Competency 2												
	Competency 3												
	Competency 4					-0.07	-0.25	0.05	0.00	-0.07	-0.24	0.05	0.00
	Competency 5												
	Competency 6												
	Competency 7												
	Competency 8					-0.14	-0.47	0.05	0.00	-0.14	-0.48	0.05	0.00
	Competency 9					-0.06	-0.22	0.05	0.01	-0.06	-0.21	0.05	0.01
	Competency 10					-0.04	-0.14	0.05	0.03	-0.05	-0.15	0.05	0.03
	Competency 11												
	Competency 12					0.10	0.34	0.05	0.00	0.10	0.33	0.05	0.00

Notes: - The standard errors (SE) and p-values presented are those obtained using unstandardized (metric) variables.
- Self-Assessment is used as the fifth dummy for balancing the analysis.

Table 12. Fixed effects estimates at three stages in the development of Model-S

		Unconditional Stage (with Level-1 variables only)					**Final Stage 1** (without interaction effects)					**Final Stage 2** (with interaction effects)				
		Coefficient					Coefficient					Coefficient				
		Std'zed	Metric	S.E	P-value		Std'zed	Metric	S.E	P-value		Std'zed	Metric	S.E	P-value	
Level-1	Intercept	2.58	2.58	0.06	0.00		2.58	2.58	0.01	0.00		2.58	2.58	0.01	0.00	
	Scenario	-0.07	-0.24	0.11	0.04		-0.07	-0.24	0.12	0.07	ξ	-0.07	-0.24	0.12	0.07	ξ
	Portfolio	-0.08	-0.27	0.15	0.10	ξ	-0.08	-0.27	0.16	0.12	ξ	-0.08	-0.27	0.14	0.07	ξ
	interaction with Competency 2											0.05	0.60	0.19	0.01	
	Self-Assessment	0.25	0.52	0.15	0.01		0.25	0.52	0.15	0.01		0.25	0.52	0.15	0.01	
	Supervisor	0.41	0.91	0.16	0.00		0.41	0.91	0.17	0.00		0.41	0.91	0.12	0.00	
	interaction with Competency 4											-0.11	-0.87	0.23	0.01	
	interaction with Competency 9											-0.10	-0.77	0.22	0.01	
	interaction with Competency 12											-0.07	-0.53	0.23	0.04	
Level-2	Competency 1						0.04	0.15	0.05	0.03		0.04	0.15	0.05	0.03	
	Competency 2															
	Competency 3															
	Competency 4						-0.07	-0.25	0.05	0.00		-0.07	-0.25	0.05	0.00	
	Competency 5															
	Competency 6															
	Competency 7															
	Competency 8						-0.14	-0.47	0.05	0.00		-0.14	-0.48	0.05	0.00	
	Competency 9						-0.06	-0.22	0.05	0.01		-0.06	-0.21	0.05	0.01	
	Competency 10						-0.04	-0.14	0.05	0.03		-0.05	-0.16	0.05	0.03	
	Competency 11															
	Competency 12						0.10	0.34	0.05	0.00		0.10	0.33	0.05	0.00	

Notes: - The standard errors (SE) and p-values presented are those obtained using unstandardized (metric) variables.

ξ - Variable has no significant effect (p>0.05) but included in the model.

- Self-Assessment is used as the fifth dummy for balancing the analysis.

For the competencies, the results in Tables 11 and 12 show that, after controlling for the differences between the assessment modes, there are advantages associated with being assessed for Competencies 1 and 12, and there are disadvantages associated with being assessed for Competencies 4, 8, 9 and 10. In addition, the results in Tables 11 and 12 show significant interaction effects between Portfolio and Competency 2 and, between Supervisor and Competencies 4, 9 and 12. The interaction effect between Portfolio and Competency 2 mean that there are advantages of being assessed for Competency 2 using Portfolio. On the other hand the interaction effects between Supervisor and Competencies 4, 9 and 12 indicate that there are disadvantages in being assessed on these three competencies by the supervisor.

Despite what has been said above regarding the advantages and disadvantages of being assessed for some competencies, it should be noted that the standardized coefficients for the competencies have small values ($\leq|0.15|$). These small coefficients indicate that any advantages (or disadvantages) that may arise from being assessed for these competencies are very small.

Correlations between assessment modes

The first and the second panels of Table 13 show the correlations between the students' scores from the four assessment modes that are obtained following HLM analyses of the Final Stage 2 of Models M and S respectively.

Table 13. Correlations between assessment modes based on HLM final models

Model	Scenario	Portfolio	Multiple Choice	Supervisor
Model-MC				
Scenario	1.00			
Portfolio	0.95	1.00		
Multiple Choice	0.68	0.53	1.00	
Supervisor	0.57	0.68	0.65	1.00
Model-SA				
Scenario	1.00			
Portfolio	0.97	1.00		
Self-Assessment	0.73	0.78	1.00	
Supervisor	0.69	0.83	0.82	1.00

For both Model-M and Model-S, the results in Table 13 show strong to very strong correlations between the scores obtained using the different assessment modes. Thus, it appears that the ranking of students based on scores obtained using any one of the assessment modes do not differ markedly from the ranking obtained using scores from the other assessment modes. For Scenario and Portfolio, the correlation is near unity (≥ 0.95) regardless of the model considered, which suggests a high degree of agreement between the ranks obtained using these two assessment modes.

When interpreting the correlations presented in Table 13, it should be remembered that these correlations are computed taking into consideration the operational design of the study. In other words, these are the correlations between the assessment modes after the variability between the competencies has been controlled for.

Therefore, the results presented in Table 13 (based on GT approach and HLM analytical procedure) must be giving a better picture of the relationship between the assessment modes compared to the results obtained using the IRT approach (Table 6).

Estimation of variance explained

The percentages of variances available and explained based on Model-M follow closely those based on Model-S, and therefore, only the results for Model-M are presented and discussed in this section.

The results of the final estimation of variance components for Model-M at Final Stage 2 and the results of the analyses of the variance components obtained from the null models are presented in Table 14 in rows 'a' and 'b' respectively. From the information in Table 14 rows ‘a’ and ‘b’, the information presented in rows ‘c’ to ‘f' were calculated. A discussion of the calculations involved here is to be found in Raudenbush and Bryk (2002, p.69-95).

The results in Table 14 show that, 96.1 per cent and 3.9 per cent of the variance of student scores are at the Levels 1 and 2 respectively. These percentages of variance of student scores at the various levels of the hierarchy are the maximum amounts of variance available at those levels that could be explained in subsequent analyses. Thus, the results in Table 14 support what is found using Rasch analysis, that is, there are only small differences between the 12 competencies.

Table 14. Percentages of variance explained based on Model-MC

		Level-1 (N=3,960)	**Level-2** (N=12)	**Total**
a	Null Model	0.851	0.035	**0.886**
b	Final Model (with interaction effects)	0.593	0.000	
c	Variance Available	96.1%	3.9%	
d	Variance Explained	30.4%	98.7%	
e	Total Variance Explained	29.2%	3.9%	33.1%
f	Variance Left Unexplained	66.9%	0.0%	66.9%

In addition, the results in Table 14 show that the variables included in the final model explain 30.4 per cent of 96.1 per cent variance available at Level-1 and that is equal to 29.2 per cent (that is, 30.4 × 96.1) of the total variance explained at the Level-1. Similarly, the variables included in the final model explain all of the variance available at Level 2 (3.9 per cent). Thus, the total variance explained by the variables included in the final model is 29.2 + 3.9 = 33.1 per cent, which leaves 66.9 per cent of the total variance unexplained.

In summary, the results in Table 14 row 'f' indicate that the model developed in this study explains all the between-competencies (Level-2) variance but explains only a small amount of the within-competency (Level-1) variance. The large amount of variance left unexplained at Level-1 (66.9%) strongly indicates that there are other important Level-1 factors influencing the students’ scores that have not been included in the models developed in this study. Certain important Level-1 variables that are not available for examination in this study include student background characteristics (e.g. socio-economic status, gender, age and race) and supervisor background characteristics (e.g. academic qualification and professional experience). Therefore, there is a clear need for a further study to develop models that are the most appropriate for explaining students’ scores and which maximize the total variance explained at Level-1.

SUMMARY

In this study, data from 165 students from Massachusetts and Minnesota are used to examine the validity of five assessment modes (multiple choice test, scenario, portfolio, self-assessment and supervisor rating) in measuring competence in performance of 12 human service skills based on different data analytical theories.

It should be noted that the discussions in this article are based on preliminary results of rich and complex data that need further examination before drawing conclusions or making policy recommendations. Nevertheless, this article has shed some light on the general nature of the scores obtained using the five different assessment modes. Supervisors are evidently more generous in rating the skill levels of their students, compared with the alternative assessment modes, and this raises interesting questions which should form the basis for further analyses of these data. It is clearly premature to make recommendations for policy and practice from an initial and incomplete analysis of these data. Nevertheless, it is clear that classical test theory does not provide a meaningful analysis of the data, and that the use of item response theory in its simplest form, namely Rasch scaling, is inadequate to model fully the structure of the data and the manner in which the data were assembled, while generalizability theory would appear to provide a more adequate view. However, generalizability theory does not convert the data to an interval scale. The GT approach to the examination of the data clearly warrants further investigation, while it might be possible to extend the Rasch approach to take into account more adequately the design of the study.

It is of value to summarize the findings of the investigation reported in this article. The six research questions initially proposed in this article form a useful framework for providing a summary.

1. Can the five assessment modes be used to obtain reliable measures?

After allowance is made for the systematic differences between the five modes of assessment, as well as the systematic differences associated with the 12 competencies in a way that takes into consideration the design of the study, the resulting scores show strong levels of reliability ranging from 0.81 to 0.95.

2. Do the five assessment modes differ in their mean values and spread of scores?

Only after a preliminary examination of these data have differences in mean values and spread of scores been reported in this article, and these are given only for the Rasch approach. It is evident that the supervisor's ratings, and to a lesser extend the self-assessment ratings, are more lenient than the ratings obtained using the other three modes. Moreover, the self-assessment ratings show a smaller spread of scores than do the other four modes.

3. Do the 12 competencies differ in their mean values and spread of scores?

From the preliminary examination of the competency scores, the mean values of the scores are similar except for Competency 8 for which the scores are noticeably lower than for the other 11 competencies.

4. Can the data be effectively combined?

The evidence obtained from this investigation using IRT procedures indicates that with the exclusion of some assessments for particular modes on particular competencies a single scale might be employed. Further analysis is required to examine the strength of the five underlying dimensions associated with modes of assessment, and the 12 underlying dimensions associated with the competencies.

5. What are the correlations between (a) the five assessment modes, and (b) the 12 competencies?

After adjusting the scores using both IRT and GT procedures, the extent of correlation between the different pairs of scores indicates that there are noticeable differences between the different

modes of assessment and the different competencies that would appear to warrant their continued separation in the assessment of student performance.

6. Are there significant interactions between the assessment modes and the competencies?

A limited number of significant interactions were detected that warrant further examination. It should be noted that three out of the four significant interactions were associated with the supervisor mode of assessment and one interaction involved the portfolio mode of assessment.

Clearly there are many more questions that could be asked about the relationships between the models of assessment and the competencies for which answers might be expected to be provided by further analysis of this rich body of data. Such questions would have considerable practical significance for the assessment of competencies and performance skills using the different models of assessment available.

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A Correspondence Analysis of Child-Care Students' and Medical Students' Knowledge about Teaching and Learning

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This paper describes the application of correspondence analysis to transcripts gathered from focussed interviews about teaching and learning held with a small sample of child-care students, medical students and the students' teachers. Seven dimensions emerged from the analysis, suggesting that the knowledge that underlies students' learning intentions and actions is multi-dimensional and transactive. It is proposed that the multivariate, multidimensional, discovery approach of the correspondence analysis technique has considerable potential for data analysis in the social sciences.

Teaching, learning, knowledge, correspondence analysis

INTRODUCTION

The purpose of this paper is to describe the application of correspondence analysis to rich text-based data derived from interviews with teachers and learners about their knowledge about teaching and learning. Correspondence analysis is a non-linear, multidimensional technique of multivariate descriptive analysis that "specialises in 'discovering,' through detailed analysis of a given data set" (Nishisato, 1994 p.7). A description of what teachers and learners know about teaching and learning will assist in developing the educational community's understanding about teaching and learning. If researchers, designers and policy makers are well informed about teachers' and learners' knowledge, they will be better equipped to design and recommend educational programs that meet students' learning needs. If teachers possess high quality knowledge about their own, and their students', knowledge then they will be better equipped to design and deliver high quality teaching. If students possess high quality knowledge about teaching and learning, in particular their own learning, they will be better equipped to engage fruitfully in educational programs.

Background

The domain of investigation into teachers' and learners' knowledge is founded in philosophical and psychological literature: Bandura's (1993; 1997; 2001) social-cognitive theory; Kerr's (1981) philosophy of intentions, plans and actions; philosophies of constructivism (Phillips, 1995; Phillips, 2000; Prawat and Floden, 1994); and the psychological cognitive mediation paradigm (Winne, 1987) converge to provide a model of each person as a learner who actively constructs and acts upon his or her own knowledge. Hence, we argue that teachers and learners come to educational settings with knowledge about teaching and learning, and that such knowledge directly influences teachers' and learners' engagement with educational opportunities. Therefore,

knowledge about teachers' and learners' knowledge about teaching and learning is as essential to educators as is knowledge about students' and teachers' subject-matter conceptions (Chi and Roscoe, 2002; Driver, Asoko, Leach, Mortimer, and Scott, 1994; Shulman, 1987; Wandersee, Mintzes, and Novak, 1996). It follows from the cognitive mediation and psychological and social constructivist paradigms that a primary source of teachers' and learners' knowledge is teachers and learners themselves.

The extensive work of researchers such as Marton (1993) on conceptions, Perry (1970) and Hofer (Hofer, 2000; Hofer and Pintrich, 1997) on epistemologies, Entwistle (1979) and Biggs (1979; 1987) on learners' approaches to learning and studying and Trigwell and Prosser (Trigwell, Prosser, and Taylor, 1994; Trigwell, Prosser, and Waterhouse, 1999) on teachers' approaches to teaching have made substantial contributions to educators' understandings about teachers' and learners' knowledge. However, this paper inquires into people's knowledge about a broader range of constructs drawn from the educational psychology literature, such as knowledge construction, self-efficacy, self-management, metacognition, purposes for learning, and assessment.

An introduction to the correspondence analysis technique

The aim of correspondence analysis is to find a low-dimensional representation of the dependence between predetermined categories in a two-way contingency table (Hair, Anderson, Tatham, and Black, 1995; van der Heijden and de Leeuw, 1985). Correspondence analysis can be conceptualised as being similar to principal components analysis, with the qualification that correspondence analysis is able to deal with frequency, or count, data (Greenacre, 1984; Nishisato, 1994; Weller and Romney, 1990). Examples of the use of correspondence analysis can be found in medical research (Greenacre, 1992), students' and teachers' cognitions about good teachers (Beishuizen, Hof, Putten, Bouwmeester, and Asscher, 2001), cross-cultural patterns of attachment (van IJzendoorn and Kroonenberg, 1988), higher education institution image (Ivy, 2001), personalities (Nishisato, 1994), and marketing research (Bendixen, 1996).

Correspondence analysis is one of many names for similar methods that have evolved in different countries under different authorship. Nishisato (1994) and Greenacre (1984) surveyed the various paths of development of correspondence analysis and closely related, or identical, techniques. Names for similar techniques have included optimal scaling, dual scaling, canonical correlation analysis and homogeneity analysis (Greenacre, 1984; Nishisato, 1994; Tenenhaus and Young, 1985; van der Heijden and de Leeuw, 1985; Weller and Romney, 1990).

The ability of correspondence analysis to deal with frequency data provides a practical methodological strength, for it is possible to work with data that may not meet the restrictions on data necessary for other statistical analyses. Thus, for example, the researcher is not forced into proceeding "as if" the data conform to a normal distribution (Shavelson, 1988). The interpretive strength of correspondence analysis lies with its representation of low-dimensional solutions in graphical displays, which permit the researcher to make comparisons between participants, between variables, and between participants and variables in their relative placement in shared low-dimensional space.

Patterns of inter-dependence

Correspondence analysis employs chi-square distances to calculate the dissimilarity (or similarity) between the frequencies in each cell of a contingency table. The concept underlying the calculation of the chi-square distances is cell-independence. Pairs of cells whose observed and expected values are the same can be considered to be independent of each other. Pairs of cells whose observed and expected values are different can be investigated further to ascertain patterns of interdependence.

The correspondence analysis program standardises and transforms the frequency data in the contingency table by calculating chi-square distances from the row and column profiles (actual minus expected cell values as a proportion of marginal totals). The program then reduces the complexity contained in the row and column profiles by creating a low-dimensional representation of the row and column profiles. It achieves this by factoring the basic structure (through a singular value decomposition) of the chi-square distance matrix, resulting in a set of row vectors, column vectors and singular values (Greenacre, 1984; Weller and Romney, 1990). Finally, the correspondence analysis scales the vectors to create scores for each participant and each variable. These scores are plotted in a visual display (Weller and Romney, 1990).

The correspondence analysis solutions can be compared to multidimensional scaling (MDS) solutions, in that both present a low-dimensional solution in a map that plots point coordinates in relative distance to each other. Major tasks for the researcher with both MDS and correspondence analysis are to select the appropriate numbers of dimensions and to interpret the meaning of those dimensions (Hair et al., 1995).

Normalisation

Correspondence analysis requires the researcher to choose between different methods of normalisation. Correspondence analysis using principal normalisation-columns calculates the Euclidean distances between a column point and the origin, which approximates the chi-square distance between the column category and the average column category. The correspondence analysis program then prepares a graphical representation of the distance coordinates (the principal coordinates of the columns) in low dimensional space. As the Euclidean distance between any two points (variables) in the graphical display approximates the chi-square distance between the corresponding columns of the correspondence table, it is possible to conduct a visual inspection of the actual magnitude of the distances between column points (variables) (Gabriel, 2002; Greenacre, 1984; Nishisato, 1994; SPSS, 2001). Correspondence analysis using principal normalisation-rows does the same as just described, but for the rows of the contingency table. It is therefore possible to conduct a visual inspection of the graphical display to determine the actual magnitude of the distances between, in this case, the row points (participants). Correspondence analysis using the symmetrical normalisation option spreads the inertia (squared correlation between row and column scores) across rows and columns. The resulting graphical representation is of the principal coordinates of the rows, and of the columns, that can be interpreted in terms of the relative, but not actual, magnitude of the distances between points.

The differences between the methods of creating the graphical representations has caused debate in the literature about the most appropriate choice of normalisation and methods of interpretation of the visual display (Gabriel, 2002; Greenacre, 1984; Hair et al., 1995; Nishisato, 1994; SPSS, 2001). Gabriel (2002) calculated goodness-of-fit for the various forms of graphical representation available in correspondence analysis. He concluded that researchers who have a specific interest in actual magnitudes of difference between rows (participants) or columns (variables) should choose the appropriate principal normalisation (row or column). However, researchers whose interest lies in comparing the general orientation of row points and column points, rather than visualising actual magnitudes, are well served by the symmetrical normalisation option:

> The symmetric biplot, in addition to its optimal fit of the data, proportionally fits the form and the variance almost optimally and is an excellent candidate for general usage, unless one requires representation of the actual magnitudes. (Gabriel, 2002 p. 435)

Our concern in the current project lies with interpreting the meaning of the dimensions extracted in the low-dimensional solution, and in interpreting the placement of participants relative to those

dimensions. We therefore selected symmetrical normalisation for the graphical representations and analyses in this paper.

Assumptions

Correspondence analysis is relatively free from assumptions about the nature of the data. It can work with counts (frequencies), and, as mentioned, does not require data that conform to a normal distribution (Greenacre, 1984). The main assumption, or limitation, of correspondence analysis is that all of the relevant variables are included in the analysis (Hair et al., 1995). If a key variable is overlooked in the design stage of the research, then the final scaling solution is impoverished. This is an assumption that is shared with other compositional techniques such as factor analysis, but can be contrasted with decompositional techniques such as multi-dimensional scaling, which employ respondents' (unconstrained) overall judgements of similarity to create the perceptual maps. The multiple readings and codings of the interview transcripts undertaken for this study encourages our belief that the variables included in the analysis are reasonably comprehensive.

METHOD

The Participants

Two participant groups from a larger interview based study were selected with a view to conducting a correspondence analysis: 12 child-care students and their two teachers, and seven medical students and their mentor (a General Medical Practitioner). The reasons behind the selection of these two groups are two-fold. On the one hand, it seems reasonable to propose that these two groups of learners are engaged in what might reasonably be considered to be different levels of demand and achievement in formal, academic learning: that is, different academic press. On the other hand, the two groups have features in common, such as their age range and the structure of their respective courses.

The medical group contained seven adult students enrolled in the third (clinical) year of a graduate entry, four year, medical education program run by a university in South Australia. Thus, these seven participants had completed an undergraduate degree, in some cases had completed post-graduate qualifications, and one participant held a PhD in science. Furthermore, the seven students had undergone a further selection process, based upon interview and performance in the first two years of the medical degree, for entry into an innovative new program of rural, community-based clinical placement. Added to this participant sample was the medical students' General Medical Practitioner mentor, who had day-to-day responsibility for overseeing the students' clinical training placements and range of clinical learning experiences. The high level of academic achievement that the participants in this group had achieved suggested that we could expect these students to have had considerable exposure to formal teaching-learning environments, and to have developed knowledge and strategies to enable them to achieve success in such environments.

The child-care group included 12 adult students taking a pre-qualification, Certificate Level III in Community Services: child-care, run by a Technical and Further Education College in South Australia. This certificate is of one-year duration, and equips students to gain base-level (unqualified) employment as a child-care worker. Participants' prior educational level ranged from minimal secondary schooling to completion of five years of secondary schooling, with the exception of one student who was concurrently enrolled in degree studies at university. Compared to the students in the medical sample, the students in the child-care sample could be expected to have experienced considerably less exposure to formal teaching-learning environments, and had not necessarily achieved success in such environments (as did become evident during the

students' interviews). Included with this participant sample were the students' two teachers, who were responsible for the partial design and delivery of the course material, and for conducting the competency based assessment that led to the students' certification. Both child-care teachers held Bachelor of Education degrees.

All participants are of English or European heritage. Socio-economic class based upon participants' and parents' occupation ranged from unemployed/retired through unskilled, skilled, technical to professional. Ages ranged from 18 to mid 40s.

Although the content of the medical course and the child-care course was vastly different, the two courses had interesting similarities. The structure of the child-care course and the medical course was such that students spent Wednesday of each week in classroom based activities such as lectures, small group discussions, video presentations and, in the case of the medical students, problem-based learning sessions. The other days of the week required the students to attend rostered, on-the-job, training. For child-care students, this training was at a fully operational, metropolitan, public access, child-care centre. For medical students, training was at rural, community based general practice surgeries and public, rural community hospitals.

A second point of similarity between the two courses lies in the area of developing effective interpersonal relationships. Medical practitioners interact with patients, clients' immediate and extended families, related health and other professionals, community organisations (shelters, support groups) and so on. Child-care workers interact with the children in their care, and also with immediate (sometimes estranged) family, extended family, related human service and other professionals, community organisations (libraries, play groups, pre-schools) and so on. Thus the nature of the teaching and learning that the two participant groups engaged with was both different, and similar.

The interviews

We reviewed the teaching and learning literature to compose a set of 18 focus questions to guide the direction of each interview. The focus questions and their broad theoretical foundations are included at Appendix A. Each interview also included extra probing questions according to the idiosyncratic direction that each interview took.

In particular, our aim was to comprehensively capture each participant's understandings about their own learning *in action*. This, 1) was based upon our recognition of the importance of all three vertices of Bandura's (1997) cognition, environment and behaviour triangle of social-cognitive theory, 2) heeds the role that context plays in teaching and learning (Lave, 1988), and 3) adheres to Candy's (1991, p.457) suggestion that "the person in context" be the main unit of analysis. Interviews were therefore conducted at participants' usual place of learning, either during a break in, or immediately after, a learning session. Each interview lasted from about 20 to 90 minutes, with the average being about 45 minutes. Interviews were transcribed verbatim and all participants' names were substituted with pseudonyms.

Coding the interview transcripts

Participants' interview transcripts were coded so that exact frequencies of participants' statements that could be categorised into 38 variables were recorded. The 38 variables were identified in an earlier stage of the research as being key issues in the educational psychology literature as well as being salient to the participants themselves (Askell-Williams, 2001), and are presented in Table 1.

Table 1. Categories of Knowledge about Teaching and Learning

Level 1 Categories	Level 2 Categories and Sub-categories	short labels of variables included in correspondence analysis
The Nature of the Learner	**Motivation**	
	value of the subject matter	
	useful and/or important for present and/or future	useful
	interest #	interest
	like; enjoy; fun #	like
	cost #	cost
	individual achievement goals	
	achieve certification/qualification	certification
	master the subject matter	mastery
	achieve certification and mastery	certification + mastery
	self-fulfillment through achieving goals	self-fulfillment
	personal development through exposure to opportunities	personal development
	self-efficacy	
	strong beliefs in own capabilities	strong self-efficacy
	weak beliefs about own capabilities	weak self-efficacy
	uncertain and/or reflective evaluation of own capabilities	uncertain self-efficacy
	task assessment	
	task is easy #	easy
	task is difficult	difficult
	uncertainty about difficulty of task	uncertain task difficulty
	expectancy	
	expect success	expect success
	hope and/or uncertain expectations for success	hope
	expect failure *	
	Cognition and Metacognition	
	metacognition (thinking about thinking)	metacognition
	individual differences in personality and learning styles	individual differences
	Management	
	self-regulation (thinking about and managing behaviour)	self-regulation
	external regulation (other people organise the students' learning behaviours)	external regulation
	self-regulation responding to external facilitation by teachers and mentors	self x external regulation
The Nature of Teaching and Learning	**Constructing knowledge**	
	constructing knowledge (joining, building up, adding on)	construct
	linking theory with practice and practice with theory	theory x practice
	belonging to a learning community	community of learners
	Transmitting-receiving information	
	transmitting and/or gathering information	transmit/gather
	Schooling activities	
	assessment and feedback	assessment/feedback
	logistics of teaching (human and material resources)	logistics
	facilitate learning (designing and delivering learning experiences)	facilitate
	busywork (activities without intellectual engagement)	busywork
The Nature of the Learning Environment	**Learning in authentic, situated practice**	
	learning through authentic practice (on the job training)	authentic practice
	Learning in class or through individual study	
	learning through studying (at home and classroom based)	studying
	learning through social interaction (discussions, watching, listening)	social learning
	supportive environment (encouragement, safety net, caring)	supportive environment
The Nature of the Subject Matter	**Subject matter purpose**	
	purpose of learning experiences	purpose
	learning is a lifelong endeavour	lifelong learning
	Subject matter content**	

** participants' accounts were so thoroughly embedded in content that this category was not coded separately
* this category did not appear in transcripts
# omitted from Correspondence Analysis due to poor fit

From Table 1 it can be seen that four categories provide the foundational structure for organising the interview data at Level 1, namely the nature of the learner, the nature of teaching and learning, the nature of the learning environment, and the nature of the subject-matter. Next, organising the data at Level 2, are 38 variables drawn from educational psychology, such as motivation and constructing knowledge. It is important to note that any statement recorded in an interview transcript could be coded to more than one variable, thus the total number of codes per transcript exceeds the total number of statements per transcript. This multiple coding procedure was selected after trials of both multiple and discrete coding. We assessed that multiple coding captured more of the richness in the data, even though it made the coding task more complex and time consuming. Note that one variable, *subject matter content*, was ubiquitous and therefore not coded separately. Another variable, *expectancy for failure*, did not appear. Thus the initial run of the correspondence analysis was with 36 variables.

Following coding, the report function in NUD*IST summed the frequencies of occurrence of each variable in each transcript, ready for entry into a contingency table.

The contingency table

We used the correspondence analysis program in SPSS (1995). The initial step in a correspondence analysis is to enter the frequencies of participants' responses in the form of a contingency table, which is a two-way table with, in the present case, 22 participants' names as row headings, and 36 variables as column headings. By way of illustration, Table 2 is a portion of the contingency table.

Table 2. Portion of the 22 X 36 contingency table

Participants	purpose	authentic practice	social learning	supportive environment	meta-cognition	self-regulation	(n=36)	Totals
Anne	24	119	14	20	304	172		1431
Josi	46	171	0	0	159	144		1420
John	19	117	7	0	108	117		735
Rory	38	249	21	0	167	294		2080
Roxy	32	285	27	0	430	169		2005
Sally	15	206	31	3	513	493		3193
Troy	9	297	15	5	175	227		1430
Cait (p=22)	0	78	21	2	47	84		461
Totals	537	2597	317	340	2645	2897		**21860**

From Table 2 it can be seen that in Row 1, Anne made 24 statements about the *purpose of learning*, 119 statements about *learning in authentic practice* and so on, with a total of 1431 statements. Reading down the columns, the participant group as a whole made 537 statements about the *purpose of learning*, 2597 statements *about learning in authentic practice*, and so on. The total number of coded statements for the 22 participants is 21,860.

Initial trials of correspondence analysis

Initial trials of the correspondence analysis identified that some of the variables achieved a poor fit of less than 0.5 (Hair et al., 1995). Fit is determined by the proportion of variance in each variable accounted for by the dimension. It is measured by the squared correlation (Clausen, 1998). The squared correlation is the same as $\cos^2$ for the angle between a line from the centroid to the point and the line of the dimensional axis. If the squared correlation is high, then the angle between the vector of the point and the dimensional axis is small, and the point is therefore situated in the direction of that dimensional axis (Clausen, 1998). If all possible dimensions are included in the final analysis (in the present case 21, being one less than the smaller total of points

in the rows and columns), then the squared correlations sum to one. In a lower dimensional solution, the squared correlations provide an index of fit of the representation of each point in the solution, which is equivalent to communalities in principal components analysis (Clausen, 1998).

It was necessary to achieve a compromise between retaining all of the variables in the analysis and the interpretability of the solution. Therefore, a generous cut off point for total fit of variables was set at 0.4, resulting in the removal of four variables from the analysis. J. P. Keeves (personal communication 28th May, 2003) suggested that a potential reason for the poor fit of the four variables was that those variables did not show reliable patterns of differentiation between participants. Looking at the nature of the variables, and from our in-depth knowledge of the participants' transcripts, this seems to be a reasonable explanation. For example, the first three poorly fitting variables are the motivational variables *interest*, *like*, and *cost*. These three motivational variables seem salient to all participants. The fourth variable, *easy*, occurs with extremely low frequency, and thus can be considered irrelevant in participants' accounts. Therefore, the final run of the correspondence analysis was with 32 variables.

In addition to providing measures of fit for variables, correspondence analysis also provides measures of fit for participants' scores. Fit for participants' scores in a four-dimensional solution range from low (0.170) to high (0.905), with five participants' scores falling below 0.3. Moving to a seven dimensional solution, two participants' scores still fall below a 0.4 cut-off point for fit (0.355 and 0.379). An essential premise of this paper is the importance of finding out about the knowledge held by teachers and learners. We were therefore reluctant to remove participants from the analysis so as to achieve a neat statistical model, especially as this is a relatively small sample study. We are also mindful that Jean-Paul Benzecri, arguably the father of correspondence analysis, conceptualised the correspondence procedure as being a technique that is founded on inductive reasoning, describing in a complete and honest way, the data set at hand and where, "the model must fit the data, not vice, versa" (cited in Greenacre, 1984, p. 10). Therefore, we retained all 22 participants' transcripts in the analysis. However, it is necessary to maintain constant contact between the final dimensional solutions and the original data, such that unwarranted claims are not made. It is possible, of course, to achieve better fit of participants' scores by moving to a higher dimensional solution, however, this must be balanced against the basic aim of employing the correspondence analysis, which is to seek a parsimonious way of representing and understanding the data.

The row and column profiles

Each row and column of the contingency table is characterised by its profile, which is a 'system of proportions' (Benzecri, 1992). To begin, the correspondence analysis program calculates the so called 'row profiles,' which are the relative proportions of each variable within all of the variables mentioned by each participant. The row profiles permit a within-participant comparison of the variables. Table 3 is the row profile for one participant, Anne (medical).

From Table 3, it can be seen that of all of the coded statements in Anne's transcript, 0.017 (or 1.7%) referred to the purpose of learning, 0.083 (8.3%) referred to learning in authentic practice, and so on. The marginal total of 1 equates to 100 per cent of all coded statements in Anne's transcript.

Next, the correspondence analysis program calculates the 'column profiles.' The column profiles are the proportion of each variable mentioned by each participant as a total of all participants' mentions of that variable. Profiling participants across the column variables permits between-participant comparisons. Table 4 is the column profile for Anne's coded statements.

Table 3: Row profile: Anne (medical): Proportion of each variable appearing in Anne's transcript

indicator	proportion	indicator	proportion	indicator	proportion
purpose	0.017	mastery	0.000	individual differences	0.005
studying	0.108	certification x mastery	0.000	construct	0.010
authentic practice	0.083	fulfilment	0.009	transmit/gather	0.083
social learning	0.010	personal growth	0.000	assessment/feedback	0.120
supportive environment	0.014	strong self-efficacy	0.001	logistics	0.010
metacognition	0.212	weak self-efficacy	0.000	facilitate	0.063
self-regulation	0.120	uncertain self-efficacy	0.000	busywork	0.000
external regulation	0.001	difficult	0.000	community of learners	0.000
self x ext. regulation	0.027	uncertain task difficulty	0.000	theory x practice	0.062
useful	0.010	expect success	0.005	lifelong learning	0.002
certification	0.002	hope for success	0.025	margin total	1.000

Table 4: Column profile: Anne (medical): Proportion of Anne statements in all participants' statements across all variables

indicator	proportion	indicator	proportion	indicator	proportion
purpose	0.045	mastery	0.000	individual differences	0.056
studying	0.159	certification x mastery	0.000	construct	0.024
authentic practice	0.046	fulfilment	0.040	transmit/gather informati	0.112
social learning	0.044	personal growth	0.000	assessment/feedback	0.090
supportive environment	0.059	strong self-efficacy	0.005	logistics	0.037
metacognition	0.115	weak self-efficacy	0.000	facilitate	0.125
self-regulation	0.059	uncertain self-efficacy	0.000	busywork	0.000
external regulation	0.059	difficult	0.000	community of learners	0.000
self x ext. regulation	0.048	uncertain task difficulty	0.000	theory x practice	0.043
useful	0.034	expect success	0.019	lifelong learning	0.039
certification	0.028	hope for success	0.242	margin	0.067

From Table 4 it can be seen that Anne contributed 0.045 (or 4.5%) of all participants' statements about the purpose of learning, 0.046 (4.6%) of all participants' statements about learning in authentic practice, and so on. Table 4 also contains the marginal total for Anne, 0.067, which is the proportion of Anne's statements about all variables relative to all participants' statements. The marginal totals provide the mass, or weight, of the contribution of each participant, (and each variable), to the dimensional solution (Greenacre, 1984).

An early result from the profiles generated by the correspondence analysis can be obtained by graphing the proportional marginal totals of each participant, as displayed in Figure 1. It is clear from Figure 1 that there is considerable variation in the total number of statements made by participants, ranging from 0.009 (0.9%) of total statements for Bec (child-care) to 0.159 (16%) of total statements for Sally (medical). It is also possible to discern a pattern of response levels between groups of participants, with the child-care students occupying the lowest 10 positions, through a mixture of child-care students, teachers and medical student in the middle ranges, to the top six positions being held by medical students. In summary, child-care students provided the fewest, and medical students the most, statements about the 32 variables of knowledge about teaching and learning.

It is possible to continue to investigate the numerical information contained in the row and column profiles to search for patterns of occurrence of variables. One way of doing this would be to provide a graph such as that in Figure 1 for each participant across all variables, and then each variable across all participants: 22 x 32 graphs. It is immediately apparent that information presented in such a fashion would soon become too large to manage and extremely difficult to penetrate in a meaningful way. Therefore, the next step in the correspondence analysis is to reduce the complexity contained in the row and column profiles by creating a low-dimensional representation.

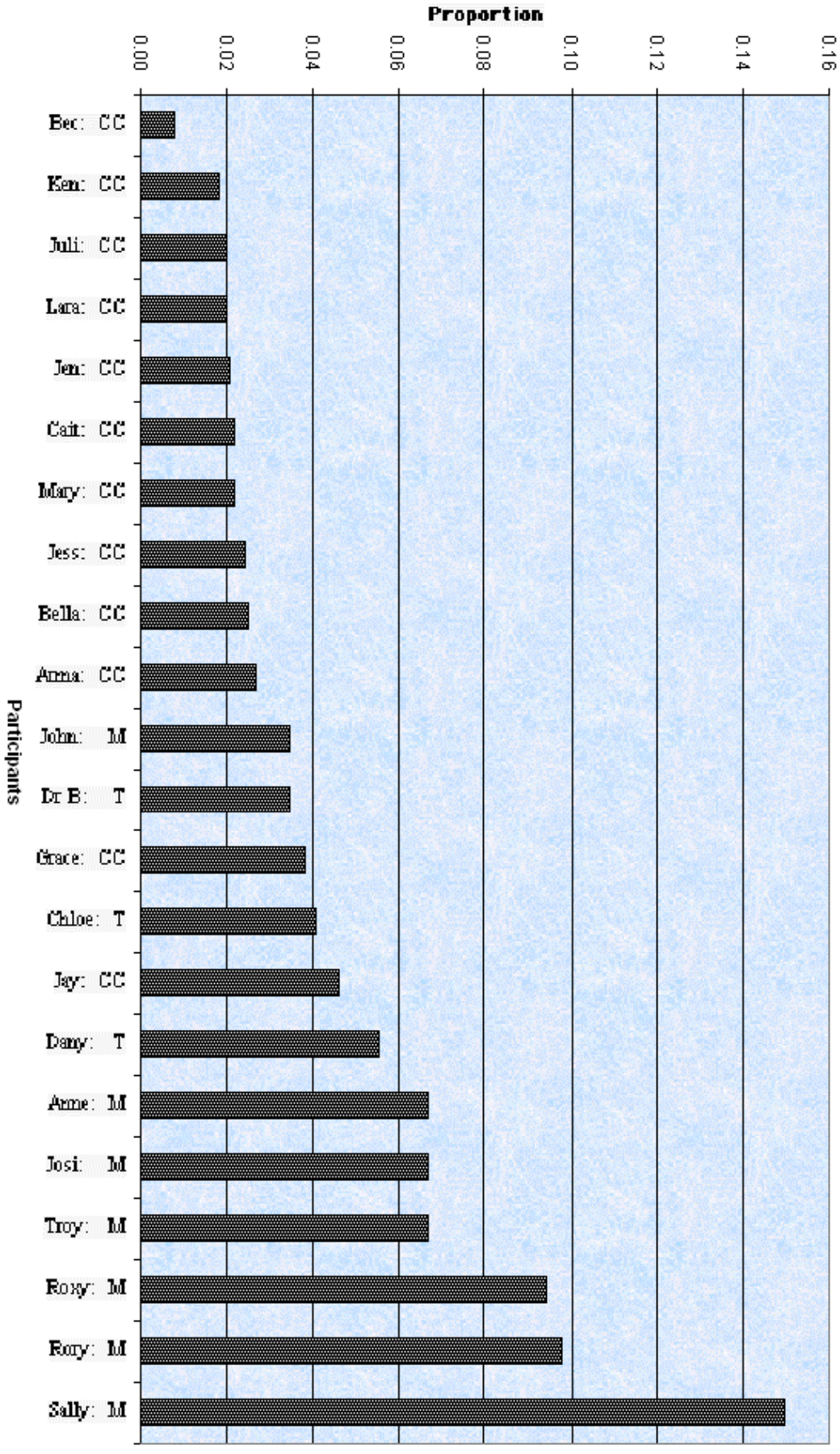


Figure 1. Proportional marginal totals for each Participant

The 32 variable correspondence analysis solution

Table 5, taken from the correspondence analysis (symmetrical normalisation) output for the 22 participants and 32 variables, contains the singular values, inertia, and proportion of variation explained for 21 dimensions. (The maximum number of singular values equals the number of dimensions possible, which is one less than the lesser number of participants and variables.)

From Table 5, the singular value indicates the relative contribution of each dimension to an explanation of the inertia, or variance, in the participant and variable profiles. The singular values can be interpreted as the correlation between the rows and columns of the contingency table, and are analogous to the Pearson correlation coefficient in correlation analysis (SPSS, 2001). As in principal components analysis, the first dimension explains as much variance as possible, the second dimension is orthogonal to the first and displays as much of the remaining variance as possible, and so on (Clausen, 1998; SPSS, 2001). Hair et al. (1995) recommended that singular values of greater than 0.2 indicate that the dimension should be included in the analysis. However, this cut-off point must be balanced against the proportion of variance explained by each dimension, as well as achieving a balance between the interpretability of multiple dimensions and a model that captures the complexity of the data (Benzecri, 1992). The singular value and the inertia are directly related ($I=SV^2$): the inertia is an indicator of how much of the variation in the original data is *retained* in the dimensional solution (Bendixen, 1996).

Table 5. Singular values and proportion of variance explained

Dimension	Singular Value	Inertia	Proportion Explained	Cumulative Proportion
1	0.421	0.177	0.210	0.210
2	0.347	0.120	0.143	0.353
3	0.322	0.103	0.123	0.476
4	0.281	0.079	0.094	0.570
5	0.249	0.062	0.073	0.643
6	0.246	0.060	0.072	0.715
7	0.221	0.049	0.058	0.773
8	0.193	0.037	0.044	0.817
9	0.187	0.035	0.042	0.858
10	0.156	0.024	0.029	0.887
11	0.141	0.020	0.024	0.911
12	0.127	0.016	0.019	0.930
13	0.121	0.015	0.017	0.948
14	0.104	0.011	0.013	0.960
15	0.096	0.009	0.011	0.971
16	0.086	0.007	0.009	0.980
17	0.083	0.007	0.008	0.988
18	0.065	0.004	0.005	0.993
19	0.056	0.003	0.004	0.997
20	0.038	0.001	0.002	0.999
21	0.033	0.001	0.001	1.000
Total		0.843	1.000	1.000

On the one hand, the purpose of running a correspondence analysis is to reduce the complexity in the data. On the other hand, it is not helpful to select such a low dimensional solution that important features are overlooked. One method for assisting in the decision about the most appropriate number of dimensions to interpret is to prepare a scree plot of the proportions of variance explained, in order to observe where the proportion is seen to drop away at a less rapid rate (Clausen, 1998; Hair et al., 1995). Such a scree plot is presented in Figure 2.

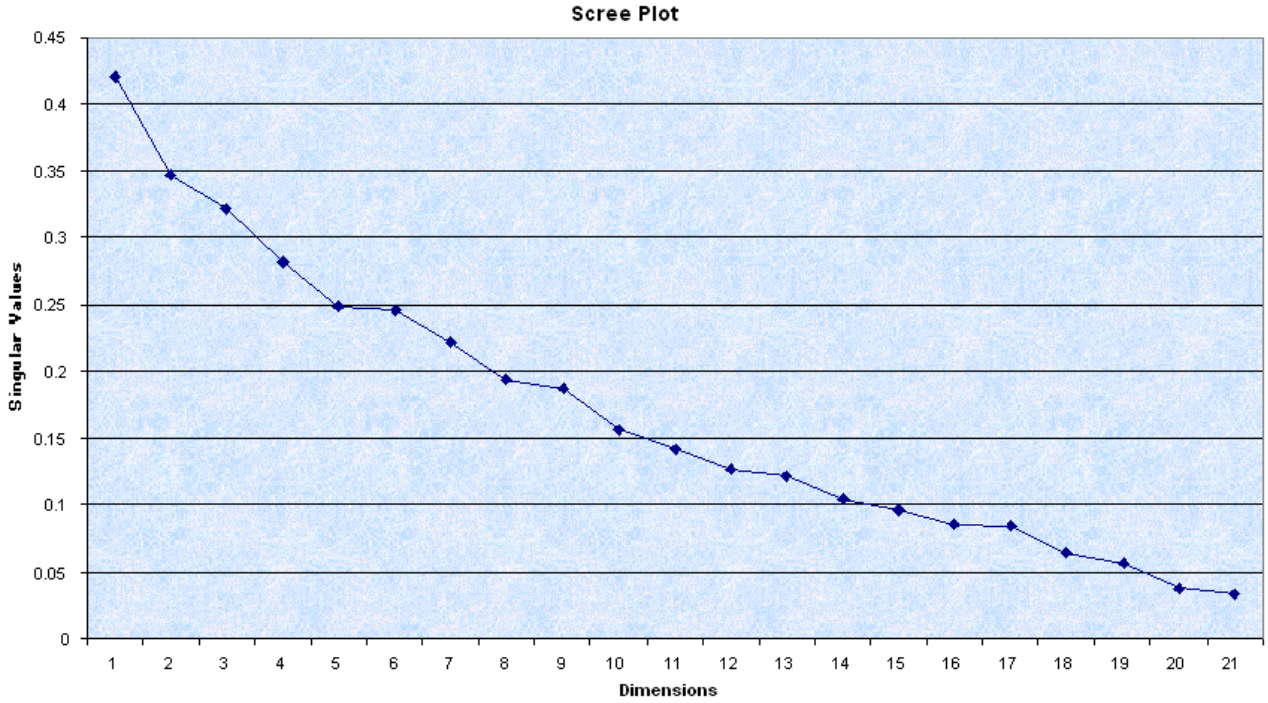


Figure 2. Scree plot of singular values

The scree plot suggests that the proportion of variance explained drops away less rapidly after the tenth dimension. However, we considered that working with 10 dimensions would not achieve the conceptual clarity that we were seeking with the use of correspondence analysis. Consequently, we decided to adopt the singular value of 0.2 as a cut off point as a first step, and to attempt to interpret the first seven dimensions. Although attempting to interpret seven dimensions seems excessive when compared to literature about interpretation of multidimensional scaling solutions, where usually two or three dimensions are interpreted (for example, see Davison, 1983), if comparisons are made to exploratory factor analysis, it is common to search for potential extra factors (Hair et al., 1995). Although most of the correspondence analysis literature deals with two or three dimensions, there are some exceptions, such as Nishisato's (1994) interpretation of seven dimensions of personality.

In order to interpret each dimension the authors met on multiple occasions to review the correspondence analysis solution and to identify the potential latent concepts underlying the combination of variables contributing to each dimension. Our discussions were extensive, comparing each dimensional combination of variables with our knowledge of the literature and contemporary teaching and learning environments. Our discussions can be theoretically conceptualised as a "peer debriefing" process for establishing validity in qualitative enquiry, as described by Creswell and Miller (2000):

> A peer review or debriefing is the review of the data and research process by someone who is familiar with the research or the phenomenon being explored. A peer reviewer provides support, play's devil's advocate, challenges the researcher's assumptions, pushes the researchers to the next step methodologically, and asks hard questions about methods and interpretations (Lincoln & Guba, 1985). (Creswell & Miller, 2000 p. 129)

Our discussions continued until we reached complete agreement upon our interpretations of each dimension.

The graphical displays

To manage the visual presentation of seven dimensions we will present successive two-dimensional displays. Table 6 contains the coordinates, proportional contributions of points (variables) to dimensions, and fit of dimensions to points (squared correlations) that generate the graphical displays.

Table 6. Correspondence Analysis Solution

	A	B	C	D	E	F	G	H
Participants	**Margin**	**Scores on each dimension**						
		Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5	Dimension 6	Dimension 7
Anne: medical	0.067	0.112	-0.261	0.130	-0.308	0.147	-0.240	0.524
Josi: medical	0.067	-0.477	-0.174	0.062	0.212	-0.512	0.121	-0.088
John: medical	0.035	-0.412	-0.381	-0.023	0.332	-0.132	-0.447	0.268
Rory: medical	0.098	-0.464	-0.136	-0.128	0.252	0.199	-0.530	-0.147
Roxy: medical	0.094	-0.251	0.191	0.223	-0.069	-0.821	0.477	-0.091
Sally: medical	0.150	-1.000	-0.134	-0.286	-0.377	0.403	0.164	-0.144
Troy: medical	0.067	-0.138	-0.111	0.052	0.599	-0.598	-0.560	0.589
Cait: child-care	0.022	0.395	0.467	0.373	0.430	-0.765	-0.050	0.053
Arma: child-care	0.027	0.147	0.692	0.284	-0.448	0.657	0.157	0.003
Grace: child-care	0.038	0.509	0.783	0.232	0.666	0.238	0.426	0.522
Bella: child-care	0.025	1.094	0.301	-1.924	-0.338	-0.417	-0.142	-0.538
Jen: child-care	0.021	0.204	0.791	0.443	-0.564	0.337	-0.301	0.171
Jess: child-care	0.024	0.395	2.100	0.530	-0.487	0.138	-1.328	-1.351
Jay: child-care	0.046	0.547	0.366	-0.092	-0.280	0.686	0.268	1.147
Juli: child-care	0.020	0.822	-0.247	-0.522	-0.007	-0.220	-0.430	0.396
Ken: child-care	0.018	0.600	1.510	0.688	0.137	0.416	0.583	0.295
Lara: child-care	0.020	1.315	-0.279	-1.778	-0.516	-0.215	0.344	0.014
Mary: child-care	0.022	0.165	0.352	0.501	-0.218	-0.884	0.957	-0.507
Bec: child-care	0.008	1.269	-0.017	-2.581	0.023	-0.332	-0.259	0.336
Chloe: teacher	0.041	0.545	-0.561	0.283	0.047	0.398	1.194	-0.534
Dany: teacher	0.055	1.115	-1.301	0.996	-0.752	0.011	-0.475	-0.302
Dr B: teacher	0.035	0.568	-0.423	0.003	1.955	0.895	0.089	-0.754
Variables								
purpose	0.025	0.642	-0.409	0.484	1.062	0.617	0.418	-0.963
studying	0.046	-0.173	0.431	0.176	0.056	0.001	-0.595	0.470
authentic practice	0.122	0.198	0.109	-0.225	0.794	-0.181	-0.129	0.070
social learning	0.015	0.669	-0.824	1.155	-0.598	-0.148	0.216	-0.420
supportive environ.	0.016	1.122	1.426	0.918	-0.179	1.503	0.856	1.698
metacognition	0.125	-0.315	-0.024	0.168	-0.309	-0.223	0.138	0.243
self-regulation	0.136	-0.033	0.315	-0.297	-0.141	0.122	-0.154	0.436
external regulation	0.001	2.244	-0.056	-3.265	-0.633	-0.078	1.524	-0.808
self x ext. regulation	0.039	-0.839	-0.292	-0.203	0.137	-0.053	-0.493	0.013
useful	0.020	-0.261	0.013	0.344	0.492	-1.668	0.033	0.122
certification	0.005	1.140	1.149	-0.804	-0.569	0.175	0.100	0.183
mastery	0.017	-0.098	-0.301	0.338	0.177	-0.515	1.384	-0.341
certification x mastery	0.012	-1.750	-0.401	-0.422	-0.764	0.466	0.640	-0.582
fulfilment	0.016	0.197	1.393	0.220	-0.214	-0.437	-0.443	-0.772
personal growth	0.005	0.924	3.799	1.008	-1.343	0.841	-1.853	-2.468
strong self-efficacy	0.019	-0.645	0.898	0.127	-0.274	0.153	-0.810	-0.932
weak self-efficacy	0.007	-0.164	0.788	0.484	0.580	-1.240	0.530	0.187
uncertain self-efficacy	0.005	0.353	1.997	1.191	-0.275	-1.316	1.089	-1.143
difficult	0.002	-0.177	0.218	0.513	0.618	-2.354	0.483	0.253
uncertain task difficulty	0.003	1.828	-2.248	1.824	-1.710	-0.891	-0.922	-0.722
expect success	0.017	-0.581	-0.434	-0.198	0.986	1.118	-0.215	-0.775
hope for success	0.007	1.039	-1.169	0.916	-1.008	-0.887	-0.503	-0.045
individual differences	0.006	1.248	0.461	1.339	-1.196	-0.004	-1.061	-0.944
construct	0.030	-1.400	-0.161	-0.358	-0.625	0.315	0.317	-0.146
transmit/gather info	0.050	0.908	-0.688	-0.142	-0.580	0.218	0.176	0.063
assessment/feedback	0.090	-0.581	-0.467	-0.125	0.022	0.414	-0.181	-0.152
logistics	0.018	0.573	-1.146	0.735	-0.057	-0.596	-1.369	0.332
facilitate	0.034	1.256	-0.669	0.023	-0.132	0.657	-0.066	-0.123
busywork	0.007	2.604	0.266	-5.142	-0.737	-1.115	-0.087	-0.821
community of learners	0.003	1.284	0.765	0.792	3.452	1.102	0.745	-0.420
theory x practice	0.099	0.031	0.128	0.086	-0.098	-0.202	0.719	-0.226
lifelong learning	0.004	0.363	-1.088	0.656	1.614	-0.789	-1.636	0.793

Table 6. Continued

	I	J	K	L	M	N	O
Participants	**Contribution of points to the inertia of each dimension**						
	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5	Dimension 6	Dimension 7
Anne: medical	0.002	0.013	0.004	0.023	0.006	0.016	0.084
Josi: medical	0.036	0.006	0.001	0.011	0.070	0.004	0.002
John: medical	0.014	0.015	0.000	0.014	0.002	0.028	0.011
Rory: medical	0.050	0.005	0.005	0.022	0.016	0.112	0.010
Roxy: medical	0.014	0.010	0.015	0.002	0.256	0.087	0.004
Sally: medical	0.357	0.008	0.038	0.076	0.098	0.016	0.014
Troy: medical	0.003	0.002	0.001	0.086	0.097	0.086	0.106
Cait: child-care	0.008	0.014	0.009	0.014	0.051	0.000	0.000
Arma: child-care	0.001	0.037	0.007	0.019	0.047	0.003	0.000
Grace: child-care	0.023	0.067	0.006	0.060	0.009	0.028	0.047
Bella: child-care	0.071	0.007	0.289	0.010	0.018	0.002	0.033
Jen: child-care	0.002	0.039	0.013	0.024	0.010	0.008	0.003
Jess: child-care	0.009	0.306	0.021	0.020	0.002	0.173	0.198
Jay: child-care	0.033	0.018	0.001	0.013	0.087	0.014	0.274
Juli: child-care	0.032	0.003	0.017	0.000	0.004	0.015	0.014
Ken: child-care	0.015	0.116	0.026	0.001	0.012	0.024	0.007
Lara: child-care	0.081	0.004	0.194	0.019	0.004	0.010	0.000
Mary: child-care	0.001	0.008	0.017	0.004	0.070	0.083	0.026
Bec: child-care	0.029	0.000	0.157	0.000	0.003	0.002	0.004
Chloe: teacher	0.029	0.037	0.010	0.000	0.026	0.238	0.053
Dany: teacher	0.162	0.267	0.169	0.110	0.000	0.050	0.023
Dr B: teacher	0.027	0.018	0.000	0.473	0.112	0.001	0.089
Variables							
purpose	0.025	0.012	0.018	0.101	0.039	0.018	0.106
studying	0.003	0.025	0.004	0.001	0.000	0.066	0.046
authentic practice	0.011	0.004	0.019	0.274	0.016	0.008	0.003
social learning	0.016	0.029	0.062	0.019	0.001	0.003	0.012
supportive environ.	0.048	0.094	0.042	0.002	0.146	0.048	0.209
metacognition	0.029	0.000	0.011	0.042	0.025	0.010	0.033
self-regulation	0.000	0.039	0.037	0.010	0.008	0.013	0.117
external regulation	0.010	0.000	0.027	0.001	0.000	0.008	0.002
self x ext. regulation	0.065	0.010	0.005	0.003	0.000	0.038	0.000
useful	0.003	0.000	0.007	0.017	0.219	0.000	0.001
certification	0.016	0.019	0.010	0.006	0.001	0.000	0.001
mastery	0.000	0.004	0.006	0.002	0.018	0.130	0.009
certification x mastery	0.091	0.006	0.007	0.026	0.011	0.021	0.019
fulfilment	0.001	0.087	0.002	0.003	0.012	0.012	0.042
personal growth	0.010	0.206	0.016	0.032	0.014	0.069	0.136
strong self-efficacy	0.019	0.044	0.001	0.005	0.002	0.051	0.075
weak self-efficacy	0.000	0.013	0.005	0.009	0.046	0.009	0.001
uncertain self-efficacy	0.001	0.057	0.022	0.001	0.034	0.024	0.029
difficult	0.000	0.000	0.002	0.003	0.046	0.002	0.001
uncertain task difficulty	0.026	0.047	0.034	0.034	0.010	0.011	0.008
expect success	0.014	0.009	0.002	0.059	0.086	0.003	0.046
hope for success	0.018	0.028	0.018	0.025	0.022	0.007	0.000
individual differences	0.022	0.004	0.033	0.030	0.000	0.027	0.024
construct	0.138	0.002	0.012	0.041	0.012	0.012	0.003
transmit/gather info	0.098	0.068	0.003	0.060	0.010	0.006	0.001
assessment/feedback	0.072	0.057	0.004	0.000	0.062	0.012	0.009
logistics	0.014	0.067	0.030	0.000	0.025	0.135	0.009
facilitate	0.127	0.044	0.000	0.002	0.059	0.001	0.002
busywork	0.107	0.001	0.546	0.013	0.033	0.000	0.020
community of learners	0.013	0.006	0.007	0.144	0.017	0.008	0.003
theory x practice	0.000	0.005	0.002	0.003	0.016	0.208	0.023
lifelong learning	0.001	0.012	0.005	0.034	0.009	0.040	0.010

Table 6. Continued

	P	Q	R	S	T	U	V	W
Participants	**Contribution of dimension to the inertia of each point**							**Total (fit)**
	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5	Dimension 6	Dimension 7	
Anne: medical	0.013	0.059	0.014	0.067	0.014	0.035	0.153	0.355
Josi: medical	0.243	0.027	0.003	0.032	0.165	0.009	0.004	0.484
John: medical	0.132	0.093	0.000	0.057	0.008	0.091	0.029	0.411
Rory: medical	0.238	0.017	0.014	0.047	0.026	0.181	0.013	0.535
Roxy: medical	0.071	0.034	0.043	0.004	0.450	0.150	0.005	0.756
Sally: medical	0.719	0.011	0.045	0.069	0.069	0.011	0.008	0.931
Troy: medical	0.017	0.009	0.002	0.211	0.186	0.161	0.161	0.748
Cait: child-care	0.065	0.075	0.044	0.051	0.143	0.001	0.001	0.379
Arma: child-care	0.016	0.293	0.046	0.099	0.189	0.011	0.000	0.653
Grace: child-care	0.111	0.216	0.018	0.126	0.014	0.045	0.061	0.591
Bella: child-care	0.249	0.015	0.589	0.016	0.021	0.002	0.032	0.925
Jen: child-care	0.027	0.333	0.097	0.137	0.043	0.034	0.010	0.682
Jess: child-care	0.024	0.560	0.033	0.024	0.002	0.158	0.148	0.949
Jay: child-care	0.166	0.061	0.004	0.029	0.155	0.023	0.385	0.824
Juli: child-care	0.295	0.022	0.091	0.000	0.013	0.047	0.036	0.504
Ken: child-care	0.085	0.446	0.086	0.003	0.024	0.047	0.011	0.702
Lara: child-care	0.352	0.013	0.492	0.036	0.006	0.014	0.000	0.912
Mary: child-care	0.011	0.042	0.079	0.013	0.190	0.219	0.056	0.610
Bec: child-care	0.202	0.000	0.638	0.000	0.008	0.005	0.007	0.861
Chloe: teacher	0.126	0.110	0.026	0.001	0.040	0.352	0.063	0.717
Dany: teacher	0.298	0.335	0.182	0.091	0.000	0.032	0.011	0.948
Dr B: teacher	0.076	0.035	0.000	0.603	0.112	0.001	0.070	0.897
Variables								
purpose	0.156	0.052	0.068	0.286	0.085	0.039	0.184	0.870
studying	0.029	0.149	0.023	0.002	0.000	0.202	0.113	0.519
authentic practice	0.065	0.016	0.064	0.697	0.032	0.016	0.004	0.895
social learning	0.135	0.170	0.308	0.072	0.004	0.008	0.028	0.726
supportive environ.	0.160	0.212	0.082	0.003	0.169	0.054	0.192	0.872
metacognition	0.245	0.001	0.053	0.158	0.073	0.027	0.077	0.635
self-regulation	0.003	0.215	0.177	0.035	0.023	0.036	0.263	0.753
external regulation	0.207	0.000	0.335	0.011	0.000	0.056	0.014	0.624
self x ext. regulation	0.424	0.042	0.019	0.008	0.001	0.085	0.000	0.579
useful	0.026	0.000	0.035	0.063	0.637	0.000	0.003	0.764
certification	0.288	0.241	0.110	0.048	0.004	0.001	0.004	0.697
mastery	0.003	0.024	0.027	0.007	0.049	0.351	0.019	0.480
certification x mastery	0.559	0.024	0.025	0.071	0.023	0.044	0.032	0.778
fulfilment	0.012	0.498	0.011	0.010	0.035	0.036	0.097	0.699
personal growth	0.039	0.538	0.035	0.055	0.019	0.091	0.145	0.921
strong self-efficacy	0.165	0.264	0.005	0.020	0.005	0.152	0.182	0.794
weak self-efficacy	0.006	0.119	0.042	0.052	0.211	0.038	0.004	0.472
uncertain self-efficacy	0.013	0.341	0.112	0.005	0.106	0.072	0.071	0.721
difficult	0.004	0.005	0.026	0.033	0.419	0.017	0.004	0.508
uncertain task difficulty	0.187	0.233	0.142	0.110	0.026	0.028	0.015	0.742
expect success	0.130	0.060	0.011	0.250	0.284	0.010	0.122	0.868
hope for success	0.171	0.178	0.102	0.108	0.074	0.023	0.000	0.656
individual differences	0.253	0.028	0.223	0.156	0.000	0.107	0.076	0.843
construct	0.634	0.007	0.032	0.084	0.019	0.019	0.004	0.798
transmit/gather info	0.453	0.214	0.008	0.123	0.015	0.010	0.001	0.825
assessment/feedback	0.418	0.223	0.015	0.000	0.125	0.024	0.015	0.820
logistics	0.075	0.248	0.095	0.001	0.048	0.250	0.013	0.730
facilitate	0.593	0.139	0.000	0.004	0.096	0.001	0.003	0.836
busywork	0.227	0.002	0.677	0.012	0.025	0.000	0.012	0.955
community of learners	0.092	0.027	0.027	0.444	0.040	0.018	0.005	0.652
theory x practice	0.002	0.023	0.010	0.011	0.042	0.526	0.047	0.661
lifelong learning	0.014	0.107	0.036	0.191	0.040	0.172	0.036	0.597

Figure 3 contains the correspondence analysis scaling solution coordinates for variables and participants in Dimensions 1 and 2, with Dimension 1 on the horizontal axis and Dimension 2 on the vertical axis. Dimension 1 accounts for 21 per cent of the variance in the data and Dimension 2 accounts for 14.3 per cent of the variance. It can be seen that one variable, personal development, appears to lie outside of the chart. This is simply a space limitation due to the

extreme score (0.92, 3.8) of that variable. Recall that in symmetrical normalisation, the graphical display is of relative, but not actual magnitudes. Variables that are labelled in italics contribute most to Dimension 1: Variable labels that are underlined contribute most to Dimension 2 (columns I and J in Table 6).

It is important to note that in this case the two-dimensional chart is part of a seven-dimensional solution. Therefore, when interpreting each dimension it is necessary to consider the contribution of variables to that dimension. This is because a variable that appears on the two-dimensional chart might be a major contributor to another dimension but might not be located in the extant two-dimensional plane (Clausen, 1998; Nishisato, 1994). For example, in Figure 3, the variable *community of learners* appears to the right of Dimension 1, and a superficial analysis might suggest that it be included in an interpretation of Dimension 1. However, an inspection of Table 6 demonstrates that *community of learners* contributes more than its expected proportion to Dimension 4, but contributes minimally to Dimensions 1 and 2. Expected contribution is calculated by dividing 1 (the possible total contribution) by the total number of variables, in this case 32, giving an expected proportion of contribution per variable of 0.031 (Hair et al., 1995). Therefore, variables that contribute more than 0.031 are important for the interpretation of that dimension, in so far as they contribute more than would be expected by chance.

It is also necessary to consider the contribution of each dimension to an explanation of the variance in each participant's profile. Some participants' profiles are not well fitted in certain planes (both dimensions each contribute less than a nominal cut off point of 10 per cent to the variance in the participant's score). For example, Roxy's (medical) score is not well fitted by Dimensions 1, 2, 3, or 4. However, 45 per cent of the variance in her profile is accounted for by Dimension 5, and a further 15 per cent is accounted for by Dimension 6 (from Table 6; Columns P to V). Participants whose profiles are poorly fitted are marked with an asterisk in each two dimensional display.

Dimensions 1 and 2

We turn now to an interpretation of the dimensions. The left-hand pole of Dimension 1 appears to contain variables that relate to issues that are recognised in contemporary literature as being important for learning. *Construct* (contributing 0.138 from Table 6) refers to participants' accounts of joining together and adding on to what they know, and is at the heart of constructivist theories of teaching and learning (Anderson, Greeno, Reder, & Simon, 2000; Bransford, Brown, & Cocking, 1999; Phillips, 2000). *Certification* x *mastery* (0.091), and *self-regulation* x *external-regulation* (0.065), are also located at the left-hand pole. The variable *assessment/feedback* (0.072) also contributes more than expected to the left side of Dimension 1, and highlights students' and teachers' attention to the importance of assessment in formal learning environments (Biggs, 1999; Shepard, 2001). Metacognition (0.029) does not quite reach the 0.031 threshold for contribution, but could be considered a minor contributor to this Dimension.

At the right-hand side of Dimension 1 are variables that do indeed seem to be opposite in character to those on the left. For example, *busywork* (0.107) suggests a role for the student where the student is engaged, often in a purposeful, self-regulated fashion, with activities, but does not connect such purposeful activity with an intention to learn (Bereiter & Scardamalia, 1989). *Transmit/gather information* (0.098) suggests traditional models of instruction based upon the flow of knowledge from the teacher, and other resources, to the student. *Facilitate* (0.127) and *supportive environment* (0.048) seem to refer to the responsibilities that the teacher has to create an environment for learning to occur. *Uncertain task difficulty* (0.026) and *purpose* (0.025) are minor contributors to this dimension.

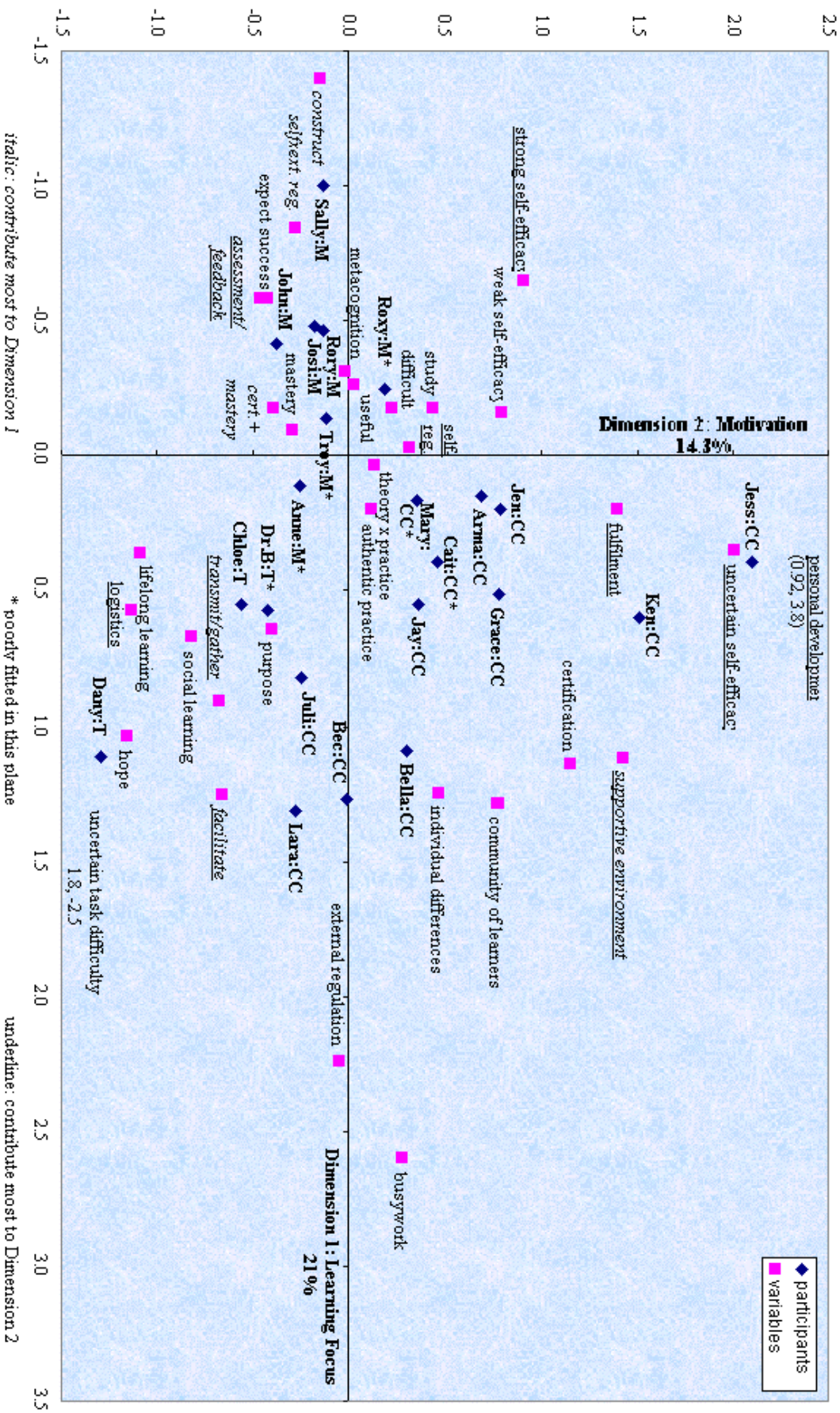


Figure 3. Dimension 1: Learning Focus and Dimension 2: Motivation

In summary, the left-hand pole of Dimension 1 seems to have an intrinsic flavour, dealing with issues that relate to the role of the learner in focussing upon cognitive engagement with, and the management of, learning. The right-hand pole of Dimension 1 seems to contain variables that relate to learning as an externally facilitated, sometimes very task focussed activity, and knowledge as something that is transmitted from external sources. Thus Dimension 1 can be interpreted as a dimension of *Learning Focus*, with a continuum ranging from a focus on *an intention to construct knowledge* at the left-hand pole to focus on *learning as work to be done* at the right-hand pole.

Turning to Dimension 2, six variables contribute more than average to its upper pole: *personal development* (0.206), *uncertain self-efficacy* (0.057), *fulfillment* (0.087), *supportive environment* (0.094), *strong self-efficacy* (0.044) and *self-regulation* (0.039). *Studying* (0.025) is a minor contributor. This cluster of variables contains intrinsic issues relating to learners, but in a different sense to Dimension 1. Here, learners' motivations and assessments of self seem to predominate, once again finding parallels with the work of Bandura (2001) and other theories of motivation that incorporate concepts of self-efficacy (for example, Wigfield & Eccles, 2000) and fulfillment (for example, Mayer, 1998; Ryan & Deci, 2000; Winne, 1991).

At the lower pole of Dimension 2 are variables related to the role of the teacher in organising learning, including the *logistics* (0.067) of organising people and equipment, *facilitate* (0.044), which refers to things that teachers and other people do, such as providing support and encouragement, *transmit/gather information* (0.068), and *assessment* (0.057). An interesting inclusion at this pole is *uncertain task difficulty* (0.047), which, from a reading of the transcripts, reflects both the teacher's dilemma of designing instruction to match varying levels of student ability in heterogenous classes, as well as to students' uncertainty about the difficulty of tasks. Minor contributors to this pole are *social learning* (0.029), which includes statements such as 'learning through class discussions,' and *hope for success* (0.028), which reflects participants' expectancies for success or failure and can be related to their assessment of the difficulty of the task. Together, the variables at the lower pole of Dimension 2 seem to relate to the role of the teacher in organising for effective learning to occur, and so it is possible to assign the label *external* to this pole. In sum, Dimension 2 can be interpreted as *Motivation*, comprised of a continuum of *intrinsic motivations* at the top pole, and *external facilitators and motivators* at the lower pole.

It is worth noting at this point that, unlike a procedure such as cluster analysis, which partitions variables into mutually exclusive clusters, procedures such as correspondence analysis and multidimensional scaling recognise the potential for variables to contribute to more than one dimension (Nishisato, 1994). Hence, it can be seen from Figure 3 for example, that *transmit/gather information* contributes more than expected to both Dimensions 1 (0.098) and 2 (0.068), as does *assessment/feedback* (0.072 and 0.057). However, whereas *transmit/gather* lies at the *external* poles of both Dimensions 1 and 2, *assessment/feedback* lies at the *internal* end of Dimension 1 and the *external* end of Dimension 2, pointing to a transaction between the internal and external nature of teaching and learning, and teacher and learner.

The interpretation of Dimensions 1 and 2 so far has resembled the search for latent factors in a principal components, or factor analysis. However, correspondence analysis has much more to offer, as is demonstrated by its ability to place participants' scores in the same multidimensional space as the variables. It is immediately apparent from Figure 3 that participants' scores form distinct clusters. Three of the medical students' scores (Roxy, Troy, Anne) are poorly fitted in this Dimension 1 and 2 plane. The remaining medical students' scores cluster to the left of Dimension 1, closest to the *intention to construct knowledge* pole, while none of the child-care students' or teachers' scores are located near this pole. However, six of the child-care students' scores are

located near at the *learning as work to be done* pole of Dimension 1. Two child-care students' scores (Cait, Mary) are not well fitted in the Dimension 1 and 2 plane.

Interestingly, all of the medical students' scores are poorly fitted by Dimension 2 (from Table 6), indicating that Dimension 2 contributes very little to the medical students' scores. However, Dimension 2 accounts for five childcare students at the *intrinsic motivations* pole.

One teacher's scores (Dr. B) are poorly fitted in the Dimension 1 and 2 plane, while the two child-care teachers' (Dany, Chloe) scores are located in the lower right quadrant, closest to *extrinsic facilitators and motivators*, and *learning as work to be done* variables.

The symmetrical normalisation method chosen for this correspondence analysis permits the placement of variable and participant scores in the same graphical display. It will be recalled that in such displays the distances between participant and variable scores are not Euclidean distances, and therefore it is incorrect to measure the exact distance between, say, Sally, and *metacognition*. However, it is appropriate to consider the relative placement of participant and variable scores, and especially to consider the relative placement of participants' scores to the meaningfully interpreted poles of dimensions (Gabriel, 2002; Greenacre, 1994).

It seems reasonable to conclude that, even with the removal of poorly fitting scores from the Dimension 1 and 2 plane, participants' scores cluster into three distinct groups: medical students at the *constructing knowledge* pole of Dimension 1; child-care students at the *learning as work to be done* pole of Dimension 1, and at the *intrinsic motivation* pole of Dimension 2; and teachers at the *learning as work to be done* pole of Dimension 1 and at the *extrinsic facilitators and motivators* pole of Dimension 2. It is interesting to note that the two teachers who are located with the child-care students at the *learning as work to be done* pole of Dimension 1, are indeed the child-care students' own teachers, suggesting some congruence between the teachers' and their own students' perspectives.

Dimensions 3 and 4

Figure 4 is the graphical display of variables and participants in Dimensions 3 and 4. From Figure 4 it can be seen that *busywork* (Table 6, column K, 0.546) is a dominant contributor to the left-hand pole of Dimension 3. *Self-regulation* (0.037) is a second major contributor and e*xternal regulation* (0.027) is a minor contributor to this pole. The location of these three variables at the same pole raises the interesting possibility that students can be effectively utilising their own and externally sourced skills of regulation, such as time and resource management, to complete tasks that do not require much in the way of cognitive engagement to construct knowledge. The right-hand pole of Dimension 3 has *supportive environment* (0.042), *social learning* (0.062), *individual differences* (0.033) and *uncertain task-difficulty* (0.034) as its major contributors and *logistics* (0.03) as a minor contributor. Dimension 3 can be interpreted as an *Organising for Learning* continuum, with *group management* at the right-hand pole, and *individual management* at the left-hand pole.

Turning to Dimension 4, at the top of Figure 4, the variables *community of learners* (0.144), *lifelong learning* (0.034), *purpose* (0.101), *expect success* (0.059) and *authentic practice* (0.274) all point to integrating learning with the everyday fabric of life: over time, in communities of practice and with positive outcomes. At the lower pole of Dimension 4 are *uncertain task difficulty* (0.034), *construct* (0.041), *transmit/gather* (0.06), *metacognition* (0.042) *personal development* (0.032), and at a slightly lower contribution, *certification x mastery* (0.026), *individual differences* (0.03) and *hope for success* (0.025). This lower pole seems similar to the negative pole of Dimension *1 (an intention to construct knowledge*), however, the inclusion *of uncertain task difficulty, individual differences and personal development* in this cluster suggests

an interaction between constructing knowledge and variables that seem concerned with issues that are salient to each individual learner. The relationship of the variables at the two poles of Dimension 4 suggests a continuum of *Context*, with *authentic, situated practice* describing the upper pole, and *learning by studying* describing the lower pole.

The positioning of participants' scores in Dimensions 3 and 4 tells a different story to the readily identifiable clusters that emerged in Dimensions 1 and 2. Certainly, the higher dimensions account for fewer participants' scores. From Table 6, columns R and S, it can be observed that each of Dimensions 3 and 4 account for less than 10 per cent of the variance in half of the participants' scores. Dimension 3 accounts very little for medical students' scores, rather, positioning a child-care teacher (Dany) at the *group management* pole (this seems to make intuitive sense), and three child-care students (Bec, Bella, Lara) at the *individual management* pole. Another two child care students' scores almost reach the nominal 10 per cent cut off point for inclusion in this Dimension, namely Jen (0.097) at the group management pole and Juli (0.091) at the individual management pole.

Dimension 4 accounts for more than 10 per cent of the variance in only one (Troy) medical student's score, and positions his, one child-care student's (Grace), and one teacher's (Dr. B.) scores at the *authentic, situated practice* pole. At the other end of the Dimension 4 continuum, *learning by studying*, is located only Jen's (child-care) score, although the scores of Arma (child-care, 0.099) and Dany (teacher, 0.091) could be included in this Dimension.

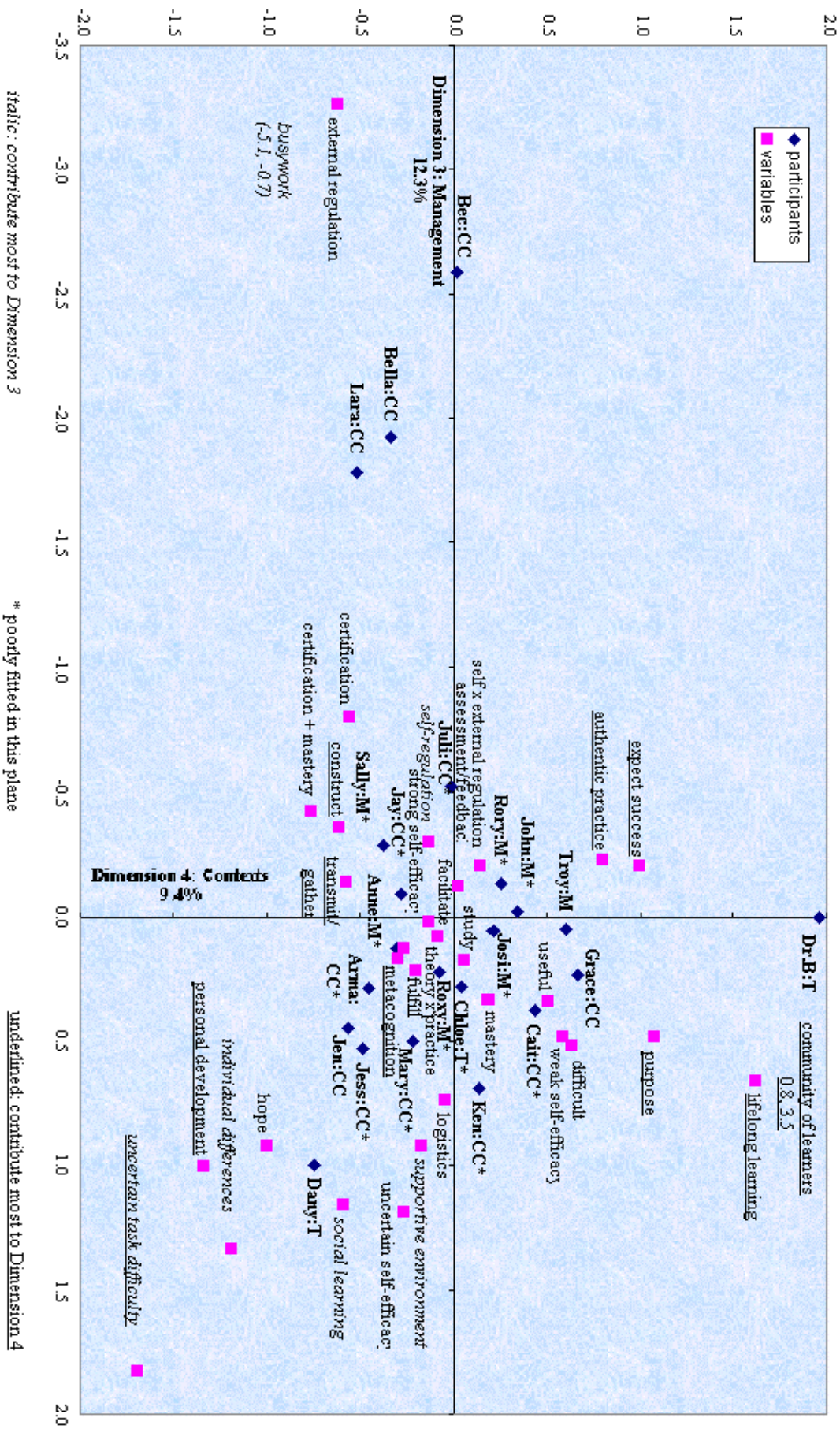
In sum, there may be some indication of group differences in Dimension 3, which picks up so little of the variance in the medical students' scores but places child-care students and teachers at opposite poles. It seems reasonable to propose that Dimension 3, with issues of self-and external regulation of individuals and groups, is the domain of the child-care cohort. Dimension 4 seems to be mostly capturing idiosyncratic differences between individuals, thus adding a richness of interpretation to the picture of group differences and similarities uncovered by Dimensions 1, 2 and possibly 3.

Dimensions 5 and 6

Dimensions 5 and 6 are represented in Figure 5. As the analysis moves to higher dimensions, progressively less of the variance contained in participants' transcripts remains to be explained by each dimensional solution. From the annotated axes in Figure 5, it can be seen that Dimensions 5 and 6 are explaining 7.3 per cent and 7.2 per cent, respectively, of the variance. However, in a domain as complex as teaching and learning, it is worth persisting with the analysis in the search for understandings that might be masked under more general theories or categories.

At the left-hand side of Dimension 5 are the variables *difficult* (0.046) *useful* (0.219), *uncertain self-efficacy* (0.034), *weak self-efficacy* (0.046) and *busywork* (0.033) as major contributors, and minor contributors *metacognition* (0.025), and *logistics* (0.025). With the exception of *busywork*, the variables at the left pole of Dimension 5 appear related to the expectancies and values as described by Wigfield and Eccles (2000). It seems that participants are weighing up their own capabilities against the demands of the learning environment and deciding, that although the learning that they are engaged in is useful for their goals, learning is sometimes difficult and participants are uncertain about their ability to do well.

At the right-hand side of Dimension 5 are the variables *expect success* (0.086), *supportive environment*, (0.146) *facilitate* (0.059), *purpose* (0.039), and *assessment/feedback* (0.062). These variables suggest a combination of individual and contextual features necessary for successful learning. This pole has a more positive flavour than the opposite pole of this Dimension.



italic: contribute most to Dimension 3

* poorly fitted in this plane

underlined: contribute most to Dimension 4

Figure 4. Dimension 3: Management for Learning and Dimension 4: Contexts of Learning

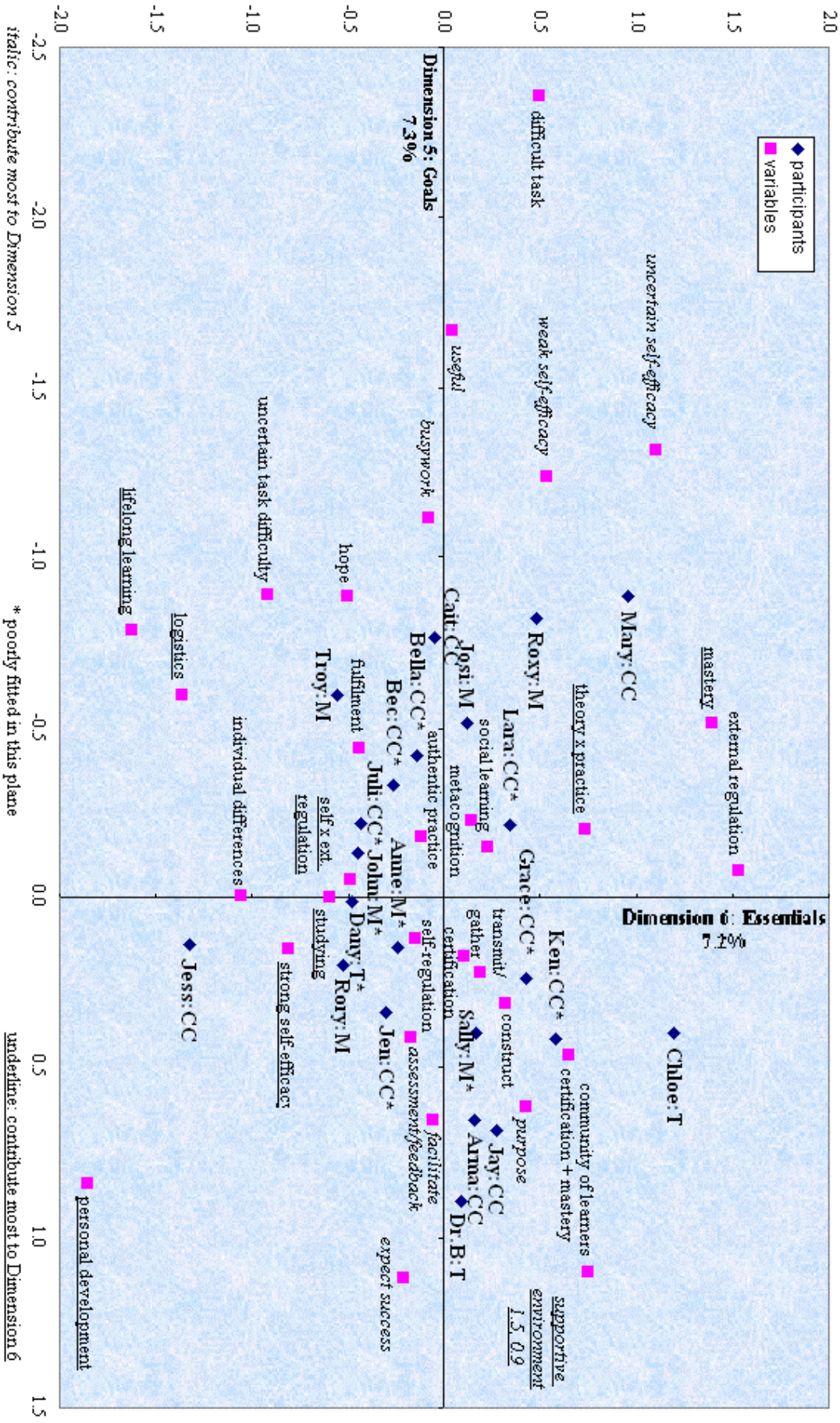


Figure 5. Dimension 5 Expectations and Dimension 6: Goals

Together, the two poles of Dimension 5 appear to make a continuum of *Expectations*, ranging from *positive expectancy* at the right-hand pole, to *uncertain/reflective expectancy* at the left–hand pole.

Dimension 6 has at its top pole *mastery* (0.13), *supportive environment* (0.048) and *theory x practice* (0.208) as major contributors. At its lower pole are *personal development* (0.069), *lifelong learning* (0.04), *logistics* (0.135), *strong self-efficacy* (0.051), *studying* (0.066), and *self x external regulation* (0.038) as major contributors, with *individual differences* (0.027) as a minor contributor. Dimension 6 can be interpreted as capturing different *Goals*, with *achieving mastery* at the top pole of the display, and more *abstract and long-term* personal development goals at the lower pole of the display. Furthermore, Dimension 6 is a good example of the value of investigating higher dimensions, for the variables *mastery* and *theory x practice* do not emerge until the sixth dimension, and so would be lost from the analysis if a lower dimensional solution were accepted.

Whereas Dimensions 3 and 4 account for little of the variance in the medical students' scores, Dimensions 5 and 6 do contribute to some of the medical students' scores. Dimension 5 accounts relatively better for the scores of Roxy (medical), Josi (medical) and Troy (medical). Interestingly, Dimension 5 is the first dimension that accounts for a substantial proportion of the variance in Roxy's score (45 per cent). The three medical students' scores are located at the left-hand (*uncertain/reflective expectancy)* pole of that dimension. Dimension 5 also accounts substantially for the scores of the child-care students Cait, Arma, Jay and Mary, and Dr B (teacher). Cait's and Mary's score are located at the *uncertain/reflective expectancy* pole, and Arma's, Jay's and Dr B's scores are located at the *positive expectancy* pole.

Dimension 6 accounts relatively better for the scores of Rory (medical), Roxy (medical), Troy (medical), Jess (child-care), Mary (child-care), and Chloe (teacher). Whereas in Dimension 5 Roxy's and Troy's scores are clustered at the same pole, in Dimension 6 Roxy's and Troy's scores take opposite poles of the continuum of *Goals*, from *achieving mastery* (Roxy) to *abstract and long term goals* (Troy). Rory's (medical) score is located near Troy's. Jess' (child-care) score and Mary's (child-care) score take opposite poles of Dimension 6 *(Goals).*

Both Chloe's (teacher) and Dr. B's (teacher) scores are in the upper-right-hand quadrant of the graphical display of Dimensions 5 and 6. For Chloe, this is accounted for by Dimension 6 (*Goals-achieving mastery*): For Dr. B. it is accounted for by Dimension *5 (Expectations-positive expectancy*) .

It seems that the only clustering of participant cohorts in Dimensions 5 and 6 occurs with the placement of three medical students at the uncertain-reflective pole of Dimension 5. Otherwise, as the analysis moves to higher dimensions, it does seem to be accounting more for idiosyncratic differences between participants, rather than more general factors (Nishisato, 1994).

Dimension 7

We turn now to a discussion of Dimension 7. The graphical displays assist with the interpretation of the dimensions. However, it must be remembered that the presentation of seven dimensions in the form of successive two-dimensional charts is somewhat artificial, especially as some participants and variables might lie outside of any particular two-dimensional plane. Hence our interpretation of the dimensions has relied heavily upon the underlying statistics in Table 6. As an alternative to a two–dimensional representation, we will present Dimension 7 in the form of a single-dimensional profile as displayed in Figure 6.

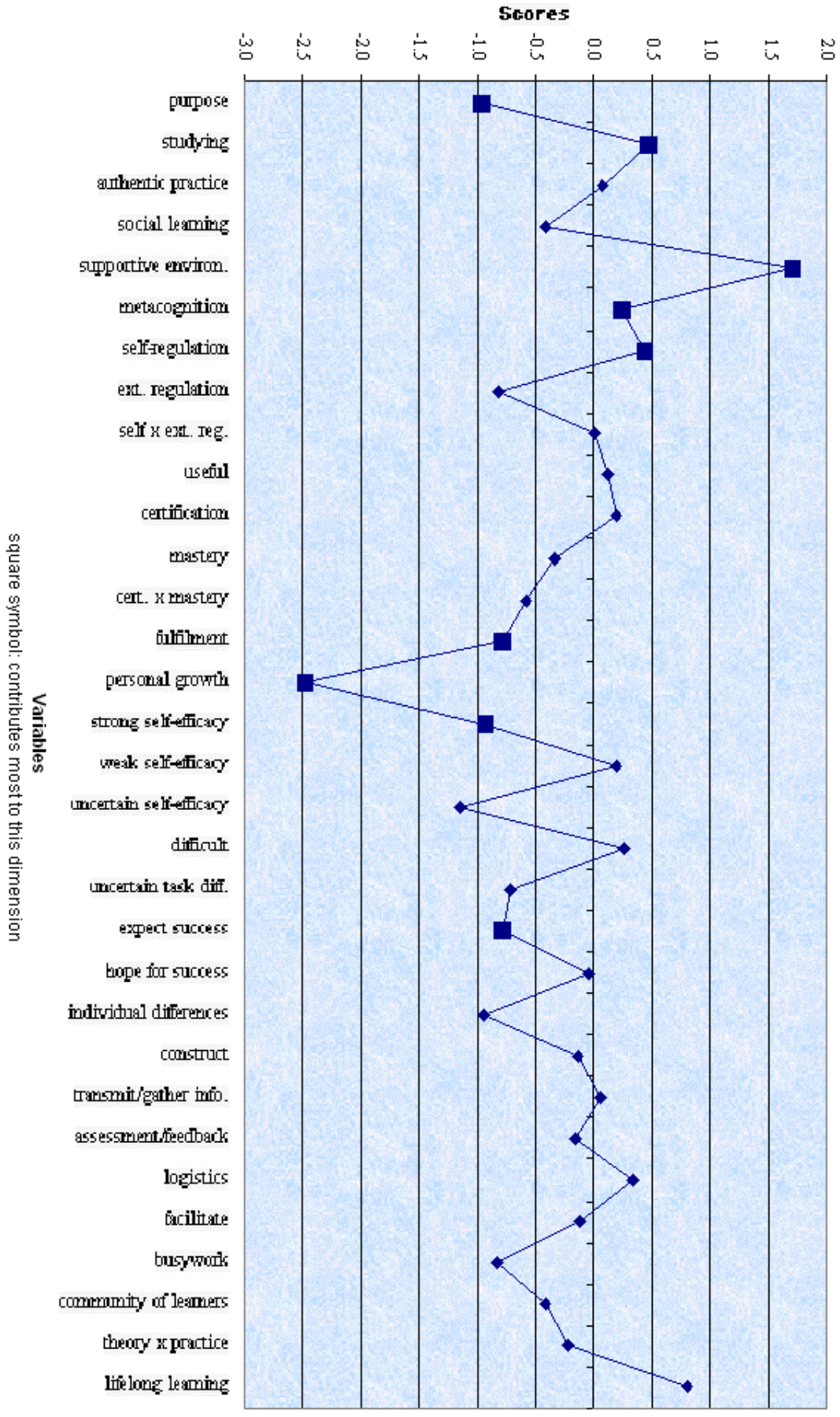


Figure 6. Knowledge about teaching and learning: Dimension 7

Dimension 7 accounts for 5.8 per cent of the variance in the participant transcripts. It is displayed in Figure 6, from which it can be seen that the negative pole of Dimension 7 has *purpose* (0.106) *fulfillment* (0.042), *personal development* (0.136), *strong self-efficacy* (0.075) and *expect success* (0.046) as its major contributors and *uncertain self-efficacy* (0.029) as a minor contributor.

At the postive pole of Dimension 7 lie *studying* (0.046), *supportive environment* (0.209), *metacognition* (0.033), and *self-regulation* (0.117). It is difficult to find an interpretation of this dimension that is different to what has been canvassed in the six lower dimensions. However, Dimension 7 is the first dimension to make a substantial contribution to Anne's (medical) score, accounting for 15.3 per cent of the variance in her profile. Dimension 7 also contributes substantially to Jay's (child-care) score, contributing 38.5 per cent of the variance. Thus it seems worth persevering with including Dimension 7 in the analysis.

Dimension 7 appears to capture variables that are *Essentials for Learning*, ranging from *actions* such as *studying* and *self-regulation* at the positive pole, and *attitudes* such as goals for *personal development* and *strong self-efficacy* at the negative pole. Anne's (medical), Troy's (medical) and Jay's (child-care) scores are located at the positive pole, and Jess' (child-care) score is located at the negative pole.

SUMMARY AND CONCLUDING DISCUSSION

The foregoing discussion has described the substantial reduction of over 20, 000 coded statements in 22 participants' transcripts to seven dimensions, and the graphical representation of participants' scores and variables in successive planes in that seven dimensional space. Nevertheless, the description provided above remains complex. In order to make the dimensional solutions more accessible, we have collated the bare essentials of the correspondence analysis solutions into Table 7, from which it can be summarised that the seven dimensions and their differentiation between participants is as follows:

Dimension 1: Learning Focus, differentiating between child-care students and their teachers at the *Learning as work to be done* pole and medical students at the *An intention to construct knowledge* pole

Dimension 2: Motivation, differentiating between child-care students at the *Intrinsic motivation* pole and their teachers at the *Extrinsic facilitators and motivators pole*

Dimension 3: Management for Learning, differentiating between teachers at the *Group management* pole and child-care students at the *Individual management* pole

Dimension 4: Contexts of Learning, highlighting individual differences

Dimension 5: Expectations, highlighting individual differences

Dimension 6: Goals, highlighting individual differences

Dimension 7: Essentials for learning, highlighting individual differences

Thus, it is now possible to propose that, not only does the participant sample as a whole possess a broad range of knowledge about teaching and learning, but also that there appear to be identifiable patterns of responses between participants with different kinds of teaching and learning backgrounds. In particular, the differences seem to be in the areas of, working at learning activities compared to working at constructing knowledge, the salience of internal motivations and external motivators, and management of learning in groups and in individual settings. Of course, it is important to note that the correspondence analysis solution does not mean that, for example, child-care students did not talk about, say, *an intention to construct knowledge*, or that medical students did not talk about *intrinsic motivations*. Rather, the correspondence analysis extracts differences in the greater or lesser proportions that groups or individuals talked about the different variables.

Table 7. Summary of all dimensions

Positive pole variables	Contribution to dimension	Negative pole variables	Contribution to dimension
Dimension 1: Learning Focus (accounts for 21% of total variance in participants' profiles)			
Learning as work to be done		**An intention to construct knowledge**	
Accounting for more than 10% of the variance in 6**child-care** students' and 2 **teachers'** scores		Accounting for more than 10% of the variance in 4**medical** students' scores	
facilitate	0.127	construct	0.138
busywork	0.107	certification x mastery	0.091
transmit/gather information	0.098	assessment/feedback	0.072
supportive environment	0.048	self- x external-regulation	0.065
uncertain task difficulty	0.026	metacognition	0.029
purpose	0.025		
Dimension 2: Motivation (accounts for 14.3% of total variance in participants' profiles)			
Intrinsic motivations		**Extrinsic facilitators and motivators**	
Accounting for more than 10% of the variance in 5**child-care** students' scores		Accounting for more than 10% of the variance in2 **teachers'** scores	
personal development	0.206	transmit/gather	0.068
supportive environment	0.094	logistics	0.067
fulfilment	0.087	assessment	0.057
uncertain self-efficacy	0.057	uncertain task difficulty	0.047
strong self-efficacy	0.044	facilitate	0.044
self-regulation	0.039	social learning	0.029
studying	0.025	hope for success	0.028
Dimension 3: Management for Learning (accounts for 12.3% of total variance in participants' profiles)			
Group management		**Individual management**	
Accounting for more than 10% of the variance in 2**teachers'** scores		Accounting for more than10% of the variance in 3**child-care** students' scores	
social learning	0.062	busywork	0.546
supportive environment	0.042	self-regulation	0.037
uncertain task-difficulty	0.034	external regulation	0.027
individual differences	0.033		
logistics	0.030		
Dimension 4: Contexts of learning (accounts for 9.4% of total variance in participants' profiles)			
Authentic, situated practice		**Studying**	
Accounting for more than 10% of the variance in 1**medical**-, 1 **child-care students'** and 1 **teacher's** scores		Accounting for more than 10% of the variance in 1**child-care** student's score	
authentic practice	0.274	transmit/gather	0.060
community of learners	0.144	metacognition	0.042
purpose	0.101	construct	0.041
expect success	0.059	uncertain task difficulty	0.034
lifelong learning	0.034	personal development	0.032
		individual differences	0.030
		certification x mastery	0.026
		hope for success	0.025
Dimension 5: Expectations (accounts for 7.3% of total variance in participants' profiles)			
Positive expectancy		**Uncertain/reflective expectancy**	
Accounting for more than 10% of the variance in2 **child-care** students' and 1 **teacher's** scores		Accounting for more than 10% of the variance in 3**medical**- and 2 **child-care** students' scores	
supportive environment	0.146	useful	0.219
expect success	0.086	difficult	0.046
assessment/feedback	0.062	weak self-efficacy	0.046
facilitate	0.059	uncertain self-efficacy	0.034
purpose	0.039	busywork	0.033
		metacognition	0.025
		logistics	0.025
Dimension 6: Goals (accounts for 5.8% of total variance in participants' profiles)			
Achieving mastery		**Abstract and long term goals**	
Accounting for more than 10% of the variance in 1**medical**-, 1 **child-care** students' and 1 **teacher's** scores		Accounting for more than 10% of the variance in 2**medical**- and 1 **child-care** students' scores	
theory x practice	0.208	logistics	0.135
mastery	0.130	personal development	0.069
supportive environment	0.048	studying	0.066
		strong self-efficacy	0.051
		lifelong learning	0.040
		self x external regulation	0.038
		individual differences	0.027
Dimension 7: Essentials for Learning (accounts for 5.8% of total variance in participants' profiles)			
Actions		**Attitudes**	
Accounting for more than 10% of the variance in 2**medical**- and 1 **child-care** students' scores		Accounting for more than 10% of the variance in 1**child-care** student's score	
supportive environment	0.209	personal development	0.136
self-regulation	0.117	purpose	0.106
studying	0.046	strong self-efficacy	0.075
metacognition	0.033	expect success	0.046
		fulfilment	0.042
		uncertain self-efficacy	0.029

It is now possible to say, for example, that Sally (medical) spoke relatively more about metacognition, that Troy (medical) spoke relatively more about learning in authentic, situated practice, and that the medical students generally spoke more about an intention to construct knowledge. Conversely, the dimensions of motivation and management appear more salient to the child-care students and their teachers. In addition, not only are group differences apparent, but across the seven dimensions there are idiosyncratic differences between participants that appear unrelated to their group membership. From this, it would be inappropriate for educators to assume that adult learners enter educational settings with a full range of knowledge about teaching and learning, or that such knowledge necessarily conforms to what educators themselves know about teaching and learning.

It is worth at this point revisiting the underlying premise of our research, which is that people's successful engagement with educational opportunities is mediated by their knowledge about teaching and learning. The significance of our research lies in its ability to provide conceptual frameworks that can inform the design of educational programs that seek to meet the learning needs of individuals and groups of learners. In particular, this paper has highlighted the multi-dimensional nature of teachers and learners knowledge, suggesting that it might be necessary to move beyond conceptualising teachers and learners as having uni-dimensional dispositions such as 'surface' approaches or 'higher' conceptions. Rather, teachers and learners appear to hold multi-dimensional knowledge that has the potential to interact between dimensions and between contexts.

From a methodological perspective, we would like to draw attention to value of correspondence analysis for providing elegant graphical representations to assist in understanding the richness of the information contained in large data sets. Furthermore, correspondence analysis is particularly suited to the type of data that is commonly available in the social sciences: frequency data.

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APPENDIX A

Level 1 Categories of teaching and learning

1: The nature of the learning environment
2: The nature of teaching and learning
3: The nature of the learner
4: The nature of the subject matter

Level 1 Categories	Background theories	Questions for learners	Questions for teachers
3	Achievement goals	What do you want to achieve from what you are doing in this lesson/topic/course? Why do you want to achieve this?	What do you want your student/s to achieve from what they are doing in this lesson/topic/course? Why do you want them to achieve that?
3	Self-efficacy, expectancies for success and attributions for success/failure	How well do you expect to perform in this lesson/topic/course? Why do you have those expectations? Can your performance be changed and if so, how?	How well do you expect your student/s to perform in this lesson/topic/course? Why do you have those expectations? Can your sudents' expected performance be changed and if so, how?
1, 2, 3	Psychological and social constructivism; cognition and metacognition	What thinking processes will you be using in this lesson/topic/course?	What thinking processes will student/s be using in this lesson/topic/course?
2, 3	Self-regulation	In what ways are you responsible for the learning in this lesson/topic/course? In what ways is your teacher responsible for the learning in this lesson/topic/course?	In what ways are you responsible for the learning in this lesson/topic/course? In what ways are your student/s responsible for the learning in this lesson/topic/course?
2, 3	Assessment & feedback	How will you know that you have learned what you are meant to?	How will you know that your student/s have learned what they are meant to?
4	Curriculum content	What specific things are you meant to learn from this lesson/topic/course? What broad understandings or ideas do you think you are meant to get from this lesson/topic/course?	What specific things do you want your student/s to learn from this lesson/topic/course? What broad understandings or ideas do you want your student/s to get from this lesson/topic/course?
4	Curriculum purpose	Why are you learning this? When, where and how will you use the learning in this lesson/topic/course?	Why are you teaching this? When, where and how will your student/s use the learning in this lesson/topic/course?
1, 2, 3	Teaching and learning strategies	How does what you are doing help you to learn what you are meant to?	How will your teaching and learning strategies help your student/s to learn?
3	Value and Interest	Is this what you want to learn? Why, or why not, do you want to learn it?	Is this what your student/s want to learn? Why or why not do they want to learn it?
1, 2, 3	Psychological and social constructivism. Teaching and learning strategies.	Who and/or what helps you to learn? How do they/it help you to learn?	Who and/or what helps your student/s to learn? How do they/it help your students to learn?

Prior Teacher Experiences Informing How Post-Graduate Teacher Candidates See Teaching and Themselves in the Role as the Teacher

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This study examined the preconceptions and beliefs that 17 entry-level post-graduate preservice teachers held about the type of teacher they do and do not want to become. Results indicated that there are differences in the way the primary and secondary preservice teachers entering into this post-graduate teacher certification program interpreted their prior teacher experiences. There were differences in not only how but also why participating teacher candidates remembered their prior teachers. Specifically, results highlighted that it was those remembered teachers, which informed on how they saw teaching and themselves in the role of the teacher.

Preservice teacher education, teacher cognition

INTRODUCTION

How entry-level preservice teachers, those students enrolled in their first teacher preparation course (Brookhart and Freedman, 1992, p. 37), see themselves as teachers requires an exploration and understanding of teacher-student interactions, particularly their own experiences as a student of these interactions. Research about teacher-student interactions is a well-established field of inquiry; however, this research has been historically from the point of view of the teacher. Two of the prominent researchers in this area Good and Brophy (2000) revisited an earlier synthesis (Brophy and Good, 1974) of over half a century of work in this area. These interactions were catalogued into an extensive list of causes and consequences ranging from higher praise given to higher socio-economic status students to differentiation based on everything from students' speech characteristics, seating location in the classroom, promptness, handwriting styles to deportment. Good and Brophy (2000) then augmented this initial work to include another quarter century of research and study into classroom relationships.

Teacher-student research has seen a redirection in focus away from the teacher to how students themselves perceive and make sense of the educational experience (Weinstein, Marshal, Sharp, and Botkin, 1987; Weinstein, 1983, 1985; Whitfield, 1976). Preservice teachers have spent more than a decade observing first-hand the role of the teacher. Therefore, it is no revelation they come to teacher education programs with ideas about teaching (Anderson, Blumenfeld, Pintrich, Clark, Marx, and Peterson 1995; Anderson and Holt-Reynolds, 1995; Henson, 2001; Holt-Reynolds, 1992; Hollingsworth, 1989; Kagan, 1992; Tatto, 1998; Weinstein, 1989 Wubbels, 1992). That they are the product of their own lifetime of experiences and these life experiences affect not only what they do but also why and how they do it, was recognised in Lortie's (1975) seminal work, *Schoolteacher: A sociological study*. This shift from teacher-student interactions to student-teacher interactions has been further carried on through the works of Babad, Bernieri, and Rosenthal (1991), Galbo (1983, 1989) and Tierno (1996) in the recognition of the significant roles teachers play in the lives and development of their students.

These student developments have resulted in studies, which have explored participants' beliefs about teachers, students and education. Beliefs are those tacit and often unconsciously held preconceptions and assumptions about students, classrooms and the academic material to be taught (Kagan, 1992, p. 65). These beliefs have been the focus of research studies and papers as to how they are addressed by teacher education programs (Aldridge and Bobis, 2001; Bobis and Aldridge, 2002; Freppon and MacGillivary, 1996; Johnston, 1992; Martinez, Sauleda, and Huber 2001; Wubbels, 1992). However, the emphasis of this research has been primarily on how the teacher education programs can more effectively change these beliefs to those espoused by either the education ideology of the researcher or investigating institution and not on where, why or how these beliefs were formed.

PURPOSE

This study sought to identify those beliefs that entry-level preservice teachers brought with them to their post-graduate teacher education program about teaching and their role as the teacher. There has been a growing trend in research away from quantitative observations of the classroom and into the qualitative life experiences of both students and teachers. One area of this trend is research into prior schooling experience, which has resulted in a broadened exploration of preservice teacher and teacher beliefs. Preservice teachers are not just simply formed or socialised by their lifetime of experiences; they are active participants in interpreting these experiences. As such the focus of this field of research has shifted from what is going on in the classroom to what went on in the classroom from the point of view of the participant. What do preservice teachers remember about their prior schooling experiences? Why do they remember these events or people? Do their interpretations of those prior experiences influence the teacher they see themselves to be?

Preservice teachers enter teacher education programs with powerful and significant ideas that have developed out of their own personal histories (Buckmann and Schwille, 1983; Carter, 1994; Knowles and Holt-Reynolds, 1991). It is these personal histories, those prior experiences that have moulded their educational thinking (Knowles and Holt-Reynolds, 1991, p.89), that preservice teachers use directly to predict their own future teaching practice. Through the interpretations of these prior experiences, prospective teachers enter their education programs with images as to the type of teacher they do and do not want to become (Connelly and Clandinin, 1994).

METHOD

This study was conducted in two phases. The study employed a mixed-model research design using both survey instrument and interview methods. The phase one survey instrument was used a) to gather demographic data, b) to give participants the opportunity to reflect upon their prior schooling experiences, c) to report what these experiences meant to them, and d) to report on what they saw as the ideal characteristics of a teacher. The phase two interviews initially focused on what the participants actually reported in their questionnaire and the meanings the metaphors held for them. This allowed a means of establishing a prior schooling context for the further exploration of prior teacher experiences.

Participants

Out of the 264 candidates entering the program, 66 (25%) agreed to participant in this study. Of these, 26 (39.4%) were male and 40 (60.6%) were female. 26 of the participants were primary education majors and 40 were secondary education majors. Eleven (16.7%) of the teacher candidates were classified as recent undergraduates, under the age of 24 years; 53 (80.3%) were

classified as adults returning to education, aged 24 years or more; and two (3%) declined to answer this question. Forty-six (69.7%) of the participants classified themselves as being Anglo/Caucasian; 18 (27.3%) as Asian; and two (3%) as Other.

Seventeen of these 66 respondents were then selected for interviews. Interviewees were selected to represent best the wide range of candidates entering this post-graduate teacher certification program: male, female, primary, secondary, adults returning to education and recent undergraduates. Nine of the interviewees were male, of whom five were primary education and four were secondary education majors. Four of the nine male teacher candidates were classified as recent undergraduates and five were adults returning to education. Eight of the interviewees were female teacher candidates, of whom three were primary education majors and five were secondary education. Of these eight, there were four each of recent undergraduates and adults returning to education.

Phase 1

A self-administered questionnaire *What Was School Like?* (Mahlios and Maxson, 1995) was offered to all of the 264 primary and secondary education students entering a post-graduate teacher education program at a large university in Australia before they commenced their academic year. All prospective degree program students were invited to complete voluntarily the questionnaire, 66 students (25%) agreed to participate in this study. This questionnaire asked participants to provide demographic data then recall both their primary and secondary school years and then choose from a list of metaphors, or write in their own metaphor, that best described these educational experiences. Participants then chose from a list of metaphors or wrote in their own for how they saw teaching and finally chose eight characteristics from a list of 62 characteristics as to what they perceived were ideal student and teacher characteristics. This questionnaire was selected as it had a research history with cross-cultural populations, established validity and research use in both its original and modified forms (Hardcastle, Yamamoto, Parkay, and Chan, 1985; Mahlios and Maxson, 1995; Yamamoto, Hardcastle, Muehl, and Muehl, 1990).

Phase 2

Seventeen of the participants were then selected from the survey instrument respondents for interviews to further explore the meaning and reasoning behind their questionnaire responses. The interviews took approximately one hour and were conducted on the university's campus. All interviews were conducted prior to the commencement of the program to prevent any course content from altering the teacher candidates' preconceptions and beliefs about teaching and their role as the teacher (Connelly and Clandinin, 1994; Hollingsworth, 1989; Mahlios and Maxson, 1995; Phelan and McLaughlin, 1995; Tabachnick and Zeichner, 1984). The researcher conducted all interviews.

The interviews began as semi-structured interviews following an interview protocol asking the respondents to expound upon the reasons behind their reported responses to the questionnaire. The interviews, after establishing a prior schooling experience context, became semi- or unstructured interviews about the respondents' prior teacher experiences. Interviewees were guided by the researcher as needed to provide explicit examples of their prior teachers.

DATA COLLECTION AND ANALYSIS

The questionnaires allowed the researcher to gather demographic data about the participating teacher candidates and were used primarily as a means of obtaining life stories, an interpretive framework through which the meaning of human experience was revealed in personal accounts (Creswell, 1994), from the interviewees. The questionnaire was present for each interview in

order to allow the researcher to modify the interview protocol for each interviewee. The interview protocol was designed to elicit incidents of prior teachers from each participant. This protocol provided a rich contextual background for the extraction of participants' beliefs about their role as a teacher and how this role has been informed by their own prior teachers.

The constant comparative method provided the theoretical construct from which the researcher operated (Glaser and Strauss, 1967). The researcher transcribed each interview and individual references about prior teachers and teaching were recorded. The process of data collection was consistently compared to generate categories. As the data were coded and compared, the categories were collapsed. The following categories were used to examine and describe the participating preservice teachers:

a) how the participants saw themselves in the role of the teacher;

b) their positive or negative examples of prior teachers held;

c) how those prior teacher examples influenced their selection of ideal teacher characteristics; and

d) common trends.

Results

The analysis of the data yielded many insights into these preservice teachers' beliefs about their role as the teacher, teachers and teaching. Most of the participants saw their role as the teacher in one of three ways: facilitator or guide, encourager or enthuser, or role model. These three categories accounted for three-fourths of the interviewees' images with each category nearly equally represented. The remaining mixed images were of someone who took a holistic approach to students' mental, emotional, physical and intellectual growth, a helper and an experience giver.

In relating their ideal teacher characteristics to prior teacher examples, 43 explicit prior teacher examples were remembered. Of these, the interviewees saw 29 as positive teacher examples and 14 as negative teacher examples. Ten additional general or vague references were also made about prior teachers; two of these were positive and eight were negative. These ten references grouped all teachers into one category and were not comments about any one specific prior teacher, such as, "in my high school the teachers took a real interest in the way they taught, their enthusiasm just rubbed off on the students" (Adrian - all names have been changed to protect identity) and "I was never enthused by my teachers … most of them, I would have to say most of them" (Carolyn).

Twenty-six (90%) of the positive teacher examples involved teachers who were judged to be good because they were seen as teachers who were "not teachers but people … and saw me more as a person … to be encouraged rather than a student" (Louisa). These teachers were seen as willing to go beyond the classroom boundaries and become involved in the students by actively encouraging, inspiring, and showing enthusiasm to and for their students. While ten (71%) of the negative teacher examples were seen as bad teachers because they did not provide this enthusiasm, inspiration or encouragement to either their students or their classes.

These 43 prior teacher examples resulted in 134 separate references to the respondents' ideal teacher characteristics. Of these, 77 were remembered as prior teachers positively demonstrating or possessing a certain characteristic and 57 as prior teachers either demonstrating the opposite of an ideal characteristic or not possessing this characteristic. In addition to these 134 references, another 28 ideal teacher characteristics were remembered with both positive and negative teacher examples. Seven of the interviewees remembered only positive prior teacher examples. While

four were only able to remember negative examples in vague or general terms, two of the interviewees had only clear and distinct negative teacher memories. The remaining five interviewees had mixed well-remembered prior teachers.

Seven of the interviewees felt that teaching should be fun for the students, "she would be spontaneous … she would use our contributions and that would just make class fun, she always brought us around to a positive goal …, she had a good sense of humour" (Kristy). This was seen as the best way to keep students engaged and Chuan stated best what five of the teacher candidates expressed, "if you are going to be a teacher you need to have that good experience." This kind of positive educational experience, positive being seen as fun, inspired or enthused, was required for students to want to become teachers. This was carried further with five other teacher candidates stating that they believed it was more important how you teach than what you actually teach, such as Sook's comment "I think it is more important not so much what they are teaching but the way they teach you." However, five of the interviewees stated their prior teachers' level of subject matter knowledge and interest in the subject matter were the key to their positive memories of school, "they knew what they were talking about … they developed an interest in that particular subject" (Matthew).

Eight of the interviewees saw their ideal teacher characteristics as "how I want to see myself" (Andrew) in the classroom with an additional three seeing parts of themselves in these characteristics but with room to improve after experience in the classroom. Only one interviewee saw himself as his idea of the ideal teacher. Six stated that their favourite teachers had the characteristics of what they listed as ideal teacher characteristics. Four stated they wished to emulate what they saw as positive teacher role models while four stated they did not want to be like those teachers they saw as negative role models.

Most striking was that 13 of the interviewees referred to teachers who encouraged, inspired, demanded, or insisted on students' own critical thinking, "independent thinking is what education is really about … critical thinking" (Gabrielle) and "think outside the square, independent thinking" (Stefan). This critical thinking was seen as an example of good teaching practice and a teaching method worth emulating. Those teachers who did not employ this method were seen as boring, uninspiring or the so called 'old school chalk and talk' style teachers who were seen as not really wanting to be there.

Choosing from a list of 62 characteristics in the questionnaire, the participants' top eight characteristics for their ideal teacher were: visionary (65%), versatile (56%), thorough (52%), sense of humour (52%), self-confident (50%), receptive to others' ideas (41%), energetic (33%) and sincere (30%). A so-called 'Visionary teacher' is someone who can see more than just what this lesson is or even the next lesson is about. This teacher knows how the entire program is tied together and can bring that across to their students and even bring in those outside resources needed, "you gotta think about different ways of presenting stuff … how can I teach this in a variety of ways … you gotta have a vision for where you want to go" (Gabrielle). The so-called 'Versatile teacher' is the teacher who can "think outside the square" (Stefan). This teacher is able to take not only what is in the curriculum but also that which is currently a part of their students' lives and still bring their students around to the syllabus' aims and objectives. The so-called 'Thorough teachers' have their class work prepared and know each students' individual wants and needs, "you have to make sure your work is all prepared and ready and make sure you assess the characteristics of each student properly" (Gilda). The teacher with a 'Sense of Humour' is able to go with the flow of the school's day-to-day activities and interruptions. This teacher appreciates those spontaneous outburst that come up and is able to keep the students interested, "you need to make students laugh occasionally, you can't take them seriously all the time, it's a bit boring that way … they just lose concentration" (Chuan). 'Self-confident teachers' know not only what they

are doing but also how they are going to do it. Their students see them as capable and someone able to be trusted, "I think that's what all children look for in a grown-up … if you are not self-confident as a teacher the child will see through that and not be as willing to confide in you" (Anthony). The teacher who is 'Receptive to Other People's Ideas' listens not only just to other teachers in the common room but also the students in their classes:

> if you work in a school you are part of a team, the teachers teaching there, so listen to what they have got to say and also the students might not agree with you in class and stuff, I think you should be able to listen to everyone's ideas. (Gabrielle)

So-called 'Energetic teachers' are able to show their students that they are: willing to work, want to be there and can keep up with their students, "you have got to be at the energy level of the class … if you show that energy you are showing you enjoy being with them" (Carolyn). And finally, the so-called 'Sincere teacher' is a teacher that students can trust and are willing to learn from:

> sincere is really just a part of getting on the students' level, if you can gain the students' trust you are not just speaking trash … if the students' trust you then I think you will be able to really help the students to learn. (Stefan)

DISCUSSIONS

All of the participants interviewed were able to recall at least one well-remembered event of what they interpreted as an example of what they thought as either a good or bad teacher. This example was also directly related to at least one of their selections for what they believed to be an ideal teacher characteristic. Thirteen of the participants had clear and distinct memories of specific events and feelings relating to several of their prior teachers. The remaining four were able to remember one or two teachers and events; however, they did so with less clarity and generally referred to those experiences in vague terms.

Most of the interviewees were able to describe what they interpreted as examples of good or bad teachers. Gabrielle described what she meant by her idea of what a good teacher was, "we all respected him, he dealt with it (a school camping trip incident) in a sensible way, he treated us like adults. We just had really good teachers, they weren't like teachers they were like people." Louisa also demonstrated this similar interpretation of prior experiences when she described some less favourable teacher examples she remembered, "I had teachers who would … tease or bully as if that was some kind of good teaching practice, which quite frankly I just don't agree with." The following discussion demonstrates how these memories have helped shape the type of teacher these preservice teachers see themselves as becoming along with highlighting how the participating primary and secondary student teachers interpreted those prior teacher experiences differently.

Primary candidates remembered favourable teachers principally because they were seen as willing to go beyond the classroom and get personally involved with their students. These teachers were interpreted to be good role models not only just as teachers but also as people to be emulated. Five of the primary students interviewed were able to remember specific positive examples of prior primary school teachers that directly influenced their idea of whom a teacher should be.

Adrian remembered his two primary school teachers as "moral" since that he felt they had provided him with "good role models." As a result of those two teachers' positive influence, this is the way he would like to see himself as a teacher:

> (they) were very good people, very stable … they were always caring, caring and looking out after the interest of those they were teaching … I trusted my teachers almost as much as I trusted my parents, I had no reason to fear, I was very comfortable in a very comfortable learning environment … I would like to be a good role model for them because whether I like or not, the children are going to look to me. (Adrian)

This type of teacher is to be emulated as a teacher who is not only loving and caring but also interested in them and their differences, specifically someone who is "willing to listen to them … try to understand them." His primary school teachers were "considerate … caring" possessing traits he considers as being ideal in a teacher. As he had primary school teachers who provided him with what he considered to be good role models, it was his intention to pass this experience on to his students by being this same type of teacher.

Gilda stated a very similar idea about passing along the benefit of a perceived good role model, "because having a positive education myself, it's a role model, if I've had a positive educational experience then, hopefully, I will impart that to my students." She, like Adrian, remembered her school experiences positively and felt it was her responsibility to pass this positive educational experience onto her own students in the future. Specifically, she saw this as one of her primary roles in being a teacher.

Primary school teaching candidates saw good teachers in terms of those teachers who were more than just teachers. Their teachers were open, caring and considerate and these were the qualities they believed an ideal teacher should have. And more importantly to this study, these were also the qualities they themselves hoped to possess when they became teachers.

Secondary school teaching candidates also remembered those teachers who were seen as more than just teachers but unlike most of the primary school teaching candidates they also remembered those who were seen as negative examples by being rigid or inflexible. Their positively remembered teachers, those being predominantly from their high school experience, also went beyond the classroom but in ways that were different to how the primary school teaching candidates described their primary school teachers. Their memories of rigid and inflexible teachers, who were also predominantly from high schools, were examples of teachers expressly stated not to be emulated.

Chuan explained what he meant by a teacher who was more than just a teacher, "(he was) a terrific teacher … he got you interested in your work, he made it interesting … he made this enjoyable for us, we'll do some work for him." These teachers just didn't open a book and start at page one with exercise one; they were able to relate the subject matter to their students in ways that engaged them in the subject matter. Matthew also stated this same sentiment:

> how they related to us was fairly important, um I guess that's why I put sincere in there, um but they knew what they were talking about, they were, were interesting to listen to, they developed an interest in that particular subject, there was only a few of them I can think of, I had a Maths teacher who was really good, he really developed my interest in Maths and helped me achieve in it… he took an interest in us, he was enthusiastic about what he taught, he knew what he was doing. All those things.

Primary school teaching candidates saw good teachers as those who would go beyond the classroom by getting involved emotionally and personally in their students' lives by being concerned for the student as a whole person. Whereas secondary school teaching candidates saw good teachers as those who were subject matter experts and could bring their students into this subject matter with fun and interesting ideas. Unlike primary school teaching candidates, secondary students were also clear on what they perceived as examples of a bad teacher. These so-

called ‘Bad teachers’ were more than teachers just seen as boring. Carolyn explained what she meant:

> I think mainly because there was never any enthusiasm shown in the classroom, it was like, it was just drudgery, there was no, nothing dynamic in the way they taught, it was pretty much here is a textbook, here is what we are learning.

This type of teacher showed no enthusiasm for either their students or their subject matter. Those teachers were unable to relate to their students that the subject matter was in any way important and therefore something worthwhile to learn. This belief that subject matter was important and should be made relevant to students was also stated by Gabrielle:

> I want them (my students) to think and not to agree with me, that’s what I expect, that’s when you really learn, to be a lateral thinker to be a critical thinker. I just hate the education where people go and memorize that and just spew it out. I don’t want to be that sort of teacher, I want to be the teacher that makes kids think.

The idea of subject matter being relevant and important along with the teacher being more than just a giver of subject matter was brought together in Sook’s example of her History teacher. She explained not only why this teacher was more than just a History teacher but also how she was so much more:

> it was just enjoyable to be in the class, she made it very easy to learn what we were learning … it was history but she did sometimes take time out to teach us generally about self-esteem and things like that … she was just very good in respect to that as well, she wasn’t just a History teacher, she sort of taught us a lot.

Primary school teaching candidates remembered prior teachers, almost exclusively from primary school, for affective reasons, “encouraging and willing to help students” (Kim) and “they were considerate, they were caring” (Adrian). Whereas secondary school teaching candidates remembered good teachers, almost exclusively from high school, for academic integrity and teaching abilities, “they knew what they were talking about … they developed an interest in that particular subject” (Matthew) and “a lot of them were mentors, I mean a lot of them were and are still” (Louisa). This difference was seen in their ideal teacher characteristics. Primary school teaching candidates selected ‘Determined’ and ‘Adventurous’ as opposed to the secondary school teaching candidates’ ‘Thorough’ and ‘Self-confident’. ‘Determined’ and ‘Adventurous’ primary school teachers went beyond the classroom because they knew how to enter students’ lives by bringing the class to their level. ‘Thorough’ and ‘Self-confident’ secondary school teachers knew their subject matter and are able to bring students into this by showing its relevance and importance to their personal lives.

CONCLUSIONS

This study was an exploratory search into the preconceptions and beliefs of post-graduate teacher candidates on how prior teachers informed their ideas about the type of teacher they either did or did not want to become. While this study was able to demonstrate differences in how the participating teacher candidates interpreted their prior teacher experiences, one limitation of the study must be noted. This study was conducted at only one educational institution and these findings should not be seen as indicative of all teacher candidates. Future research would be valuable to investigate whether the patterns emerging from this study were similar in other preservice teacher education programs.

The findings of this study made an important contribution to the effective teacher literature by highlighting the dearth of work relating to preservice teachers’ beliefs at the entry-level. While

there is a large body of work relating to how educational institutions affect preservice teachers' beliefs there is very little relating to what they bring with them. Future research in this area should continue.

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Self-directed Learning versus Learning in the Interests of Public Safety: A Dilemma in Adult Education?

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In adult education, there can sometimes be a dilemma between notions of learner self-direction and learning that is important for public safety. The dilemma posed is one not well resolved by education theory. Although a few theorists have broadly recognised the tension, they tend to offer little in the way of guidance towards its resolution, particularly in cases such as where the views of older adults of their learning, and those of educationists do not intersect. Nevertheless, some writers have suggested that it might be a helpful resolution of the dilemma if learning is set in contexts that are already familiar to learners, and if learners are encouraged to discuss their learning with others.

Self-directed learning, adult education, public safety

INTRODUCTION

This paper arose out of a research study conducted by the author, involving surveying various perceptions of elderly motorists' learning needs. During its planning stages, while grounding the study in relevant education theory, some interesting questions were raised regarding the perceptions adults might hold on their own learning needs, compared to the views of educationists. This is particularly the case where adults' views of their learning are inconsistent with the interests of public safety, such as sometimes happens in the case of the older car driver.

LEARNER SELF-DIRECTION vs PUBLIC SAFETY INTERESTS

For most older adults, taking note of information is an important part of their lives, particularly with respect to social interaction, day to day living and health matters. In a broad sense, this information constitutes a curriculum, albeit a largely self-determined one. Based on the 1991 *United Nations Principles for Older Persons*, there has been a global promotion (e.g. by the International Federation of Ageing) of the right of older adults to self-determine their destinies in the range of human experiences, including learning. However, such a view of learning tends to be inconsistent with any notion of forms of compulsory or socially directed learning for this age group. This is even where such learning may be deemed necessary to preserve the interests of public safety.

Consequently, there can sometimes be a dilemma between learning that has an important place in terms of public safety interest, and notions of learner self-directedness in relation to meeting older people's learning needs. On the one hand, there are powerful public safety interests in kinds of learning that are essential to the safety and welfare of older people and the community at large. On the other hand, there is the strong tradition of adults being allowed to choose what they learn, when and how.

A DILEMMA IN ADULT EDUCATION THEORY

Unfortunately, education theorists generally tend to shy away from in-depth discussion of forms of learning for adults that society considers to be vital in the interests of public safety (such as road safety). This is because adult learning is so commonly conceptualised in terms of the self-directed learning ethos. The dilemma posed is, as yet, one not well resolved by adult education theory. A few education theorists have at least broadly recognised the tension, but offer little in the way of guidance towards its resolution.

Candy (1991) noted that the eighteenth century writer, Edward Gibbon, who wrote of the transition from teacher-directed learning early in life to self-directed learning thereafter, obviously understood the concept of self-directed learning. However, it is likely both these forms of learning have been practised, if not conceptualised as such, since antiquity. While in modern times the two forms are considered in much education theory (e.g. Knowles 1975; Brookfield 1990; Candy 1991) to co-exist to varying degrees throughout the lifespan, there are nevertheless some unresolved areas of tension, such as learning considered to be essential in the interests of public safety.

In recognising the tension, Griffin (1983) has pointed out that attempts to integrate initial (compulsory) education and education for the remainder of the lifespan have resulted in an unbalanced education policy debate. He discusses the culture of individualism, so prized in Western society that it has pervaded typical conceptualisations of adult education:

> The 'individualism' of adult education only arises in societies relative to a socially-determined notion of 'individualism' itself. In Western industrialized societies, individualism has a cultural distinctiveness….(Griffin, 1983, p.93)

Apart from this issue of individualism inherent in adult education, is the extent to which adult education could also be considered in the context of social intervention. Griffin (1983) proposes that this be the subject of debate:

> The issue of… whether and to what degree adult education could or should be considered a form of social intervention, or the issue of whether or not it could or should constitute a form of social control are issues which presuppose an ideological context in which they are meaningful issues which it is worthwhile to argue about. These are [the] issues, whether adult education is in essence a 'liberal' or 'liberating' enterprise, or whether or not it is distinguishable from… social development education…. (p.93)

Griffin (1983) goes on to explain that these seemingly conflicting issues should only be considered in their historical, cultural and political context. The situation for older learners is a pertinent case. They are at a time in their lives that most cultures and societies in the world associate with respected wisdom and an earned right to self-direct learning pathways. Forms of compulsory or socially prescribed learning are considered inconsistent with this ethos of the older person.

As another perspective on the dilemma, Candy (1991) distinguished between a form of socially-constructed public knowledge that involves acceptance of consensual norms governing expected behaviours, and individually-constructed, private knowledge which includes insights and understandings of the self as a learner, often in specific situations. The constructivist view of learning is consistent with this individually-constructed, private knowledge. It considers knowledge acquisition to be the individual's self-directed building of patterns or configurations designed to make intuitive sense out of experiences, both past and present (Darling-Hammond and Snyder 1992). Older learners may perform this building quite well, but sometimes to the exclusion

of knowledge patterns and configurations objectively identified in scientific research into their needs. Therein is the curriculum tension between knowledge constructed by the individual older learner and knowledge determined by society in the interests of public safety.

Brookfield (1983) was also aware of the dilemma. He noted that a considerable number of curriculum theorists from the mid 1960s onwards made a distinction for adult learning between the natural societal setting and the formalised instructional setting. One such writer, Lawson (1975, p.59) posited:

> The distinction has been made between student-centred conceptions of education which emphasise personal values and standards, and those conceptions in which the central characteristic is the transmission of knowledge by a teacher who represents a point of reference beyond the learner.

However, Brookfield (1983) noted that writers like Lawson were somewhat dismissive of student-centred learning methods, as they argued that learning of any substance can only occur when a teacher engineers the learning environment, approach and content. Brookfield concluded (1983, p.13),

> The implication … is clear enough: adult learners themselves do not possess sufficient skills and judgment to conduct their own learning effectively….

In terms of public safety interests, Brookfield may have uttered a partial truth. Some older car drivers, for example, lack sufficient insight into the potential dangers they pose for themselves and others on the road. Such older drivers would be unlikely themselves to choose to learn about how cognitive and sensory abilities can decline with age and, more particularly, how this might apply in their case.

Brookfield (1983) sensed that the distinction between the two forms of learning that he discussed is perhaps more diffuse than may first appear. He suggested that, even within forms of self-directed learning, the individual might well make a 'deliberate, intentional' choice to pursue skills and knowledge in formalised or traditional instructional settings, even where self-directed learning options have been made available. In contrast, formalised instruction might well take place in natural societal settings, such as community centres, or other locations where older adults might meet in facilitated discussion groups or to hear guest speakers. Brookfield (1993) later pointed out that educators who honour people's self-direction in this way, should not feel they are "…abandoning their convictions and purposes as educators, in a mistaken act of pedagogic abnegation." In fact, facilitator-led discussion groups can be semi-structured ways of learning that many older people find conducive for providing the social support necessary when making decisions concerning physical and emotional fitness issues (Yassuda, Wilson and von Mering 1997).

Brockett and Hiemstra (1991) also perceived the dilemma in terms of two streams lying within self-directed learning. One stream is characteristic of the teaching-learning situation, the other is characteristics of the learner him or herself. Obviously, highly motivated persons can go a long way in determining their own learning directions, content and approaches. However, the learning activity will be measurably facilitated if the teaching-learning environment is made conducive to such self-direction. Older drivers, for example, by and large consider themselves to be very much in control of their learning directions. However, in so far as encouraging older drivers to self-regulate their driving, to perhaps cease altogether, the success of educational initiatives is very much dependent on an individual older driver's sense of personal responsibility in relation to the broader social context. Brookfield (1995, p.154) described this situation as:

> A view of learning which views adults as self-contained, volitional beings scurrying around engaged in individual projects is one that works against cooperative and collective impulses. Citing self-direction, adults can deny the importance of collective action, common interests and their basic interdependence in favour of an obsessive focus on the self.

With respect to the notion of personal responsibility in self-directed learning, Candy (1991), Brookfield (1990) and Brockett and Hiemstra (1991) all suggested that, if adult learners tend to be self-directed to differing degrees, they may well be self-directed to different degrees across various learning situations and individuals. Yet, Candy also cautioned:

> the extent to which skills and insights gained in one [self-directed learning] context can be transferred to another is somewhat restricted…. (1991, p.305)

Thus, while some older drivers can self-direct their learning towards meeting their own driving needs within the limits of road safety, others it seems have great difficulty (or unwillingness) in doing so. Such dissonance might also occur within individuals as well as across them. An example might be the case of an older driver who willingly abides by the rules of speed limit compliance, say, but who believes available knowledge about declining sensory capabilities with age does not apply to him or her, or who does not accept the recommendation of a doctor to restrict their driving in some way.

The dissonance might be related to the tendency (noted by Spigner-Littles and Anderson 1999) for older people to be emotionally attached to the beliefs, knowledge, attitudes, values and world views that they have developed over many years. Even when faced with soundly-based information that contradicts long held beliefs, older learners are often more likely to reject or attempt to explain away such new information than to acknowledge the part they played in it. A pertinent example might be the case of older drivers discounting some news that their involvement in a car crash has been deemed by the police to be due to sensory decline.

TOWARDS RESOLVING THE DILEMMA

Darling-Hammond and Snyder (1992) seem to have progressed the dilemma and its varying perspectives to pose a prime question to be asked of educationists: How does one determine what structure(s) should inform instruction where the learner's constructions of reality, and the educationist's views of learning intersect? Some theorists (such as Brockett and Hiemstra 1991) suggest that resolving a dilemma such as this should simply be a matter of reconciling situational context with individual stakeholder preferences. Unfortunately, this may not be as straightforward a matter as such rhetoric makes it seem because, as the example of older driver learning has illustrated, the views of the learners and the educationists may *not* intersect at all.

Nevertheless, moving towards resolving the dilemma, some early work by Ausubel (1969), later supported by Brookfield (1990), suggested that the learner's selective perception (such as may be acquired through self-directed learning) could be targeted on the relevant aspects of content to be learned, if the content is framed in terms already familiar to the learner. In 1993, Brookfield expanded on this view more forcefully (p.3),

> If there is one thing we have learned from activist adult educators like Horton and Freire it is that we must start (though not stay) where people are; that is we must bring them to an uncomfortable and often unsought confrontation with inequitous political realities … by grounding this activity in terms and processes which look, feel, sound and smell close to home… if you have to make a choice between moving in the direction you want to move people, and working with them where they are, you always choose to work with them where they are.

Thus, in order to facilitate learning that is essential in the interests of public safety (as a political reality), it is necessary to start, as a hackneyed educational dictum puts it, 'where the learner is at'. In the case of older car drivers' learning needs, for example, it is known that older drivers express much more interest in driving management and maintaining their mobility than driving cessation in the interests of public safety (Yassuda et al. 1997). Therefore, if the main context of learning in the interests of public safety is embedded in supporting the learner's current situation, then reactions by the learner might not be as fearful or as hostile as they can be. Spigner-Littles and Anderson (1999) reported that learning among older adults is most effectively accomplished not only when older learners are allowed to have some control over their learning, but also when new information is seen to connect to, and build upon, prior knowledge and actual life experiences. In addition, there is evidence from health promotion research to suggest that if older people feel in control of their life circumstances, and are allowed to share in making decisions that affect them (including their learning), their health and wellbeing can be affected positively (Marmot 1998).

Additionally towards a resolution of the dilemma, Candy helpfully asserted (1991, p.302) (as did Spigner-Littles and Anderson 1999):

> … in order both to learn something and to verify that it has been learned, the learner must engage in dialogue and interaction with others in the community of knowledge users.

The implication for those involved in providing learning opportunities for older adults about public safety matters, is that such learning should not only encourage self-direction, but also provide for a necessary interaction between provider and learner, and between learners, if the learning is to be at all successful. In other words, when the interests of the (self-directed) learner and the interests of public safety do not intersect, one feasible solution to the dilemma might lie in promotion of dialogues with others to explore various perspectives on what has been learned, and what remains to be learned.

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Non-public Collegiate Education in Modern People's Republic of China

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How does a country undergo the extremely rapid change necessary to go from an emerging country to a major world power in a few short years? The answer is through education. While the world reads about the many economic changes taking place in the Peoples Republic of China (PRC), an equally fundamental change is occurring in its educational structure. Evolution in its worldview has moved China from the classic Marxism/Mao dicta to a more pragmatic educational approach, one that includes non-public education. By drawing upon a) interviews with the founders on a modern Chinese non-public university, b) the perspective of educational development in the PRC, and c) a detailed analysis of the process of founding a private institution of higher learning in China, this paper analyses and discusses factors which have allowed such a radical shift in educational policy without causing social upheaval.

Education, Non-Public, Collegiate, China

INTRODUCTION

"China to Give Equal Rights to Private, Public Schools" reads the headline of the China Daily (2002), a newspaper published by the government of the Peoples Republic of China (PRC). The article itself explains that the twenty-eighth session of the Ninth National Peoples Congress (NPC) Standing Committee in Beijing has concluded a preliminary reading of a draft of a law that will give equal treatment to public and non-public education entities alike. The law enables "all individuals and social organizations (to be) eligible to sponsor non-public schools." As reinforced in a statement by Wang Jialiu, Vice-Chairperson of the Education, Science, Culture and Public Health Committee of the National People's Congress, "Private education has become an indispensable part of the national educational system" (China Daily, 2002).

This headline announces a process begun in China some years earlier, but what makes the headline so significant is that it publicly legitimises a clear break with traditional Marxist theory of education. Point # 10 of Marx and Engels' Manifesto of the Communist Party (1848) clearly states "Free education for all children in public schools" as a basic tenet of Communism. Marx and Engels emphasize the word "public," that is, government control of education is paramount. It is commonly understood that Mao Zedong, revolutionary father of the modern PRC and a founding member of the Communist Party of China (CPC), embraced and continued this educational mandate. Therefore, how could such a fundamental plank in Communist theory be changed?

This article outlines the quiet revolution in education taking place in the PRC by considering:

a) the structure and policies of higher education as formerly practiced,

b) factors that allow this educational revolution to happen without social upheaval,

c) a detailed example of the new non-public educational policy as presented by the establishment of one specific Chinese private college, and

d) the worldwide implications of this change, particularly on China itself and on the United States.

COLLEGIATE EDUCATION IN THE EARLY DAYS OF THE PRC

The founding of the People's Republic of China is an important milestone in Chinese history because China was once again unified, now in modern times, under one national government. This one government undertook the responsibility of public education at all levels, although higher education was to have a bumpy existence in the early Communist years. At the beginning of the PRC (1949), there remained in existence very few significant colleges and universities founded at the time of overthrow of the emperor's rule. These were:

a) Peking University, Beijing (founded in 1898 as "The Metropolitan University"),

b) Nanjing University, Nanjing (founded in 1902),

c) Fudan University, Shanghai (founded in 1905),

d) Jinan University, Guangzhou (founded in 1905 in Nanjing),

e) Tsinghua University, Beijing (founded in 1911, Beijing),

f) Honk Kong University (founded in 1910) and

g) Anhui University (founded in 1928).

Although few in number for a nation of such immense size, these institutions survived through precarious times and continue to prosper today. Even early in the beginning years of the New China, more state and provincially funded colleges and universities were created, such as Renmin University (People's University), Beijing, founded in 1950) and The China University of Science and Technology, Hefei, Anhui (founded in 1958, in Beijing).

Because of many economic, social, and political realities, the Cultural Revolution of the late 1960s and early 1970s wreaked havoc upon the established higher education. For example, the USTC (University of Science and Technology of China) was moved from Beijing to Hefei, capital of Anhui, a relatively less developed province in the early 1970s so that its faculty could go down to 'learn how the people lived there'. Many schools were closed so that the students could form the Red Guards (Watkins, 2002). Professors were seen as out of touch with the wisdom inherent in the peasants and were sent to rural areas in order to be re-educated or to teach in primary schools. Wisdom was to come up from the working classes in order to enlighten and lead social change. Therefore, intellectuals were debased and humiliated at this time because they were viewed as bearers of unimportant and probably false knowledge. The effect of the social philosophy and practice during those decades can be seen today, since many people born in the 1960s and 1970s still today demonstrate the effects of the limited and ineffectual education of that period.

Mao died in September of 1976. In 1977, Deng Xiaoping emerged as the leader of China. Deng espoused a different type of economic reform, one that created a place in society for its intelligentsia, since Deng foresaw a world in which knowledge and technology would forge the future. Educators relegated to rural farm work as labourers were allowed to return to their previous occupation. For 10 or 12 years there was little scholarly activity, as society readjusted to

this realignment. Higher education began to prosper as families saw it as a way out of poverty and hard labour for their children. However, higher education procedures and operations were not modernized at this time but continued to operate as they had historically. The one major difference is that each educational institution was considered to be a 'work unit'.

The Work Unit

The PRC's social structure was influenced and organized according to the then-prevailing Soviet system. The basic organizational unit, to which a person and associated family were assigned, belonged to and identified as, was 'the work unit' or the place of employment. The typical citizen and associated family had as their hub of existence, the work unit, which provided employment, housing, education, medical treatment, and, eventually, old age pension or retirement pension. Therefore, education of the people was viewed as an inherent function of the designated work unit. Although the common understanding of a work unit was as a production facility, it was also the organizing element of government departments, farms, and educational institutions. Work units were ubiquitous throughout Chinese society, with every individual assigned to one. Therefore, the individual did not focus on a large, distant, impersonal central government as the main influencing body in his or her life. Instead, the individual saw his or her future regulated by the local work unit run by known people, policies, and relationships which were much more easily identified, understood, and possibly influenced. Even today, Chinese citizens are, albeit more loosely, viewed as being parts of work units, which are under the leadership of Party organizations.

MERITOCRACY AS THE BASIS OF HIGHER EDUCATION AND CAREER PLACEMENT

College Placement by Examination

For the aristocracy from the times of Confucius (551-449 B.C.) and for all Chinese citizens from the Song Dynasty (960 –1279), China has utilized a merit system for determining both educational opportunity and job placement. From those early times to the present time, determination of the best applicants for a job or governmental position is by examination (Elman, 1991).

At the beginning of Senior Middle School (roughly equivalent to United States' high school), students were are divided, based on academic achievement and the willingness of students as well as their families, into two groups: a) students of the sciences, and b) students of liberal arts (humanities). The final choices as to which group to be placed in, are made mainly by the students themselves. Some choices by students are made with guidance by their parents and teachers, especially their particular class teacher. Their schooling also recognizes the extreme importance of high scores on the country-wide, government-administered achievement examinations, held directly after Senior Middle School graduation, and schools specifically prepare the academically elite for these examinations within the regular curricula.

Students have to indicate beforehand whether they will take the academic examinations in science or in humanities. At the end of Senior Middle School, the students have the option or right to choose both the universities and the specialties that they would prefer. After the National Entrance Examination, prior to enrolment in the higher learning institution, every candidate is obliged to fill out a form indicating which university or college they would wish to attend and the specialty of their first, second, and third preferences.

It should be noted that merit is defined solely by the examination scores. At this stage, there is no review of teacher recommendations, school grade reports, list of extra curricular activities, nor consideration of special circumstances. If the student or the family is unhappy with the

examination scores, then the student may study on his or her own, or with a tutor, and re-take the examinations the following year. However, the family must find a way on its own to finance this additional time of study and to forgo a year's family income from for that student.

After the examination scores are rank-ordered, the local educational administrations begin the process of assigning the best students (those with the highest examination scores) to a rank-ordered list of universities, with the most prestigious ones at the top of the list, such as Peking University, Tsinghua University and the Military Colleges. Once all the openings in all the universities and in all the courses are filled, the accepted students are informed of the university and course in which they are being placed. Generally speaking, students are unable to change their placement. Since there are no more college openings, nor any educational alternatives, the students with lower examination scores, that is, those on the remainder of the rank-order list, who have not been matched are therefore simply unable to attend college. A small number of these students, ones whose families have the necessary resources, may be able to find a college placement in another country.

In earlier years, as students graduated from colleges and universities, they were assigned by the local government administration to respective work units. The best students in the most highly regarded courses and prestigious universities were assigned by the government to the best positions in various work units. The traditional view of these students is one of pride and loyalty: " I am wanted by the motherland. I must do a good job". Students at less prestigious universities or in less favoured courses are also assigned job placements, although less favoured ones. The job placement procedures have changed in current times and are discussed later in this paper.

Collegiate Teaching Methodology

Except for the disruptive times of the 1960s and 1970s, the teacher has been regarded as a revered figure to the Chinese citizen since Confucian times. The teacher has been the keeper and purveyor of knowledge. Because the key to occupations other than farming and manual labour has been through knowledge, teachers have had great power in their hands regarding the upcoming generation.

The best way to impart this knowledge has been thought to be through formality and through the traditional lecture method. As the teacher enters the classroom, students show their respect by standing up and saying, "Good morning, teacher!". After the teacher has answered their greetings, the students sit down. The teacher then begins lecturing without interruption or interaction with the students. The students are expected to perform their scholarly function well by dutifully taking and reviewing copious notes. Written examinations are primarily the reiteration of this received knowledge. Grading is sometimes based on the accuracy and length of the student's written recitation. In order to maintain the formality and to co-operate with the teacher's teaching activities, conveying the students' complaints or requirements to the teacher, each course of class has an student assigned or selected to be the formal communicator with the professor. This student is called 'Representative of so-and-so course' or 'Class Committee Member in charge of studies'. Therefore, communication between class students and professor is handled through this specific mediator. Currently, this teaching method is still the predominant pedagogy. However, there are some explorations of other types of teaching, which include class discussion, practice problems, and less formalized interactions with professors.

PRESENT COLLEGIATE EDUCATION IN CHINA

Following the economic changes advocated by Deng Xiaoping, the Chinese economy has developed enormous demand for more and better college graduates. In addition, the Chinese government and educators are now aware of the differences in education in other countries (Yin,

2002). For example, they have seen that high school education is compulsory elsewhere, and they have become aware of a variety of teaching methods. By far, however, the Chinese government has responded to the foreseen unmet demand for more college graduates as China has chosen to leave its stance of isolation and attract international companies into the country.

Government Response to the Demand for Higher Education

In 1980, the first academic regulations were issued by the central government. The intent of these regulations was to increase the education of its citizenry through public education, and an explosion of colleges and universities occurred. By the end of 2001, there were 1,225 Chinese institutions of higher learning accommodating 7.2 million students (*China Today*, 2002, p.139). While 7.2 million students may seem low in a country with one-fifth the world's population, this number demonstrates rapid expansion, since it is about 2.5 times the number of students that attended Chinese institutions of higher learning only six years earlier, in 1995. Corresponding numbers for the United States are 4,070 institutions of higher learning (Statistical Abstract of the United States, Table 264, 2002) with 15.4 million students (ibid, Table 207, 2002). The Chinese Government recognizes the need for more institutions of higher learning, and, according to the national development plan, expects to accommodate over a doubling of students, that is, 16 million higher education students, in just four years, that is, by 2005 (*China Today*, 2002, p.143). This increase raises the collegiate enrolment rate to 15 per cent of Senior Middle School graduates. In contrast, 62.9 percent of United States high school graduates in 1999 went to some form of advanced education (ibid, Table 262, 2002).

Although the central government has the commitment and a national plan and there is unmet demand for more college graduates in the burgeoning Chinese workplace, at present there are not enough extant public resources to accommodate the demand. For example there are about 63 million people in Anhui province today. Approximately 250,000 Senior Middle School graduates received sufficiently high examination scores for college admission. . However, there are currently only about 120,000 college openings in Anhui province today. Very few from this one province will be selected to go to the very prestigious institutions located elsewhere. Therefore, over half, or about 130,000 prospective students, have the academic qualification to attend college but will not be able to do so (Yin, 2002).

How will the needed increase in Chinese enrolment in college be achieved in a short period of time? Although there has been major expansion of the current colleges and universities, this approach alone cannot achieve the objective. Therefore, PRC sees the practical wisdom in the establishment of so-called 'non-public' (in other words, private) colleges. Again, for comparison, about one-quarter (23%) of the 14.5 million United States college students in 1998 attended private institutions of higher learning (ibid, Table 264). However, this is a major sociological change in Chinese society. The private college has no precedent in the New China; since there were no private institutions of higher learning in the PRC in 1998.

Private Collegiate Education in China

In 1997, the Chinese government promulgated and implemented the *Regulations on Education Run by Social Forces* (*China Today*, 2002, p.145) which are the regulations that permit and promulgate the establishment of private institutions of higher education. Yongfang Li, one of the authors of this paper, was a founding person of a private college made possible under these regulations. The institute she helped create is Wanbo Institute of Science and Technology, located in Hefei, Anhui Province. Others have also taken advantage of the opportunity created by these regulations. Four years after the passing of these regulations in 2001, there were 144 private institutions of higher learning in various stages of operation.

Another change away from traditional Marxist and Mao principles helps private colleges compete in China. When there were only public colleges and universities, expenses such as tuition, room, board and books, were paid by the government. Higher education was essentially free to accepted students. Today, most students and their families must pay some of the cost of any higher education (*China Today*, 2002, p.143). At most public universities tuition is between 4,200 and 6,000 Yuan per year, equivalent to US$507 and US$725. This cost is rising at the rate of about 20 per cent per year. (*China Today*, 2002, p.144). In addition, students must pay for their room and board. However, the charges are not exorbitant. At private Chinese institutions, students pay a little more tuition per year plus room, board, and books. Although there is a monetary difference, it must be remembered that these private students have not scored at a high enough level to get into the public institutions. Therefore, the larger amount of money allows these academically qualified students to attend colleges, otherwise, they would not be able to attend college at all. They do not have the alternatives available to United States students, such as:

a) go to a cheaper higher education institution,

b) go part-time,

c) commute,

d) go into the military and reap the educational benefit, and

e) take a semester off to earn additional money.

College Selection Today

The forced assignment of students to colleges and courses ended with the reforms made by Deng Xiaoping. Today, college placement is still based on the examinations scores, but there is more flexibility in the new system. Essentially, the process works in the following manner.

1. Senior Middle School graduates take a unified college entrance examination in July after they have finished their schooling. This would be equivalent to the summer after high school graduation in the United States. As the logistics of handling greater numbers of students have become more complex, it has been decided that the National Entrance Examination should be held in June of 2003. It is also in accordance with the desire of the candidates to avoid the heat in July.
2. Students are asked to predict their scores on the examination before the final scores are ready. The aspiring students usually rank the order of their choices of courses and colleges that they wish to attend. They may list up to four preferences. Each student has to respond ‘yes’ or ‘no’, to indicate that they are willing to be placed by the government into another college that was not listed in their original choices, in case their score does not match up with the requirements of their preferred schools.
3. Students receive a report of their scores. However, a student is not permitted to change the indicated choices at this point. That is, the placement matching continues according to the choices indicated by the student initially.
4. The government matches the student’s rank order choices with the list of college openings. Logistically, if a college says that they have 100 openings, the government will supply that college with 120 candidates’ examination scores and include their files containing middle school teachers’ recommendations, grade reports, list of extra-curricular activities, awards, moral comments, and their physical test reports. If the college decides not to accept a particular student, the college administration must return the above relevant materials to the committee and explain why it turned the student away.

The following data give an idea of the numbers involved in the matching process. In a year in Anhui Province, 37,000 students were placed with four-year colleges, 86,000 students were placed in three-year colleges, and 100,000 students were not able to be accommodated in any college and were simply dropped from the matching list.

5. If a student is not selected by any of their college choices, they may either accept the course and college assigned by the committee (assuming that the student initially indicated that they would obey the assignment), or wait a year for another cycle of allocations to take place. Of course, if the student chooses to wait, then they becomes part of next year's total applicant pool.

There are some clear operational realities inherent in this placement system. Because of the computer matching system, it is important for the prospective student to be realistic about their probable examination results. There is no point in asking to be admitted to the very best colleges if the score is not likely to be good enough to merit admission. If the student lists only, so-called, 'long shots', then the student will be left having only the government assigned choice. However, if the student takes a conservative approach, then they will not be matched with a prestigious college for which they would have qualified.

Quite a few examinees cannot have their dreams realized because their results in the examination are below the requirement level of their desired choice of course or university. If the student has expressed a willingness to be sent by the examining authorities to another college or university, in the case that their preferred institutions would not accept them, then the student may be sent to another college or university.

Job Placement Today

After college graduation, the job placement process has fundamentally changed from that under the Marxist and Mao forced placement system. In accordance with the market economy of the whole society, a brand new system based on the principle of a 'two-way choice' is adopted in place of the old assignment system. The two-way choice system, which is a reform of the former job assignment system, means that graduates can choose employers and the employers can choose graduates, both of their own free will. For instance, a firm approaches a college and requests a list of prospective employees, that is, graduating students in a particular course. The prospective employer receives the appropriate list and interviews the potential employees. For example, the Ministry of Foreign Affairs may request a list of graduating English specialists to be hired as interpreters. It will then interview and select its new employees. Students may accept or reject the position.

However, there is still a remnant of the old assignment system. If a student is particularly asked to accept a position that is considered critical to the success of some governmental agency, the student is expected to accept it. If the student does not accept this kind of position, then a notation is made on the student's work record, unless the student offers a valid reason to decline, such as, caring of an aged parent so cannot move, or physically cannot perform the tasks.

In the case in which a student fails to receive any job offer, the college will help them in finding a job. Most colleges and universities have set up Employment Directing Offices with the aim of guiding, directing and helping graduates seek employment. Consequently, graduates are now trying to prepare in every possible way for the crucial job interviews so that they may be offered better jobs in an environment of keen competition. Unfortunately, students in some less wanted courses, such as history or library archiving, find it difficult to get jobs, since there is little prestige or demand for these graduates, even in a society where overall demand for college graduates cannot be met.

AN EXAMPLE OF PRIVATE CHINESE COLLEGIATE EDUCATION: WANBO INSTITUTE OF SCIENCE AND TECHNOLOGY

The Founding of a Private College

Wanbo Institute of Science and Technology, located in Hefei, Anhui Province, is a private institution of higher education that offers its students the possibilities of a three-year college education. Yongfang Li, one of the authors of this paper, is the current Dean in the Department of Foreign Studies in the Institute and has been involved since its inception. The senior author, Richard Rosecky, was a visiting professor in China and was present at and familiar with the Institute's formative process. Wanbo Institute is one of the new non-public institutions established to fill the demand by the 100,000 and more Anhui Provincial students who desire to attend college but could not be accommodated by the public system of universities and colleges.

In 1999, Professor Yin Hongjun, Deputy President of the University of Science and Technology of China (USTC), the most prestigious of China's technology universities, proved to be one of the pioneers of non-public college education in China. At that time, he was going to retire from the USTC, when the Anhui Provincial governmental education authorities approached him. They wanted to discuss with him the opportunity to establish a private technological university in Hefei, allowed under the recently adopted 'regulations' and to see if he would consider becoming its first President.

Professor Yin faced two monumental challenges when he accepted the position. Firstly, he could only hire retired faculty or new graduates. That is, he could not hire faculty staff who were presently employed by state funded colleges and universities. At that time, there were no faculty at existing private colleges. Secondly, he would be required to raise more than half of the college's start-up funds from non-governmental sources. Professor Yin decided to accept the challenges.

After a few years were spent in planning and fund raising, the Wanbo Group was formed as the formal owner of the proposed college offered its investment in the construction of the school. The Wanbo Group presented its plan and obtained approvals from three governmental bodies: a) the Anhui Provincial Judging Panel of Higher Education Setting, b) the Anhui Provincial Government, and c) the National Education Ministry, before it could begin operations.

In 2000, the Wanbo Group purchased property and began the conversion of the property into a suitable college site. Costing initial funds of 190 million Yuan (about US$23 million), the property is a lovely one, nested between a hill and a lake. It is also located in the New Hi Tech Industrial Development Zone, so that it will be close to growing companies with which it can establish student internships and permanent job possibilities for its graduates. The site covers an area of 150,000 square meters. The buildings already on the property had originally been a boarding school; however, they required considerable renovation. Professor Yin explains the present funding situation for the college:

> Because China is still a developing country, the compulsory education norm is only nine years. For rich countries, 12 years of education is the norm. In China, college education, though used to be free of charge for sometime, is not compulsory. So the government does not have the duty to educate everyone at college level. That is why the government endorses the use of money for higher education. Wanbo is funded entirely by its own money: the Wanbo Group plus the tuition from the students. About 30 to 40 per cent of the operating costs are funded by tuition. The rest is funded by local enterprises.

Wanbo Institute's initial faculty and staff were recruited from retired professors from the University of Science and Technology of China, Anhui University, Hefei University of

Technology, and the Hefei branch of the Academy of Science of China. Meanwhile, college and university graduates with bachelor and master degrees, have been employed as young teachers. The Institute provides a small amount of advertising to publicize that it is available as a choice for Senior Middle School students taking the entrance examinations every year.

In the Fall of 2000, Wanbo Institute opened with an enrolment of about 300 students in its four schools: a) the School of Science and Engineering, b) the School of Liberal Arts and Law, c) the School of Economic Management, and d) the School of Art and Physical Culture. According to Professor Yin, "Wanbo attracts students essentially from the Anhui Provincial area, but does attract some students from other provinces."

Wanbo Institute Today

By Fall 2002, there were 2,500 students enrolled, with approximately 5,000 students envisaged for the 2004-2005 school year. It completely renovated the existing premises and erected new classrooms and faculty office facilities as well as ultramodern academic buildings. The rate and quality of the changes are nothing short of astonishing. Compared with the comparatively run down facilities that it acquired, completely modern facilities exist today, just two years after the initial acquisition of the site.

Since the college has been in existence for only two and a half years, it has not yet been granted by the government the right to issue any four-year bachelor's degrees. Like all other Chinese private colleges at this time, it is operating as a three-year college, since it has not yet developed and offered its fourth year curriculum. At this time the Institute can and does offer an official diploma that recognizes junior college academic programs that are done in preparation for the National Self-Taught Senior Program for a Bachelor Degree.

Wanbo expects to be among the first of the non-government higher education programs to be allowed to grant a four-year degree. In anticipation of graduating its first bachelor's degree students, Wanbo Institute already is concerned with their employment. As Professor Yin says,

> The school has set up an employment directing division to contact work units, so as to get information to assist graduates in their job-hunting. Now an employment network has been established. Up to now, many work units have come to Wanbo to select the students they need. The school is trying to satisfy both the graduates and the employing units. We hope all students will finish their program and some students go to work part time. We are confident of the first group of our graduates.

Interviews with present Wanbo students find them to be very proud of their new institute. They feel that Wanbo Institute trains them in modern methods of thinking and uses of technology, breaking away from traditional university teaching methods. They are pleased that Wanbo emphasizes useful and applicable knowledge. However, the students are not naïve and recognize that Beijing University. Tsinghua University, and the USTC are still considered to be the 'best' places to study. In the ranking by students of the subsequent acceptance by colleges and universities, they would still list, at this time, the established Chinese higher education institutions in order of preference as:

1. The Peoples Liberation Army colleges and universities
2. "First line schools" (Chinese University of Science and Technology, Peking University, Tsihua University)
3. "Key 100" universities (Anhui University)
4. A new, forward-looking college (Wanbo Institute)

It will be interesting to see, as Wanbo Institute graduates prove themselves in the workplace and in graduate schools in future years, how these preconceived preferences may change.

SUMMARY

What does it take for a country to move rapidly from an emerging country to a major world force? An educated citizenry. How does a country educate masses of people and prepare them to be a modern workforce with only limited state-run institutions of higher education? A pragmatic PRC government fosters private education in a country that has never had it before, even if this goes against classic Marxism/Maoism, in which the state, and only the state, can provide education. But, as the People's Republic of China has added its own characteristics to socialism, so it has recognized that its historic education system did not and could not meet the needs of a modern society. Therefore, the state now sanctions and promotes private institutions of higher education. The critical steps taken by one particular exemplary institution, Wanbo Institute of Science and Technology, demonstrate the practical considerations that are making such private institutions a successful part of the so-called 'New China' society and culture.

IMPLICATIONS

The change in law has led to a vigorous growth in non-public-run institutions of higher learning. However, it is easy to demonstrate that there is a huge unmet demand for higher education in modern China.

Just as Chinese society at large has embraced key elements of economic competition, it is very likely that non-public-run institutions of higher education like Wanbo Institute are apt to embrace competition for students. While there are some elements of control maintained by the state, Wanbo has tried to lure students to its campus.

Lastly, China must enlarge its capacity for higher education. As a major member of the World Trade Organization, China needs many more educated managers of its enterprises. The state understands this and has increased its funding for higher education. A major question is, "Is the increased funding enough"? Only the passage of time will tell.

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Executive Perceptions on International Education in a Globalized Environment: The Travel Industry's Point of View

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Research on globalization has determined travel executives' perceptions of the psychological implications brought about by an interconnected global environment and the implications on international education. With the concepts of Clyne and Rizvi (1998) and Pittaway, Ferguson, and Breen (1998) on the value of cross-cultural interaction as a framework for international learning, the study has explored strategies by which international education may be nurtured in a globalizing environment.

The globalized environment has affected business in a way that it has re-shaped cross-border interactions. This new landscape has provided the potential to affect the individual's psyche and opened new avenues towards the delivery of innovative international learning approaches.

executive perceptions, international education, globalization, travel industry

INTRODUCTION

Globalization has led the growth of business between nations of the world, so that money flows rapidly in and out of them, creating a situation of economic and political interdependence among these countries. A number of factors account for this event. First, technology has drastically lowered the cost of transportation and communication, thereby enhancing opportunities for international commerce. Second, laws regulating trade have generally become less restrictive throughout the world. Third, developing nations have expanded their economies by promoting exports and opening their doors to foreign companies seeking investments. This trend has expanded opportunities for economic growth and competition throughout the world (Greenberg and Baron, 1997, p.37).

As a result of this evolving landscape, the speed and volume of information has increased proportionately. These changes have led to the rethinking and creative implementation of mechanisms for efficient knowledge transfers. Corporate universities have become an accepted element within the educational landscape. Corporate organizations and academic institutions are exploring combinations of bricks and mortar and virtual learning through the Internet to disseminate critical knowledge and information across borders. The Lufthansa School of Business in Frankfurt has initiated measures to bridge potential knowledge gaps that may exist between the academic world and the business world.

In the travel industry, rapid spread of cross-border information and knowledge is the crux of business. The pursuits of greater efficiency in technology, communication, and education have become routine.

Within this landscape, it is likely that cross-cultural social interactions enhance personal development and provide a rich venue for increasing efficiency through network expansion, and may constitute the most fruitful aspect of an international learner's experience (Clyne and Rizvi, 1998; Pittaway, Ferguson, and Breen, 1998).

This study sought to explore the potential impact of globalization on the mindsets of individuals and the delivery of international education as perceived by the travel executives and members of the Pacific Asia Travel Association (PATA).

The travel executives were selected for the study for reasons of linguistic congruency, or proficiency in English. This perspective was a factor because the travel executives had very likely traveled to various parts of the world. Multicultural exposure or contact with various races and cultures was another factor. Cross-cultural involvement was considered because the travel executives were involved in activities and transactions with people from various sectors. Technological aptitude was a criterion because the travel executives were familiar with the use of advanced technology that related to the work they performed.

SAMPLE POPULATION

In the context of this study, a Travel Executive is defined as a professional performing a management function relating to travel and tourism. A travel executive may be involved in either the production or delivery of a travel related product or service.

This broad definition encompasses individuals engaged in ventures such as travel agencies, travel research and consulting, travel technologies, hotels and resorts, hospitality management, travel media, airlines and aviation, car rental, tour operators, tourism boards, convention and exhibition bureaus, travel distribution systems, travel and tourism education, travel media, destination management, and destination investment companies.

TRAVEL INDUSTRY CLASSIFICATION

The travel executives are classified according to their primary functions. *Cluster 1* (**Travel Services**) refers to those executives directly involved in the business of selling and promoting travel related products and services. This category includes travel agencies, tour operators, travel technologies, distribution systems, and related businesses. *Cluster 2* (**Tourism**) refers to executives who sold and promoted tourist destinations and tourism in general. This category includes tour boards and destination management companies. *Cluster 3* (**Airline**) refers to executives working in the airline industry. *Cluster 4* (**Hospitality**) refers to executives working for hotels, resorts, lodging and related businesses.

Utilizing this classification, the respondents are described as follows:

Classification	**Number of Respondents**	**Percentage**
Travel Services	42	35%
Tourism	40	34%
Airline	8	7%
Hospitality	28	24%

CHARACTERISTICS OF THE SAMPLE POPULATION

The respondents came from thirty-five (35) countries: *Austria, Australia, Bahrain, China, Canada, Cook Islands, Fiji, France, French Polynesia, Germany, Hong Kong, India, Indonesia, Japan, Korea, Macau, Malaysia, Mongolia, Nepal, New Guinea, New Zealand, Pakistan, Philippines, Saudi Arabia, Singapore, South Africa, Sri Lanka, Switzerland, Thailand, Tonga, Turkey, Turkmenistan, United States, United Kingdom,* and *Vietnam.*

Out of the 118 respondents, 87 (73%) were male, and 31 (27%) were female. All of the respondents were college graduates. The profile of the respondents based on their level of education was as follows:

Degree Completed	Number of Respondents	Percentage
Bachelor's Degree	60	50%
Master's Degree	54	47%
Phd	4	3%

The average industry experience of all the respondents was 20 years.

Industry Experience	Number of Respondents	Percentage
1-5 Years	3	3%
6-10 Years	11	9%
11-15 Years	30	25%
16-20 Years	21	18%
Over 21 Years	53	45%

It was evident that 88 per cent of the respondents had at least 11 years of industry experience.

RESEARCH METHODOLOGY

Survey forms were sent out to 1,000 members of the Pacific Asia Travel Association (PATA). This international organization is composed of senior executives in the travel and tourism industry. There were 118 valid surveys completed and returned, comprising a return rate of 12 per cent.

The data collected related to the respondents' perceptions of the potential psychological impact of globalization, as well as selected international education deliveries.

Each of the statements in the survey was assessed on a five-point Likert-type scale. The respondents were asked to indicate their response to each statement. The possible responses were 5 for Strongly Agree (SA), 4 for Agree (A), 3 for Undecided (U), 2 for Disagree (D), and 1 for Strongly Disagree (SD).

Since the purpose of the study was to determine the central tendency of the responses to each statement, the weighted mean of each statement was calculated.

In order to arrive at a definite interpretation of the respondents' central tendency, the researchers assigned the following hypothetical mean range to the scales for each item:

Range	Scale	
4.21-5.00	Strongly Agree	(SA)
3.41-4.20	Agree	(A)
2.61-3.40	Undecided	(U)
1.81-2.60	Disagree	(D)
1.00-1.80	Strongly Disagree	(SD)

FINDINGS

The data were recorded on tables showing the frequencies and percentages of responses under each item in the various dimensions of the survey. The weighted mean, as well as its qualitative equivalent were also recorded and interpreted.

Table 1 shows the travel executives' perceptions regarding the (psychological) impact of globalization. The factor average of 3.85 revealed their agreement to the statements in this dimension.

Table 1. Travel executives' perceptions on the psychological impact of globalization

Statement	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		(N = 118)	
	F	%	F	%	F	%	F	%	F	%	u	Scale
Globalization is a fact in our world today, and most of what we do has international repercussions.	49	41.52	55	46.61	6	5.08	8	6.78	0	0	4.23	SA
The globalized system has changed the way I perceive the world to be.	30	25.42	44	37.29	20	16.95	20	16.95	4	3.39	3.64	A
I feel pressured and threatened as our world becomes more globalized.	39	33.05	66	55.93	9	7.63	4	3.39	0	0	4.19	A
There is a risk that those who are left behind in a globalizing world will create a backlash that is chaotic.	17	14.41	36	30.51	38	32.20	26	22.03	1	0.85	3.35	U
Factor Average											3.85	A

Strong agreement was shown by the travel executives with the statement that "globalization is a fact in our world today, and most of what we do has international repercussions". This finding has a number of implications. First, globalization affects an individual's way of perceiving his or her ability to respond to the purposes of globalization. Second, globalization affects the way in which people view technology. In the past, people used to think of technology as a luxury that only a few privileged persons could acquire whereas today people view technology as indispensable. Third, anyone who has a tendency to resist change will eventually accept that there are modifications in one's lifestyle and way of doing things, and that these changes are necessary. This realization makes people alert, responsive, and aware of the importance of interconnectivity.

The respondents agreed, the "globalized system has changed the way I perceive the world to be". The respondents realized that the world is no longer composed of isolated countries working toward survival and sustenance. Instead, they perceived the world to be so interconnected that individuals and countries acquire voluminous amount of information across borders. The world today is integrated in a way that can lead to worldwide learning.

The respondents agreed that they "felt pressured and threatened as our world globalizes further". This feeling is psychological, and affects those who think that they are not prepared for globalization. The pressure to excel, to compete with others, and to pass on new standards set by a global labor market may be felt by many individuals. Furthermore, the realization that globalization may be complicated and that every individual must cope with the pressures of globalization may lead to an individual's feeling of insecurity when witnessing the transformation of a globalizing world. Employees in travel organizations felt this insecurity because any lapse in the technology or information on travel may cause the travelers to transfer their patronage to other travel organizations.

As international learners and processors in a global environment, those unfamiliar with varying cultural codes may experience a high level of stress in social encounters, and suffer from interpersonal anxiety and self-doubt (Gudykunst and Hammer, 1988; Zaharna, 1989).

Indecision was shown by the travel executives with respect to the statements that "there is a risk that those who are left behind in a globalizing world will create a backlash that is chaotic".

Despite their anxiety and feelings of pressure regarding globalization, the travel executives were not sure that a backlash against globalization would create a chaotic world. The respondents recognized the need for an acceleration of technology, an improvement of information systems, and the management of quality in order to conform to a globalizing world. However, they doubted that there would be violent reactions to globalization even if those who were slow to change and develop were left without economic advantages. Instead, it is possible that international learners who lack social skills and aptitude may decide to withdraw from the process and prefer to stay within their comfort zones and interact with co-ethnic or like-minded members (Fan and Mak, 1998).

Perceptions of International Education

Table 2 presents the travel executives' perceptions on international education. The factor average of 3.84 denoted that the respondents generally agreed to the statements under this factor.

Table 2. Travel executives' perceptions of international education

Statement	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		(N = 118)	
	F	%	F	%	F	%	F	%	F	%	u	Scale
Academy has a major role to play in educating and preparing youth to cope with our globalizing world.	51	43.22	56	47.46	10	8.47	1	0.85	0	0	4.33	SA
Studying in another country would heighten an individual's chance of succeeding in a globalized world.	52	44.07	50	42.37	8	6.78	8	6.78	0	0	4.24	SA
On-line education is an effective method of providing educational access across borders.	12	10.17	65	55.08	29	24.58	9	7.63	3	2.54	3.63	A
I would spend over $500 for a relevant short-term course offered by an academic institution in another country, on the internet.	11	9.32	32	27.12	45	38.13	24	20.34	6	5.08	3.15	U
Factor Average											3.84	A

The respondents strongly agreed, "Academy has a major role to play in educating and preparing youth to cope with our globalizing world". They acknowledged the important role of the academic sector in revolutionizing technology, imparting radical theories of economics and trade, and refining students' skills and competencies so that they can cope with rapid globalization. The respondents showed confidence in the capabilities of academic institutions to promote a better understanding of globalization and its features among people, to encourage research on globalization, and to clarify the role of individuals in a globalized society.

The travel executives strongly agreed, "studying in another country would heighten an individual's chance of succeeding in a globalized world". The respondents affirmed the importance and value of experiential learning in other countries, especially in those that have achieved technological and scientific advancement. Studying in another country provided the learner with opportunities to meet prospective investors, to make comparative analyses of the government systems that encourage globalization and of those that militate against globalization, and to learn about advances in science and technology.

Mangan (1997) highlighted the importance of cultural sensitivity in offshore learning experiences. Intensive offshore teaching has the potential to contribute significantly to an institution's internationalization process (Watkins, 1993; Mangan, 1997). It is widely believed that international protagonists need effective cross-cultural awareness skills and knowledge to allow them to adjust their service to meet the needs and expectations of international colleagues and to communicate effectively with others in diverse cultures (Mallison, 1997, p.35).

Mendenhall, Punnett and Ricks (1995) stress the importance of the study of other cultures and highlight the interrelationship between labor and globalization and the importance of ethics in the global environment. They suggest that when a company faces risks in international transactions, an understanding of cultural differences becomes a necessity. Robey and Sales (1994, p.462) also

recommend that international participants and global learners should endeavor to understand the ethical considerations of global business.

The travel executives agreed, "online education is an effective method of providing educational access across borders". They affirmed that unbounded knowledge could be gained through on-line education. Knowledge of new trends in production and technology as well as global marketing is possible through on-line education. Clark et al. (1995) noted that academics have made inroads in innovating and developing on-line support materials that augment student learning and enable students to work collaboratively.

However, the respondents were uncertain that "they would spend over $500 for a relevant short term course offered by an academic institution in another country on the Internet". Their uncertainty could be due to the relatively high cost of online education. With the knowledge that they could acquire knowledge free of charge on the Internet, the travel executives were in doubt as to whether a fee of $500 would be acceptable.

STRATEGIES FOR EFFECTIVE INTERNATIONAL EDUCATION ADAPTATION

From the results of the study, it is clear that globalization has an impact on the psyche of organizational participants. The effects of a closely-knit and competitive environment linger in their mindsets. The respondents clearly see the important role academic institutions need to play in furthering international education and believe there is value in cross-border and online education. Appreciation of academic institutions and openness towards cross-cultural learning is evident.

In the context of pedagogical approaches for the international learner, the study demonstrates the need for the consideration of the following issues: a) assessment of the technological compatibility, as well as the learner's psychological preparedness and learning predisposition in a globalized environment; b) strategic partnering with corporate or field-related institutions may provide added value to the learner; c) foreign institutional alliances that allow a learner's exposure to other countries and cultures can expand one's learning within an international context; d) incorporation of online learning methodologies may provide a timely and more extensive knowledge sourcing; and f) sensitivity to the variations in the price of knowledge across borders needs to be considered.

Cateora and Graham (1999, p.117) recommend 10 criteria that international organizations need to meet when adapting to a globalized environment. They are:

1. open tolerance;
2. flexibility;
3. humility;
4. justice/fairness;
5. ability to adjust to varying tempo;
6. curiosity/interest;
7. knowledge of the country;
8. liking for others;
9. ability to command respect; and
10. ability to integrate oneself into the environment.

It is important for an organization to assess and benchmark their position based on these criteria. Gorman (1999) cited the need for awareness of an international learner's cultural disadvantages, such as adaptations pertaining to information gathering and presentation, dealing with status, gender and family roles, financial security issues, and diversity.

Language can be a challenge when attempting to transfer knowledge across borders. "It is impossible to consider any form of education, or even human existence, without first considering the impact of language on our lives" (Cole and Scribner, 1974).

Mak et al. (1999) recommend overcoming barriers relating to ineffective coaching and limited feedback, feelings of inadequacy due to a large number of adjustments that need to be made, interpersonal anxiety to other races, and threats to the international learner's original identity.

In the light of the impact of globalization on organizations, it is necessary for corporations, governments, and educational institutions to be prepared to undertake adjustments and plan for effective international knowledge transfer within a global framework.

The manager of a travel agency who seeks to build an international enterprise needs to understand fully where the competitive edge is anchored. The organization must readily capitalize on its inherent strengths whether these lie in technology, communication, information process flow, or a highly skilled and globalization-ready workforce.

The organization needs to be prepared to introduce innovations in order to cope with global competition. In the travel industry, the predominant practice is to send letters to institutions and companies to invite their employees to avail themselves of a tour package. The information is limited to a one-page poster. Today, however, the principle is, "If you are not online, you are not on sale" (WTO, 1999, p.4). Destinations and travel businesses eager to have an impact on the marketplace must be on-line. Remote destinations and products with well-developed and innovative web sites can now become "equal contributors" to international information and be active participants in the spread of knowledge. With the advent of technology and information relating to e-business, travel and destination marketing organizations can improve their relative positions within the international context (Trade and Development Board, 2000, p.8).

Furthermore, the Trade and Development Board (2000, p.13) advocates that the tourism industry develops a web site with a message that is appropriate to the target audience, and characterized by a lively design reflecting the nature of the firm's destination and corporate and promotional style, as well as updated information on travel. The web site must have two versions, one of which is suitable for low technology users. This demonstrates the need for sensitivity to varying levels of technology across borders.

Technological advancement can give rise to accelerated information flow. A dynamic web service makes information about a travel product or service highly accessible to customers, suppliers, partners, and researchers worldwide through the Internet. Pollock and Benjamin (n.d.) enumerate the benefits of deploying web services as: 1) enabling full interoperability between platforms and applications as they can be read and processed by all operating systems; programming languages and applications; 2) being ubiquitous or accessible; 3) enjoying widespread support; and 4) enabling automation.

The simultaneous occurrence of various innovations may have a psychological impact on organizational participants. Insecurities may result from the knowledge that one may not have a competitive advantage or the skills to compete effectively in a globalized environment. Starkov and Price (n.d.) advocate the adoption of more aggressive e-business strategies and a move toward the web at low cost, and highly efficient marketing and distribution. These strategies could potentially increase organizational efficiencies while requiring some form of adaptation or re-adjustment from employees.

It is possible that not all employees within an organization share the same propensity or desire for international adaptation and learning. An assessment of the psychological and behavioral implications of a globalized environment on employees may need to be fully explored as a company maps out its globalization strategy.

Opportunities in international education abound on the web. Though a short-term course on the Internet may not be necessary, many organizations are now responding to new ways to accelerate communication and education. Educational institutions are creatively offering information technology and interdisciplinary studies using computer-aided instruction. Cross-border online education has grown in popularity and usage.

The access and provision of international education may not be as daunting a task as previously perceived by many. Travel executives worldwide have responded to a global learning environment by building efficiencies in technology, communication, information and knowledge flows.

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Human Capital and Technology Development in Malaysia

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This paper examines the development of Information and Communication Technology (ICT) and its relation to the development of human capital in Malaysia as a country undergoing transformation into an ICT-driven and knowledge-based society. Education and training, being the key variable of human capital, is examined in terms of the government expenditure on education and training, years of schooling, number of enrolment and level of education of the labour force. ICT development is measured in terms of the personnel involvement in Research and Development (R&D) in related areas of technology or the development allocation and expenditure for R&D, and the extent of ICT usage in the various sectors of the economy and population.

human capital development, technology development, ICT use, knowledge-based

INTRODUCTION

It is well recognized that a trained, skilled and well-educated workforce is critical in enhancing work and economic performance and sustaining competitiveness as Malaysia transforms into an ICT-driven and knowledge-based society (Zainol, 1999). By using technology as a tool, ICT has emerged as an enabler in creating, manipulating and distributing information and communication to improve the quality and effectiveness of both the public and private sector programs and services (Mazlan, 1998). Under the Seventh Malaysia Plan 1996-2000, and more so under the Eighth Malaysia Plan 2001-2005, the government has placed much emphasis on ICT utilization during the implementation of policies and programs and the need to use this process as a means for the creation of new technologies.

To facilitate Malaysia's participation in the emerging networked global environment, the initiatives introduced by the government include the establishment of the Multimedia Super Corridor (MSC) and the formulation of the National IT Agenda (NITA). Government allocations have increased substantially for Research and Development, especially in Science and Technology, as well as for the development of intellectual human capital. This paper attempts to examine Malaysia’s preparation towards the new era in terms of its human capital development. And whether the manner and the means to enforce a paradigm shift in work culture to produce the kind of workforce that the Malaysian economy needs is being undertaken at the same pace, and in the right manner, as the infrastructure development.

HUMAN CAPITAL DEVELOPMENT

In its effort towards shifting to a knowledge-based economy, Malaysia’s main responsibility lies with the development of human and intellectual capital to produce adequate supply of, support and sustain a flexible, agile, and mobile workforce with relevant knowledge and skills. One important if not the most important variable of human capital is education and training which can be measured in several ways including expenditure on education and training, years of schooling, number in enrolment and level of education of the labour force. Government expenditure on education and training as a representative of human capital variable is significantly related to economic growth variable represented by Growth Domestic Product (Ismail and Jajri, 1998).

The Federal Government development allocation and expenditure by sector during the Seventh Malaysia Plan (7MP, 1996-2000), the expenditure in education and training as shown in Table 1 was RM19.7 billion or 19.9 per cent of the total development expenditure and expended to RM22.7 billion during the Eighth Malaysia Plan (8MP, 2001-2005). The Federal Government allocation and expenditure for education and training showed a big jump in the expenditure for technical and vocational schools from RM404.9 million during the 6MP to RM756.6 million during the 7MP. The allocation for technical and vocational schools during the 8MP is further increased to RM900 million. For industrial training, the allocation of close to RM3.8 billion during the 8MP is doubled that allocation and expenditure of RM1.88 billion and RM1.83 billion respectively during the 7MP.

Table 1. Development Allocation for Education and Training, 1996-2005 (RM million)

	7MP		8MP
Program	**Allocation**	**Expenditure**	**Allocation**
Education	17948.5	17542.2	18660.0
Pre-school	123.6	107.5	147.4
Primary Education	1632.0	2631.8	2750.0
Secondary Education	5330.1	5317.5	4862.6
Government & Government-aided Schools	3860.0	3853.7	3262.6
MARA Junior Science Colleges	710.0	707.2	700.0
Technical & Vocational Schools	760.1	756.6	900.0
Tertiary Education	5362.8	5005.1	8900.0
Teacher Education	350.0	332.5	300.0
Other Educational Support Programme	4150.0	4147.8	1700.0
Training	2237.3	2181.9	4000.0
Industrial Training	1876.0	1827.0	3760.0
Commercial Training	71.3	71.2	100.0
Management Training	290.0	283.7	140.0
Total	20185.8	19724.1	22660.0

Source: 8th Malaysia Plan

Concomitant with the increase in allocation for education and training, there has been a substantial increase in the number of population having access to education at all levels over the past decades. Total enrolment at the tertiary level in local public educational institutions doubled from 147,927 students in 1995 to 321,729 in 2000. Table 2 showed that there were 170,794 students enrolled for bachelor degree courses in 2000, while Table 3 indicated that 392,304 students were at the diploma level and 28,154 at certificate level. This represents more than 100 per cent increase compared to enrolment at the respective level in 1995.

Table 2. Enrolment for First Degree Courses from Local Public Institutions 1995-2005

Course	**Enrolment**					
	1995	**%**	**2000**	**%**	**2005**	**%**
Arts	44886	59.3	81914	48.0	103846	42.5
Arts & Humanities	22262		40130		48208	
Economics & Business	20072		37875		50522	
Law	2552		3909		5116	
Science	18171	24.0	49575	29.0	71897	29.4
Medicine & Dentistry	3738		6908		8656	
Agriculture & Related Sciences	2472		4940		5961	
Pure Sciences	4032		9081		14739	
Technical	12652	16.7	39305	23.0	68784	28.1
Engineering	9756		31494		57684	
Architecture, Town Planning & Survey	1397		4682		7920	
Others	1499		3129		3180	
Total	75709	100	170794	100	244527	100

Sources: Malaysia 2001

Table 3. Student Enrolment in Local Public Institutions, 1995-2005

	1995	%	2000	%	2005	%
Pre-school	253675	5.1	399980	7.0	549000	8.4
Primary	2799359	56.6	2945906	51.7	3035018	46.3
Lower Secondary	1124910	22.8	1245523	21.8	1364153	20.8
Upper Secondary	502964	10.2	697223	12.2	921271	14.0
Post-secondary	80080	1.6	76755	1.4	134134	2.0
Teacher Education (Non-graduates)	35410	0.7	14460	0.3	31310	0.4
Certificate	13556	0.3	28154	0.5	88848	1.4
Diploma	46480	0.9	92304	1.6	148025	2.3
First Degree & Post-graduate	87891	1.8	201271	3.5	289806	4.4
Total	4944325		5701576		6561565	

Source: 8th Malaysia Plan

The increase in tertiary enrolment was consistent with the overall pattern of employment, as presented in Table 4, which registered highest average annual growth rates for administrative and managerial category followed by professional and technical category suggesting a strong demand for manpower with skills and tertiary education. The dire need to increase enrolment at the tertiary level is reflected by the very low 13.9 per cent (Third Outline Perspective Plan (OPP3)) of the population in the labour force in 2000 with tertiary education that is critical to drive a knowledge-based economy. This is also reflected in Table 5 by the small percentage of knowledge workers in the labour force, which ranges from 11.1 per cent in 1996 to 17.8 per cent in 1999, as well as the substantial increase in the projected employment of knowledge workers from 2,800 in 1997 to almost 32,000 in 2001.

Table 4. Employment by Major Occupational Group, 1995-2005 ('000 persons)

Occupational Group	1995	2000	2005	Average Annual Growth Rate (%)		Net Job Creation (%)	
				7MP	8MP	7MP	8MP
Professional, technical & related workers	791 (9.9)	1019.8 (11.0)	1314.0 (12.1)	5.2	5.2	17.9	18.5
Administrative & Managerial workers	256.0 (3.2)	389.4 (4.2)	543.0 (5.0)	8.8	6.9	10.5	9.7
Clerical & Related Workers	871.9 (10.9)	1029.1 (11.1)	1216.2 (11.2)	3.4	3.4	12.4	11.8
Sales Workers	871.1 (10.9)	1019.8 (11.0)	1227.1 (11.3)	3.2	3.8	11.6	13.1
Service Workers	887.9 (11.1)	1094.0 (11.8)	1346.6 (12.4)	4.3	4.2	16.2	15.9
Production & Related Workers	2711.8 (33.9)	3041.0 (32.8)	3355.4 (30.9)	2.3	2.0	25.9	19.8
Agricultural Workers	1607.8 (20.1)	1678.1 (18.1)	1856.6 (17.1)	0.9	2.0	5.5	11.2
Total	7999.2	9271.2	10858.9	3.0	3.2	100	100

Table 5. Projected Employment of K-Workers and Percentage of K-Workers in Labour Force

	1996	1997	1998	1999	2000	2001
Projected employment of K-workers	-	2805	7078	11791	20334	31628
Percentage of K-workers in Labour Force	11.1	17.3	17.5	17.8	-	-

At the first degree level, enrolment in year 2000 marked the beginning of a dominance in science and technical courses accounting for 52 per cent of total enrolment compared to only 40.7 per cent in 1995 (see Table 2). Enrolment in Information and Communications Technology (ICT) courses in higher public institutions increased from 3,770 students in 1995 to 15,050 students in 2000 (8MP) while 49,040 students were enrolled in private institutions in 2000. However, students in private institutions were concentrated in basic computer literacy courses and software

applications. During the period 1996-2000 science and technical graduates accounted for only 42 per cent of the total output for first degree of which 16 per cent are for technical courses as presented in Table 6. Although the figure showed an improvement compared to 1991-1996 greater efforts should be taken to increase enrolment and output at higher levels in science and technical fields especially in ICT courses to cater to the need of qualified manpower.

Table 6. Output of Degree Courses, 1991-2000

	6MP		7MP		8MP	
Course	**No.**	**%**	**No.**	**%**	**No.**	**%**
Arts & Humanities including Economics, Business & Law	49018	62	87882	58	161102	48
Sciences including Medicine, Agricultural Sc., Pure Sc. & Others	19642	25	38273	26	100967	31
Technical, Engineering, Architecture, Surveying & Others	10508	13	24343	16	70650	21
Total	79168	100	150498	100	332719	100

The changing trend from resource-based to knowledge-based employment means that a school leaver today will need to be retrained at least five times in their working life. This is due to the fact that shelf life of worker's knowledge and skills are becoming shorter as a result of rapid continuing technological changes. It was estimated that 50 per cent of what is learnt in school becomes obsolete in five years and in the field of electrical engineering the shelf life of current knowledge is 2.5 years. It would be even shorter in the field of ICT. Training and retraining is therefore crucial to make workers multi-skilled and versatile to be able to cope with these changes.

TECHNOLOGY DEVELOPMENT

Studies have shown (Alias, Jaafar and Anuar, 2000; Othman, 1999; Samsudin, 1999) that economic growth cannot be separated from technological changes, and that the latter in turn depend on human capital involved in research. Technology development can be measured in terms of the personnel involvement in Research and Development (R&D) or the development allocation and expenditure for R&D. During 1985-1995 there were 500 R&D scientists and engineers per million population in Malaysia as presented in Table 7. This has placed the country in the third bottom position compared to 11 other countries most of which are developed. The ratio of R&D scientists and technologists of 7 per 10,000 labour force in 2000 (OPP3) puts Malaysia in the 16th position relative to 21 other countries, described in Table 8. Table 9 shows that, research activities are heavily concentrated in government research institutes and public institutions of higher learning and are still largely focused on agriculture and pure research.

Table 7. Public Sector R&D Expenditure and Number of Scientists and Engineers for Selected Countries

Country	**R&D expenditure (% of GDP) 1998**	**Scientists and Engineers (per million population) 1985-1995**
Australia	1.7	3166
Canada	1.6	2656
China	0.7	350
India	0.7	149
Ireland	1.5	1871
Japan	2.9	6309
South Korea	2.7	2636
Malaysia	0.4	500[1]
New Zealand	1.0	1778
Singapore	1.8	2728
United Kingdom	1.9	2417
United States	2.5	3732

Source: OPP3 2001-2010
Note: [1] Refers to preliminary figures for year 1998

Table 8. Country Position by Components of Knowledge Development Index, 2000

Country	Knowledge Index	Computer Infrastructure	Infostructure	Education and Training	R&D and Technology
United States	1	1	10	8	3
Japan	2	8	3	10	1
Sweden	3	5	2	3	2
Finland	4	2	4	4	4
Norway	5	4	1	1	10
Denmark	6	7	5	2	9
Australia	7	6	6	6	11
Switzerland	8	13	7	9	5
Canada	9	3	12	5	15
Netherlands	10	10	9	13	8
United Kingdom	11	9	8	11	14
Germany	12	12	13	12	7
New Zealand	13	11	14	7	17
Ireland	14	15	15	15	12
South Korea	15	16	11	16	13
Singapore	16	14	16	19	6
Malaysia	17	17	17	17	16
Thailand	18	19	21	14	19
China	19	18	19	18	20
Philippines	20	22	18	20	18
Indonesia	21	21	20	21	21
India	22	20	22	22	22

Source:OPP3 2001-2010

Table 9. R&D Personnel by Institution and Qualification, 1998 (%)

	PhD	Masters	Bachelor	Non-Degree
Government Research Institute	37.2	54.4	23.1	21.0
Institutions of Higher Learning	54.8	29.0	18.7	33.6
Private Sector	8.0	16.6	58.2	45.4
Total	100	100	100	100

Source: 8th Malaysia Plan

Looking at the development allocation and expenditure for R&D, it showed a significant increase in expenditure for R&D during the 7MP compared with during the 5MP and 6MP, and the allocation is further increased during the 8MP. Total allocation for S&T during the 8MP is more than double the expenditure for S&T during the 7MP. However, as shown in Table 10, more than 50 per cent of the total expenditure for S&T during 7MP and allocation during the 8MP were for S&T infrastructure and development. The R&D expenditure as a proportion of Gross Domestic Product (GDP) is very small (0.4% in 1998) and compares unfavorably with that of developed countries (see Table 7).

Table 10. Development Allocation for Science and Technology, 1996-2005 (RM million)

Program	7MP		8MP
	Allocation	Expenditure	Allocation
Intensification of Research in Priority Areas	755.0	718.0	1000.0
Malaysia-MIT Biotechnology Partnership Program	35.0	33.0	-
Technology Development for SMIs	58.0	41.2	30.0
Technology Acquisition Fund (TAF)	118.0	118.0	250.0
Commercialisation of Technology	208.0	203.9	610.0
Industrial Research & Development Grant Scheme (IGS)	50.0	45.9	200.0
MSC Research & Development Grant Scheme (MGS)	65.0	65.0	200.0
Demonstrator Application Grant Scheme (DAGS)	30.0	30.0	100.0
Commercialisation of Research and Development Fund (CRDF)	63.0	63.0	110.0
S&T Infrastructure and Development	2413.3	1496.7	2818.9
Total	3587.3	2611.2	4708.9

Source: 8th Malaysia Plan

ICT USE IN MALAYSIA

ICT has not only emerged as a strategic enabling tool but a driving force to support knowledge-economy. The important role of ICT in the economy has been well documented and that its contribution to output and productivity growth in ICT-using sectors is through enhancing their efficiency by harnessing new technology (Bassanini, et.al, 2000). The development in Information Technology and the convergence between ICT and multimedia has brought about many changes and new approaches in the way people work, conduct businesses and communicate. It has also provided the catalyst for the emergence of the development of new industries in the e-spectrum such as electronic commerce, edutainment, infotainment and high-value added communications services.

The MSC concept created in 1996 was the key initiative towards transforming Malaysia into an IT-cultured and knowledge-based society. The ICT expenditure by the government, education and research and other economic sectors rose from RM3.8 billion in 1995 to RM5.9 billion in 2000 with a total ICT expenditure during 1996-2000 close to RM25 billion, presented in Table 11. In 2000, manufacturing has the highest ICT expenditure (RM1.2 billion) followed by banking and finance (RM827 million), distribution (RM650), government (RM532 million), and telecommunication and home (RM473 million). ICT expenditure for education and research is the same as for utilities and professional ICT and other services (RM236 million). The ICT expenditure for manufacturing, education and research, professional ICT other services, and distribution in 2000 are at least double their respective expenditure in 1995. The biggest increase is for home ICT expenditure from RM76 million in 1995 to RM473 million in 2000.

Table 11. ICT Expenditure by Sector, 1995-2000 (RM million)

Sector	1995	%	2000	%	1996-2000	%
Banking & Finance	1026	27.2	827	14.0	3723	15.0
Manufacturing	494	13.1	1182	20.0	4041	16.3
Government	380	10.1	532	9.0	2062	8.3
Telecommunications	-	-	473	8.0	2323	9.3
Distribution	304	8.1	650	11.0	2586	10.4
Oil & Gas	380	10.1	296	5.0	1623	6.5
Utilities	266	7.0	236	4.0	1253	5.0
Professional ICT & Other Services	125	3.3	236	4.0	236	1.0
Healthcare	-	-	59	1.0	59	0.2
Education & Research	114	3.0	236	4.0	1008	4.0
Transportation	114	3.0	177	3.0	1147	4.6
Home	76	2.0	473	8.0	2004	8.0
Plantation & Mining	76	2.0	-	-	100	0.4
Others	418	11.1	532	9.0	2736	11.0
Total	3773	100.0	5909	100.0	24901	100.0

Source: 8th Malaysia Plan

During the 8MP the flagship applications of the MSC project is given the highest development allocation of RM1.8 billion, shown in Table 12, of which RM435 million goes to the development of E-Government. For computerization and bridging the digital divide, the development allocations are RM1.6 billion and RM1.1 billion respectively. Almost all of the allocation for bridging the digital divide is for the development of computer infrastructure for rural schools.

In terms of the extent of ICT usage, both the personal computers (PC) and Internet penetration are showing phenomenal rate of growth from 610,000 and 18,000 subscribers in 1995 to 2.2 million and 1.5 million 2000, respectively, as shown in Table 13. The number of PCs installed per 1,000 population also rose from 29.5 in 1995 to 85.7 in 2000. However, Malaysia is in the 17th position with regard to Infostructure and Computer Infrastructure when compared to 21 other countries (see Table 8). Infostructure includes newspaper circulation, telephone subscribers, mobile phones

while indicators of computer infrastructure include number of computers per 1,000 population, computer power per capita and connections to the Internet.

Table 12. Development Allocation for ICT-Related Program and Projects, 2001-2005

Program / Project	Allocation (RM million)	%
Flagship Applications	1824.9	35.4
E-Government	434.8	
Smart Schools	401.1	
Telehealth	400.0	
Multi Purpose Card	418.1	
R&D Cluster	1.9	
Cross Flagship	169.0	
Computerization	1641.8	31.8
Research & Development	300.0	5.8
Bridging the Digital Divide	1098.0	21.3
Infodesa (Rural Info)	30.2	
Internet Desa (Rural Internet)	3.0	
Universal Service Provision	119.8	
Computer Infrastructure for Rural Schools	945.0	
Local Content	10.0	0.2
Others	284.4	5.5
Total	5159.1	100.0

Source: 8th Malaysia Plan

Table 13. Selected ICT Indicators 1995 and 2000

Indicator	1995	2000
Newspaper circulation per 1000 population	162	159[1]
Telex subscribers	6578	3105[2]
Personal computers (units installed)	610k	2.2m
Personal computers per 1000 population	29.5	95.7
Telephone lines per 1000 population	161.07	204.76[2]
Telephone subscribers	3.33m	4.65m
Mobile phones	873k	5.1m
Number of Internet subscribers	18k	1.5m
Number of Internet users	30k	6.0m

Sources: MECM, PIKOM
Note: [1] Refers to 1998, [2] Refers to 1999

DISCUSSION

The crucial role of human capital development and R&D requires firm commitments, support and direction from the government. The adoption of ICT in the public sector is inevitable in the light of the changing technology and huge investment by the government to turn electronic all aimed at improving efficiency and effectiveness of the public service. One of the seven MSC flagship applications is Electronic Government that sets the aspiration to employ multimedia technologies to re-invent the way the government operates. The changing landscape of the Public Service through extensive use of ICT especially the Internet services will create a more knowledgeable society that will demand for better quality of services and governance. The introduction of ICT-enabled processes compounded by the rapid change in ICT products and services require the need to learn new skills and processes. The use of ICT and other new technologies at the operational levels are for creating more productive and efficient workers. Hence employees must require new skills as well as the skill to acquire new skills on a continuous basis. A core generic skill would be ICT skills that all employees must have together with other skills to perform multiple tasks. A study by Hazman (2000) on extent of IT use in 500 public service departments revealed wide use of IT in finance, budgeting, enforcement activities and inventory control. Low use of IT was observed in human resource management, communication, counter service and record keeping. The study also found that quality of service depend on employee readiness with regard to ICT

competence, satisfaction with ICT in terms of beliefs and attitudes about ICT, knowledge of ICT potential as well as work productivity impact of ICT and other technologies.

Certainly there is a need to increase enrolment in tertiary education especially in science and technical field because of the growing demand for new inventions and innovative products. The application of ICT as an enabling tool in teaching and learning should be spread for wider coverage that cuts across all levels of education and regions. More efforts should be geared towards promoting a learning culture, that is, learning to learn and lifelong learning to develop the ability to independently learn and use new knowledge and skills to meet changing needs. Thus there is a need to look at alternative pathways to acquiring these skills and knowledge such distance learning, adult learning, outreach education program and visual learning to take advantage of ICT.

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School Culture in a Private Secondary Institution in Mauritius

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This paper presents a case study of the school culture in a secondary school in Mauritius. It analyses how the school culture has an impact on the effectiveness of an educational organisation. The literature on school culture is reviewed and discussed. The education system in the Mauritian context is described; and its advantages and drawbacks highlighted. A case study of a private secondary school, Loreto Convent Port-Louis, is undertaken to illustrate school culture in an educational organisation. The way the school is organised, the goals are set and the outcomes in terms of effectiveness and achievement, are then analysed.

School culture, organisational effectiveness, educational administration, role, task culture, educational goal

"Never look upon thyself
As a conqueror,
Unless thou hath conquered thyself!"

Mary Ward, Loreto Sister's Mission

INTRODUCTION

The educational organisation this paper will focus upon is Loreto Convent Port Louis, a private Catholic secondary school in the capital of Mauritius. The particularity of this institution is that it was the first school to be built, by the Irish Missionaries, for girls in 1845 when Mauritius was still under the British rule. Throughout the centuries, the missionaries have contributed enormously in dispensing education, both academic and pastoral to the young girls in the island, regardless of their race, colour or religion; and respecting the ethnic background of the students. The school has created an environment conducive for learning and a culture based mainly on the formation of the individual and transmission of moral values, which are intended to guide the students through life (Hodgkinson, 1991).

This paper is organised into the following three major sections. First of all, a brief description of the education system in Mauritius is given while paying particular attention to the cultural diversity of the island. Secondly, a brief outlook on the literature on school culture is presented**.** Focus is then laid on the context of Loreto Convent Port-Louis secondary school; a description of the way the school is organised and its distinctive culture is given and the culture of Loreto Convent Port-Louis is discussed in relation to the theories. Finally, this paper analyses how this culture is developed and sustained, and how this relates to the effectiveness of the school.

LITERATURE REVIEW ON SCHOOL CULTURE

It is crucial, before discussing the relationship between the culture of a school and its organisational effectiveness, to have a closer look on what the literature has to say on school culture. According to Bush (1995, p.29), culture refers to the "values, beliefs and norms of individuals in the organisation" and is "manifested by symbols and rituals rather than through the formal structure of the organisation". Furthermore, Bush (1995, p.130) argues that the technical aspects of institutions are inadequate for schools and colleges to aim at excellence and the only way to achieve a high standard is by focussing on values and attitudes which "produces a more balanced portrait of educational institutions".

Bush (1995), writing about cultural models of organisations, put emphasis more on the "informal aspects" of the organisation rather than the "official elements". These informal aspects highlight the great significance of symbols and rituals within a school organisation where leaders have a central role of influencing the culture of the school. Similarly, Hoyle (1986, p.150) claims that ritual is in fact at the heart of cultural models: "Symbols are key components of the culture of all schools" and they "have expressive tasks and symbols which are the only means whereby abstract values can be conveyed … Symbols are central to the process of constructing meaning".

Alternatively, for Fidler, Russell and Simkins (1997), the culture of an organisation represents a stabilising and unifying force for and within the organisation. They believe that one of the major roles of leaders therefore is to understand the existing culture of their institution before they can adequately manage both the organisation and its culture. They describe culture as "the distinctive way in which organisation members go about their work and relate to each other in a particular organisation" (Fidler, Russell and Simkins, 1997, p.35).

Bush (1995) and Bottery (1992) argue that the common values and beliefs shared by the different members of the organisation help to contribute to its effective running and uniqueness. Very often focus is laid on the "notion of a single or dominant culture in organisation" (Handy and Aitkin, 1986, p.132), that is, the shared norms and meanings lead to the development of a monoculture in the school; "the way we do things around here". Added to that they state "cultural models assume the existence of heroes and heroines who embody the values and beliefs of the organisation. These honoured members typify the behaviours associated with the culture of the institution" (Handy and Aitkin, 1986, p.133); and, according to Bush (1995), it is the hero figure who will helps individuals to identify themselves to the school and "sustain group unity" (Handy and Aitkin, 1986, p.133).

Handy and Aitkin (1986) identify four cultures that contribute to give each school a distinctive feature and a unique ethos: 'the club culture', 'the role culture', 'the task culture' and 'the person culture'. The club culture is when there is a dominant figure in the organisation, someone with a rich personality and where there is plenty of folklore from the past that will influence the organisation of the institution. The role culture concerns mainly organisation where specific roles are assigned to people who are fully trained to fulfil them. Handy and Aitkin (1986) claim role cultures apply mainly to secondary schools. The task culture is usually when there is a warm and very friendly attitude among different members of the school community. Everyone co-operates for a single purpose, that is, for the smooth running of the school. Whereas for the person culture, emphasis is laid on individual talent and this "puts the individual first and makes the organisation the resource for individual talents" (Handy and Aitkin, 1986, p.135).

From the above theories and concepts, it can be argued that the culture of the school inevitably has an impact on the learning of the pupils. The environment and atmosphere reigning in the school especially among heads, staffs and pupils, and the values shared by all of them definitely influences the smooth running of the institution.

In the next part of this study, an insight into the Mauritian education system is given in order to understand the cultural background and see how it affects the organisational effectiveness in schools.

BACKGROUND CONTEXT OF THE MAURITIAN EDUCATION SYSTEM

The education system in Mauritius is largely based on the British system since Mauritius was a former British colony. After the country became independent in 1968, Education became one of the main preoccupations of the Mauritian Government to meet the new challenges awaiting the country. Considerable investment of resources, both human and material, has been put into the Education sector and impressive progress has been achieved in terms of free, universal, compulsory primary education, free textbooks, free secondary education and a fairly wide range of higher education courses at the University of Mauritius. Education has been free through the secondary level since 1976 and through the post-secondary level since 1988. The government has made an effort to provide adequate funding for education, occasionally straining tight budgets and even subsidised a great part of the expenditure in the Private Confessional schools, that is, schools under the control of the Catholic Church. However, the pre-primary schools are still privately owned.

The cultural diversity of Mauritius is one of the greatest riches of the country but it can also a great drawback regarding the way education is dispensed in the schools. Mauritius has a population of about 1.2 million inhabitants of whom the majority are from Indian origins. They are mostly Hindus and a minority are Muslims. A small section of the population is from China and the general section of the population is made up of Whites (mainly of French origin) and Creoles (of mixed European and African or Asian origin). The members of the general section of the population are normally Christians. When it comes to the field of education, the media of instruction at school is inevitably English, since the impact of colonialism is still very present. English is the official language of Mauritius but the paradoxical situation is that the majority of the population speaks French in their everyday interactions. However, the teaching of some Asian languages (Hindi, Urdu, Mandarin and Arabic) is also included in the curriculum.

The education system consists of the Primary and Secondary sectors. Children are enrolled in primary school from the age of six and enter Standard I and move automatically up to Standard IV. As the child reaches Standard IV, there is a streaming process that follows. The system is highly competitive and a two-year preparation starts since Standard V up to Standard VI for the end of primary school examinations, the CPE (Certificate of Primary Education). The CPE is a national examination carried out in all the schools of the island and there is a ranking system. Four subjects are compulsory and taken into account for the ranking process; English, French, Mathematics and EVS (Environmental Studies which is a combined science and geography course). The Asian languages are not included in the ranking process. This examination is like a bottleneck from primary to secondary schools. For instance, out of 25,629 candidates in 1996, 16,737 passed all grades included (Ministry of Education and Scientific Research, 1998). Among them, only about 8,000 are admitted to secondary schools, both State and Private of the island, and some 3,000 find their way to Basic Prevocational or technical school. Over 14,000 students are said to be, ‘left without a future’. Those left without secondary education are the most exposed to the vagaries of social deprivation and their consequences.

Children are admitted to secondary schools or colleges on the basis of the ranking and this creates a great disparity among the different colleges of the island. Some colleges are classified as ‘star schools’ and other are regarded as ‘low-performing schools’ and this definitely plays an important role in the development of the adolescents who very often tend to identify themselves with the

image of the college. On the whole, the CPE examination is basically like a kind of streaming at the national level.

As has been mentioned earlier, the CPE determines admission to a secondary college. Most of the colleges, whether they are State owned or Privately owned are like English-style grammar schools. The child enters college in Form I and progresses through to Form VI, requiring seven years of schooling since there is two years preparation for the A Level examinations. From Form I to III, there is no major nationally devised curriculum since each school has to plan its work according to the level of the students. However, some subjects are compulsory, like English, French, Mathematics, Sciences and Social Studies (including Geography and History). When students reach Form IV, they have to choose six major subjects for their O Level examinations. Then students have to specialise in 3 main subjects and 2 subsidiary ones for the A Level examination. The O Level and A Level examinations are carried out by Cambridge University, where they devise the syllabus, prepare the examinations papers and Cambridge examiners even do the correction.

Unfortunately, as it is, the System is grossly inequitable; it has its major structural weaknesses, and it is covertly discriminating and nurtures frustration and failures. It has many limitations; it cannot provide increased access to secondary and tertiary education; it breeds inequalities that seriously affect social harmony. The system caters for only some segments of the Mauritian society, for instance, only 52 per cent of the population within the age group 11 to 19 years are enrolled in secondary schools. It is too exam-oriented and promotes the development of memorisation and lower order thinking skills at the expense of creativity and higher order thinking. Added to that, there is inadequate and under-utilisation of co-curricular and extra-curricular activities mainly because of the constraining influence of the end of year examinations.

It is necessary to make a detailed case study of an educational institution in Mauritius in order to obtain an insight into the culture of a school in a multi-cultural society. The secondary school selected for the purpose of the argument, is Loreto Convent Port-Louis. Focus is laid on a private educational organisation and an analysis is made on whether there is a link between the school culture and the effectiveness of the school.

CASE STUDY: THE CULTURE OF LORETO CONVENT PORT-LOUIS

Background of the School

Loreto Convent Port-Louis is one of the oldest secondary schools in Mauritius for girls. Today, it is one of the most prestigious secondary institutions on the island. It is a Private school under the direction of the Church and the PSSA (Private Secondary School Association), although it is partly subsidised by the government. The School is located very near the City centre at the foot of a hill. It is a very big and spacious school, the buildings are relatively new and there are vast open spaces and playgrounds, several volleyball pitches, a basketball pitch and recently a tennis court. Added to that there is a gymnasium for Physical Education classes and table tennis, an audio-visual room, and a big kitchen for those doing the subject of Food and Nutrition. There are four modern and very well equipped science laboratories, a junior laboratory for the Forms I to III and three laboratories for the students of O and A Levels. The classes are quite large with about 30 students per class. The school population consists mainly of about 1000 students, all girls, and 80 staff, including 15 non-teaching staff. The head of the school is an Irish nun who has worked for over 20 years in the school.

The school has a very good reputation and has been associated with the success of many women on the island. In fact, the school culture is so strong that it is like a family tradition for one or two

generations, mothers and daughters, to be educated in Loreto Convent Port-Louis. The academic level of Loreto is quite high since the admission of students is based on very good ranking after the CPE exams; in other words only those who are ranked among the first 500 are eligible to apply for a seat in the college. Usually only about 130 students are admitted every year to Form I (first year of secondary school), and this is relatively few compared to the very high demand. But the policy and aim of the school are not those of the mass production of educated people but stress is laid essentially on the quality of education, the personal development and moral formation of the individual (Hodgkinson, 1991). Thus, the whole culture of the school is determined by the kind of relationships that exist among different members of the school community; and this culture is the bedrock for the effective running of the organisation. Aspects of this culture are discussed later.

An Analysis of the School Culture at Loreto Convent Port-Louis

The Role of the Head

As stated earlier, Loreto Convent Port-Louis has a specific culture where stress is often laid on the family relationship that exists among the members of the school community. So each one in the school, from the head to the pupils, including the teaching and non-teaching staff feels a member of this so-called 'big family', and they work together for the honour of this prestigious institution. Being a Catholic school, the Head, an Irish nun, has a vital role in the smooth and effective running of the institution. She can be considered to be the heroine figure and helps to sustain unity in the school community (Bush, 1995; Hoy and Miskel, 1996). She can be said to be a 'role model' since she knows every member of the staff individually and is always there whenever a teacher needs her to solve a problem, whether regarding academic or personal ones (Meyerson and Martin, 1997). She is very supportive and always motivates the staff and the pupils to give the best of themselves. She can be very firm sometimes in decision making but she is always open to any suggestion from staff, parents and pupils. She is the central figure of the school and her presence creates a great impact whereby everyone feels secure and highly motivated.

Bush (1995, p.135) points out that the culture of a school may be "expressed by its goals". Referring to Loreto Convent Port-Louis, it is clear that the school has well-defined goals. First, it sets and maintains a good academic standard. Secondly, it seeks to provide the possibility for each child to develop her potential in the specific area of her interest and ability. Finally, pupils are supported by remedial measures, pastoral care and counselling, that closely involve the home and school. The motto of the Head involves the formation of the child to make her someone responsible in life afterwards, to be "*des femmes debout*"; women who will be confident and face life with courage and dignity. Emphasis is placed on success rather than failure so as to build confidence in the child, regardless of her social, cultural or ethnic background. These goals, as Bush (1995, p.135) stated, definitely provide "a common vision and set of values". As such, how effective the school is depends on the structure of its organisation.

Are the Educational Goals Reinforced by the School Culture?

One of the main goals of the school as such is to promote unity and security for all members of the school community. Since Mauritius is a multi-cultural society, the school consists of pupils from different ethnic and religious backgrounds even though the majority is Catholic. So the school regulation lays considerable stress on uniform especially regarding the students. The uniform represents the equal status of students regardless of their class, race, colour or religion. Throughout the years, the Loreto uniform has become a symbol of pride for the pupils and the college. Concerning the curriculum, the college usually follows the one set up by the Government but the system is a little decentralised, especially for Private Schools. In Loreto Convent Port-

Louis, there is a more open curriculum whereby classes on moral values and catechism are included in the timetable. Basically these classes are carried out in small groups, in an informal setting, that is, outside the classroom and students are encouraged to participate and voice out their opinions and views about topics and issues that are of great concern to them. In fact, these classes on values contribute enormously to the formation of the personality of each individual student.

A particular feature of the school is the devotion of the teachers. Some of them usually stay after school hours to carry out remedial classes to help students who are weak in a particular subject. Sometimes, even the students from upper forms are willing to stay after school to help those from lower forms. Everything is done on a voluntary basis and this creates a strong bond among the pupils of the school. Although the education system is very competitive in Mauritius, the Head and teachers always focus on the notion of sharing and group work (Busher and Harris, 1999). Thus, the students work in a more relaxed atmosphere and this contributes largely to their very good performance at examinations, whether they are internal or the Cambridge external examinations. The percentage of passes at all levels, from lower Forms to upper Forms, is always above 98 per cent.

Loreto Convent Port-Louis is a very big organisation and since very often the subsidy of the Government is not sufficient for the running of the school, fund raising activities are undertaken to raise money for diverse projects. Parents are very much concerned with the development of the school and participate actively in these special activities. Money raised from these activities is used to finance projects such as the construction of a new tennis court or investment in Information Technology.

Bush (1995) believes that, in order to support the structures and celebrate the beliefs and norms, schools use rituals and ceremonies. The latter forms an integral part of the culture of the institution. Loreto Convent Port-Louis is an institution where a lot of importance is attached to rituals and traditions. The Annual school Mass, The Prize-Giving Ceremony, the Music Day and Annual Sports Day are among the activities organised during the year, and these help to reinforce the strong ethos. The activities allow both teachers and pupils to work together in a very friendly atmosphere to develop their artistic talents. The Prize Giving Day is an important ceremony during the academic year. The idea of reward is a great source of motivation since it helps the students to understand how hard work is valued. The best students in both academic and sport fields are rewarded, and parents are invited to assist the ceremony. Added to that, the Annual School Mass is an occasion where all the pupils participate, even the non-Catholic pupils, where values such as sharing and tolerance are inculcated.

The Parent Teacher's Association (PTA) is a very important body whenever decision-making is involved. So the Head, teachers and parents work in collaboration for the effective running of the organisation and this creates a great sense of belonging to the school. This is reinforced by the fact that most of the staff are former pupils of Loreto Convent Port-Louis and, thus, they contribute largely to maintaining and even reinforcing the existing culture.

Fidler, et.al (1997, p.35) see the concept of culture as a "unifying force within the organisations" and relates to the ethos as "the way in which the pupils experienced the school". Furthermore, they argue that there can exists two different cultures within the same school community; "in school the culture for pupils is called the school ethos whilst the term culture has been reserved for the shared assumptions of the staff" (Fidler, et.al, 1997, p.44). To support this argument, the case of Loreto Convent Port-Louis can be taken where there are different sub-cultures or ethos among the students, which can sometimes, totally contrast with the culture espoused by the head and staff. Very often, a group of pupils will tend to adopt a particular attitude to try to create their

own identity instead of following blindly what has been decided for them. They try to rebel against the values of the school and it is very important in this case to know which approach to adopt towards them (Henson, 1993; Senge, 1990). Instead of applying the rules of punishment, the policy of the school is to give proper support to these particularly difficult cases, which contrast to the way these disciplinary matters are dealt with in other State schools. If this fails, only then strict disciplinary measures are applied. The students are always given a chance first to improve their behaviour.

THE SCHOOL CULTURE IN RELATION TO SCHOOL EFFECTIVENESS

As a matter of fact, Loreto Convent Port-Louis, during the years has proved to be one of the best performing schools of the island whether it is at an academic level or concerning extra-curricular activities. It could be argued that the good performance of the students depends largely on the fact that they are among the best ones who succeeds their CPE exams, but it cannot be denied that the environment of the school in addition to the motivated staff is really conducive for learning and shaping the students to be their very best. Loreto Convent Port-Louis has won twice the National Award in 1992 and 1993 for the Best School whose criteria are based mainly on the infrastructure of the school in general and the academic performance of the students. No need to say that the Head has a key role in the institution since she is always motivating the staff and the students and encouraging each individual to give the best of themselves. The percentage of Pass for the O Level and A Level is always above 97 per cent, and many students from the school obtain Government scholarships for University studies abroad. It goes without saying that Loreto distinguishes itself from other State schools on the island.

The ethos of the school can be considered to be unique. The main objective of the school is always to allow the pupils to blossom to their full potential, to be creative, to develop their capacity to think and decide for themselves in a school culture based on co-operation rather than competition. In a rather conservative society like Mauritius, it is crucial that girls are given the proper education so that they may find their way in the job market and through life with good qualifications and strong moral values; so that they may become more independent and be able to make their own stance in society.

CONCLUSION

In summary, it can be said that considering the particular case of Mauritius, the culture of a school is very often a crucial factor in determining its effectiveness. The case study of Loreto Convent Port-Louis reveals how the values and policies of the school lead to better achievement of the students. It is crucial for students to perform well, to have a proper environment, and to receive proper moral and academic support. All these factors, added to the relationships between Head, teachers, pupils and staff contribute largely to the effectiveness of this institution.

In other words, a stable and convivial environment within the school, where individuals share the same motivation and norms, are likely to contribute to the effective organisation of the institution. In such a context where the interest of the school is always put forward, collaboration is a key word especially when dealing with problems or while taking decisions. It is only in this way that the school is able to achieve its goals.

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International Business Education in a Global Environment: A Conceptual Approach

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The globalisation phenomenon poses a different set of challenges to the higher education system in countries around the world and requires that international business students be prepared to function professionally in an increasingly complex, interdependent, and dynamic economy. Understanding the educational implications of the internationalisation process requires faculty, staff, and senior-level administrators with a global mindset. The education system in the United States, aiming to satisfy the demand from business students, should be framed in a context in which students emerge better prepared to cope with the forces that govern today's world economy. This paper introduces a conceptual framework based on social, legal, economic, political, and technological (SLEPT) conditions to justify greater internationalisation in business curricula in North American institutions of higher education. A combination of distinctive student exchanges, study abroad programs, corporate overseas internships, and more importantly, a solid international business curriculum should allow them to become more effective, problem-solving individuals.

internationalisation, business education, curriculum integration

INTRODUCTION

The higher education system in the United States calls for innovative educational programs that could serve the student cohort of the twenty first century (Symonds and Miller, 2002). Essentially, this higher education system is made up of three entities; an assortment of public state universities, a variety of community colleges, and several private universities and colleges. Policy-making at those levels is the responsibility of either an elected or appointed Board of Trustees at individual institutions. Such boards govern member institutions and grant university officials broad discretion to establish their institution's missions and manage their campuses. Along those lines, faculty, staff, and senior-level administrators have acknowledged the need to increase the international stature of institutions of higher learning in light of current globalisation opportunities (Woolf, 2002). In turn, they are striving to enhance and encourage international programs as a way to improve students' understanding of the world and emerge as truly international institutions (Scott, 2000).

International programs in the United States have managed to survive despite currently adverse funding conditions, rough faculty scrutiny, and shifting legislative priorities. They have been subject to more stringent reviews from higher education institutions in terms of their intended merit or historical support (Lamet, 2000). Nowadays international programs are being developed by faculty and approved by senior-level administrators in a context that more closely resembles the structure and interests of their own institutions as well as those of the students (Finney, 1997). Thus, international programs have had to adjust their priorities to meet better the demand they face from each constituency.

The globalisation phenomenon requires international business students to function adequately in a more integrated economy. Shifting social, legal, economic, political, and technological conditions pose various challenges to university systems around the world. These five conditions create the acronym SLEPT. Their response to satisfy the demand from international business students should be framed in a context in which business students emerge better prepared to cope with the forces that govern today's world economy. This article underscores a conceptual approach based on the SLEPT conditions to allow undergraduate business students in the United States to acquire a true international business culture. A combination of distinctive international business initiatives, study abroad programs, and corporate internships overseas should allow them to become more effective, problem-solving individuals.

THE GLOBALISATION FRAMEWORK

According to Held and Mc Grew (2002), the process of globalisation results from the expansionary scale and deepening impact of transcontinental flows of resources and expertise leading to an increasing political and economic interdependence of societies around the world. As such, the globalisation process reshapes the power relationships and scope of activities undertaken by people and organisations across geographical regions. Main drivers that explain the process of globalisation include technological advances in communication and information processing along with lower trade and investment barriers that, in turn, translate into increased competition (Sullivan, 1999). It is not surprising, therefore, that liberal groups rely on globalisation to explain a gradual convergence of SLEPT conditions. However, it is unclear whether or not nations are becoming more or less homogeneous as a result of globalisation. Some nations appear unconcerned about losing their local distinctiveness as they conform to one way of doing things, while others feel stronger about retaining their local characteristics (Samli, 2004).

Businesses seem to be one of the most visible activities of how a changing international environment transforms the appreciation of diversity worldwide. The SLEPT conditions in different countries offer as many similarities as divergences influencing the practice and determining the fate of international business. These conditions, by themselves, impose acute restrictions on responsiveness and adaptation of small and large firms to local individual markets. As shown in Figure 1, each one of the SLEPT conditions is highly dependent on each other and hence mutually reinforcing within the business environment. Therefore, one of the greatest challenges institutions of higher learning face is to provide a true international education to their business students. In this context, it is not surprising that international education is at the centre of many political agendas. Learning about other countries increases tolerance and leads to further appreciation and understanding among nations (Woolf, 2002).

In the present context of globalisation, a business curriculum, particularly at the undergraduate level, must accurately capture the main elements of each SLEPT condition. Failure to identify those elements will negate the intended purpose of educating successful business individuals. The idea is that international business faculty acknowledge the world's diversity and can reach across and beyond the SLEPT conditions by taking into account both its similarities and divergences. In view of this, a cost-effective way of achieving a global understanding would be offering on-site opportunities. International business programs, study abroad programs, and corporate overseas internships are means to enhance the understanding of the business environment.

International business education is becoming a complex endeavour that involves a dispersed network of places and institutions. As such, it is closely linked to the challenges imposed by an increasingly interdependent world. Such an interrelation compels senior-level administrators and business faculty to stress the SLEPT conditions. In Pohan's view (1996), quality services rendered to students should come from faculty knowledgeable about the particular dimensions offered by

the geographical areas in question. Undergraduate students enhance their business education vision when each one of the SLEPT conditions is incorporated in their curriculum. It has widely been recognized that personal and professional cross-cultural knowledge obtained by having an immersion experience overseas far outweighs the monetary costs involved (Cobbin and Lee, 2002).

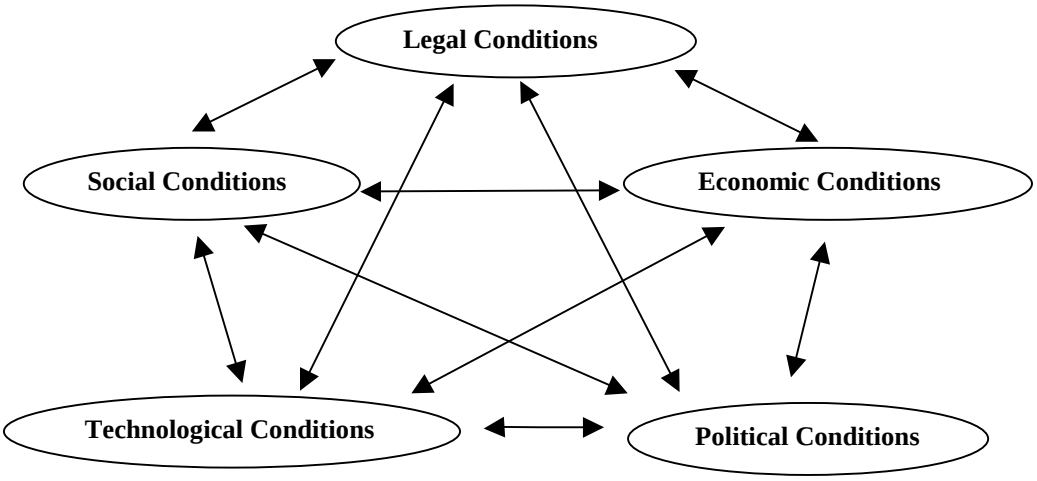

Figure 1. Business Environment

International education should discourage business students from becoming ethnocentric individuals by opening their minds to cultures other than their own. Faculty teaching business courses with an international flavour have a responsibility to provide educational opportunities to eliminate ethnocentrism. However, Cushner and Mahon (2002) assert that most faculties lack a substantial, long-term, intercultural experience abroad that can be translated into significant contributions in terms of language proficiency, global competency, and intercultural sensitivity. The United States is a case in point. Citing a very recent study, they indicate that fewer than five per cent of Ph.D. granting institutions in the United States distinguishes the importance of international experience of faculty for hiring, tenure, and promotion. The WB&A Market Research (1999) had gone even further by saying that some higher learning institutions just simply choose to ignore the need for students to function in an international business setting.

The following section underscores the main elements embedded in each SLEPT condition. The intended argument is twofold. One the one hand, it presents their meaning separately, keeping in mind the inter-relatedness of the five SLEPT conditions, and on the other hand, it highlights the fact that changes in one condition are likely to have an impact, in the same direction, in virtually all the others.

Social Conditions

Understanding the dynamics of multiculturalism encourages people not to use stereotypes and enhances their professional skills (Power, 2002). International business students should seek the opportunity to make worldwide distinctions in social differences throughout a combination of *in-situ* academic and cultural experiences. Perhaps the most salient example of attitude change is an increased commitment to international understanding. Lamet (2000) notes that overseas experiences provide students with an empathetic appreciation of the variety of perspectives that govern people's behaviour throughout the world. Such a skill is critical to develop effective cross-cultural understanding and maintain good communication. Faculty themselves tend to be more effective motivators after enriching their personal and professional experience with several assignments abroad.

A survey conducted among deans and directors of United States business programs concluded that foreign language fluency is necessary for international business (AIB, 2001). Its importance in terms of understanding protocols and communicating ideas should be emphasized at all times. Language offerings should be attuned with those parts of the world where the business school or university maintains regional geographic interests. Exposure to a language within a unique cultural situation is just as important as learning the language itself. Ultimately, it allows for a greater depth in language training and social understanding (Buckley, 2002).

Religion and education are also critical elements within the social aspect. Both have to be tackled in the context of cultural diversity and treated in terms of their inclusiveness rather than their exclusiveness. There is a tendency to see persistently something wrong with other countries instead of just pinpointing their business culture as unique to the people of that country. Ortiz (2003) considers that business models and snazzy technologies are indeed necessary, but they will prove useless if they do not take into account the fact that goods and services that are popular in one country may not prove such hits in others.

Legal Conditions

There is hardly a single legal framework that repeats itself across countries. Each one brings its own uniqueness for setting the boundaries of business development (World Bank, 2003). The regulatory business environment has a completely different meaning when invoked in a host country to settle disputes such as enforceability of contracts, intellectual property rights, or marketing regulations. In reality, only a few countries offer reliable legal systems that protect joint-ventures with local entrepreneurs and strengthen consensual agreements among the parties involved (Coyle, 2001). As a result, business litigation becomes unavoidable. Furthermore, the independence of the judicial system is being questioned mainly because of the opacity in making judiciary appointments. Lengthy and discredited judicial processes increase ambiguity concerning government policies and pave the way for discretionary decision-making (IMF, 2003). Consequently, countries face the challenge of providing a legal framework conducive to further transparency to foreign investors and accountability of government operations. Under performing working institutions and excessive bureaucratic controls translate into poor governance that, in turn, imposes significant transaction costs to businesses (Samli, 2001).

The ability of business students to analyse the efficiency of government action to deliver public goods helps mould their responsibility as international managers in the future (Sullivan, 1999). For example, corruption, in its many forms, still prevails in today's business world in all countries despite numerous denials and oversights. Countries plagued with corruption, weak rule of law, a poor regulatory framework tend to under perform in terms of their ability to promote corporate governance (World Bank, 2003). Awareness of corruption as a non-acceptable but, nonetheless, common business practice requires the careful attention of international business students as it negatively influences business decisions and distorts resource allocations. Notwithstanding, Rose-Ackerman (1999) maintains that legal conditions in developing countries tend to be more convoluted and bureaucratic than those observed in developed nations. In the former group of countries, a relatively fragile judicial system imposes an unnecessary burden on their economies, discouraging attempts to foster business relationships. Hence, it is imperative that business students acquaint themselves with regulatory procedures in order to comply fully with the processes by which laws and regulations are enacted and enforced in each country.

Economic Conditions

According to Rajan and Zingales (2001), a country experiences substantial benefits and costs when it opens up to the world economy. Both argue that openness in the form of trade and

financial liberalisation brings greater freedom to its individuals to determine the pattern of their lives at the expense of imposing excessive fiscal and monetary constraints on its government. However, an even harsher criticism of this ongoing transformation towards a free and competitive market economy comes from anti-globalising groups, which claim it does not always raise the standard of living of the people in emerging economies and developing countries, in particular (Held and McGrew, 2002). The United Nations (1999) notes that both poverty and income concentration have increased between and within those countries that have embraced market oriented policies. In contrast, the IMF (2003) goes on to say that a well-functioning economy, rapidly and fully integrated into world markets, is the only effective path leading to poverty reduction and income equality. Exploring the operational aspects of free-market capitalism and its impact on poverty alleviation and income redistribution at the country level becomes then critical in order to understand the rationale of its macroeconomic programs (Samli, 2004). Nevertheless, sound economic policies and strong financial systems may not constitute the sole means by which a developing country can achieve sustained economic development.

Countries around the globe have been adopting market-oriented strategies with various intensities and styles in order to increase opportunities for doing business in those nations (IMF, 2003). In particular, financial discipline, market deregulation, privatisation of state-owned enterprises, and incentives to foreign investment have all triggered firms' expansion to take advantage of the cost and quality differences of production factors (Rajan and Zingales, 2001). Besides, cross-border production, investment, and trade activities take place in a vast majority of countries under flexible or floating exchange rate regimes with significant domestic implications for national economic management (Held and McGrew, 2002). Consequently, there are a number of country-specific elements to display to international business students for a better appreciation of how global competitiveness affects individual countries. Along these lines, Aninat (2002) holds the view that necessary elements should include, at a minimum, the inherent structural reforms and adjustment policies of the country under study along with its insertion into the international financial markets.

Political Conditions

Political pressures exerted by interest groups on governments influence the business environment in a way that affects the relative success of firms' operations (Ortiz, 2003). Prospective business managers are meant to perform effectively in host countries regardless the stability of the governments and whether or not they were democratically elected. Awareness of the various political ideologies becomes crucial for them to anticipate responses related to quality governance and democratic accountability by politicians and policy-makers (IMF, 2003). Totalitarian regimes as well as democracies present different forms of political risks at the time of doing business. Countries governed under political extremism based on religious principles, tribal interests, and military uprisings often give rise to dictatorship schemes that impose severe constraints on business autonomy. In contrast, pure democracies tend to overemphasize collective goals with respect to individual goals when the needs of society are seen as more important than individual ones (Coyle, 2001).

Business practitioners need to adjust their management concepts according to the relative strength of the countries' institutions and the ability of their corporate systems to overcome informational asymmetry and transaction costs (World Bank, 2003). Policy-making processes depend heavily on the degree of involvement of society and its constituencies regardless of the spectrum of political doctrines available. Lately, democracy has been restored almost everywhere to embrace political factions with agendas that are bringing up some uniformity in terms of accountability and institutional governance (Singer, 2002). Nowadays, it seems acceptable for sovereign states to enjoy a minimum of constitutional guarantees such as a decentralized political power, freedom of

expression and organisation, and regular and transparent democratic elections (Warner, 2001). Learning how to assess political risks becomes unavoidable to business students as political upheavals, violence, or terrorism still remain unaddressed and create an atmosphere of business uncertainty. In fact, highly exacerbated political environments may trigger nationalisation of those private, foreign-owned assets they will someday manage with or without any form of compensation (Singer, 2002).

Technological Conditions

Technology is regarded as the key driver of total factor productivity and one of the main enhancer of long-term economic growth (Warner, 2001). Although expensive and risky, developing and adapting new technologies is instrumental for countries to achieve business competitiveness. However, a large number of countries are far from being at the forefront of technical change to become core technological innovators in the creation of goods and services (The Economist, 2000). Many countries simply do not possess the main ingredients to create successfully an environment that supports innovation and is conducive to technology development. Chief among those ingredients are collaboration between businesses and universities, the presence of strong, high-quality, public research institutes, and private financial support for research and development (Coyle, 2001). Naturally, the World Bank (2001) argues that a market economy would provide a larger number of incentives to induce a cadre of entrepreneurs to seek technological solutions for concrete managerial and manufacturing problems than any other economic system.

It is important for business students to understand that technology penetrations vary widely among countries. Hence, such a great variability in technical progress affects the capability of countries to implement specific processes and operational tasks (The Economist, 2000). Innovation is forcefully a continuous process that takes time to occur and differs between countries and within industries. Besides, it may not automatically lead to the creation of competitive advantages (Held and McGrew, 2002). However, developing and adapting new technologies help those countries to counteract the pervasive effects of diminishing returns and obsolescence. Capitalizing on the learning effects and seeking economies of scale allow businesses to achieve efficiency gains and widen product differentiation options that, ultimately, translate into profit maximization (Warner, 2001). Future international business managers must take an increasing interest in the way technological events occur and in their impact on different countries, as well as the role of their governments in shaping a culture of innovation.

APPROPRIATE INTERNATIONALISATION RESPONSES

The Role of Offices of International Programs

The Office of International Programs (OIP) within institutions of higher learning in the United States is being regarded as the administrative unit to serve as the catalyst for their internationalisation (Finney, 1999). It has university-wide responsibility for establishing and coordinating international activities for students as well as faculty. Accepting some degree of generalization, the mission of an OIP can be stated as: a) managing international initiatives, study abroad programs, and agreements with foreign institutions, b) helping students with their travel plans and other arrangements, and c) serving as a liaison to state, regional, and national organizations and consortia with an international focus. Specifically, they assist undergraduate and graduate students seeking to study abroad under the auspices of an exchange agreement with a foreign institution. The OIP also encourages faculty to develop new programs and to enhance existing ones. In particular, it may assist those interested in obtaining overseas professional assignments consistent with the mission and priorities established by their colleges, as well as

teaching to students courses that award credits under an agreement with an affiliated foreign institution.

An effective way to internationalise some aspects of the business curriculum is to encourage an increasing number of business students to travel overseas. This implies letting them participate in specialised reciprocal or non-reciprocal student exchanges, study abroad programs, and corporate overseas internships. Additionally, it can also mean developing visiting scholar programs in which business faculty spend time overseas on teaching or research assignments. Foreign faculty may also come to the hosting institution as well. Much can be learned from this international experience by both the visiting and the hosting party. As the international reputation of the university grows, it may become a desirable location for eminent government officials, diplomats, and business executives to visit and lecture. At this stage, a critical function of the OIP is to serve as a link between business schools and their departments in consolidating the ties with international partners.

Over time, the OIP needs to increase its funding for additional staff and administrative support. Senior-level administrators committed to the international scene need to place a higher priority on the OIP and encourage it to expand into new areas. A good complementary activity is a relationship with a foreign business school to establish jointly a study centre that offers a full curriculum and collegiate facilities. This particular relationship is appropriate as it offers a foreign language of choice for the majority of students. Another corresponding option is an overseas year-round study centre. Overseas study centres, particularly those run by the business programs can accommodate faculty language and geographic preferences. Full utilization of permanent study abroad or overseas centres can generate a steady source of revenue. However, the discretionary nature of these categories can be debated since a fundamental activity of an OIP is sending faculty overseas to teach and travelling overseas to meet with counterparts in countries in which joint programs either already exist or in which such programs are being developed.

In dire financial times an argument can be made that almost everything is discretionary except for the payroll of permanent staff. The promotion of study abroad programs immediately generates expressions of interest among the student body. Students going overseas then visit the OIP in order to request services ranging from information on visas to logistics advice. The challenge for the OIP is to fund the substantial start-up costs of establishing overseas study centres. Funding becomes less problematic and more profitable once business programs are in place and students are travelling back and forth between international satellite campuses.

In practice, Summers (Symonds and Miller, 2002) suggest that developing international programs in North American institutions requires fostering more globally oriented campuses, focusing primarily on the students and getting them overseas. One option is to treat each OIP like an independently funded institute, similar to a college, with a base budget large enough to fund properly its mission as agreed to by its many constituencies throughout the university. A second option is simply to allocate the necessary funds to meet effectively the obligations created by its mandate. Under the current economic climate, both options appear difficult to achieve.

Strengthening the International Business Curriculum

This section sets forward a standard international business curriculum at the undergraduate level for institutions of higher learning in the United States. It takes into account the suggestions given by the Academy of International Business (2001). A new undergraduate curriculum in international business is redesigned to enhance students' competency to function in the business environments previously identified by the business schools. In this regard, promising geographical areas in which to attain knowledge and immersion experience include Latin America and the

Caribbean, Europe, Asia, and the Pacific Rim region. The Middle East and Sub-Saharan Africa may follow suit if, and only if, overall SLEPT conditions in those areas improve over time. Business administration and management departments at those business schools should realize the need to strengthen their international business curriculum and make it more appealing to the current needs of their undergraduate student body.

The curriculum presented below allows for specific subjects that could be transferred to an international business track in order to enhance its already supposedly 'global features'. Following the template steps for analysing curriculum development suggested by Cobbin and Lee (2002), the array of course offerings is aimed at undergraduate degree-seeking students in their last two years of studies. Syllabi must subsequently be designed to ensure full coverage of an enriched set of subjects needed to conceptualise the main international business themes. Competent international business faculty should succeed in instilling confidence in students to enable them to grasp the dynamics of competing in the global marketplace.

Despite its attractiveness and appeal, internationalising the business curriculum may be an inherently difficult endeavour to be undertaken by many business administration and management faculty. However, they should abandon self-centred stances in order to accept their ultimate goal of transferring international managerial skills to students able to cope successfully with the magnitude of the SLEPT changes taking place throughout the world. Lastly, the implicit assumption continues that each course is worth three credits and that the students have completed all of their lower division and general education courses. The proposed courses are presented in Table 1.

Table 1. Proposed Courses in the International Business Track [1]

IB Core (6 courses)	**IB Electives** (2 courses)
International Business	Cross-cultural Human Relations & Negotiations
International Finance	International Business Study Abroad
International Marketing	International Business Internship
International Management	Business Issues in a Selected Area Study
International Accounting and Taxation	International Relations in a Selected Area Study
Global Supply Chain Management	
Business Electives (1 course)	**Economics Electives** (1 course)
International Trade and Investment Law	Economic Growth and Development
International Banking	International Economics

Foreign Language (2 courses) [2]					
Spanish	Chinese	Japanese	Korean	French	Portuguese

First Step: Recognition and Commitment

The first step in initiating a change in an existing international business curriculum is acknowledgment by the business administration and management faculty of the need to nurture the international dimension of their departments. Adherence to the importance of widening a global perspective through an internationalised curriculum comes from the vision held by the business school and, ultimately, by the university. Participating academic units are expected to rely on the OIP for advice and feedback. Willingness to recognize the benefits of incorporating the global perspective in the curriculum is identified as the primary step to strengthen the

[1] Conventional wisdom suggests that there may be higher education institutions in the United States that already offer courses similar to the ones listed above, but in a looser, less structured manner.

[2] These are offered among the general electives portion of the curriculum needed to meet the minimum number of credits for a Bachelor's degree. These languages correspond to those of the main trading partners of the United States.

international business discipline. Exposure to an international context is likely to be enhanced through curriculum initiatives that complement student placements in each international setting. Identification of subjects and issues with a strong international flavour as well as those more closely influenced by local factors will allow for mutually reinforcing synergies.

Second Step: Issue Selection

The second step in strengthening an international business curriculum requires business administration and management faculty gathering information about the issues that should be incorporated into each one of the courses being offered. A solid international business track requires an assortment of specific disciplines that many times differs from more conventional approaches to offer stand-alone international business subjects. Truly internationalised business curricula must provide students with the knowledge and skills to improve successfully their decision-making process to allocate efficiently resources on a worldwide basis. A general and flexible business curriculum would add international issues that could be implemented regardless of the regional educational market of interest. It would, in turn, foster awareness among undergraduate students of the global business environment and let them grasp a basic understanding of the international business field. In contrast, graduate level programs would be more suitable to increase knowledge and provide expertise in one or more of the several functional fields relevant to the international business dimension.

Third Step: Implementation

The final step in redesigning an international business curriculum compels the business administration and management faculty to develop a specific planning and coordinating approach to manage its implementation. Such an undertaking requires them to serve as a catalyst in allowing the students to acquire skills that they can use in their jobs. It can also utilize the comparative strengths of the faculty members and the surrounding environment in which the university is situated (AIB, 2001). This includes exposure to training in international business topics and language training in the areas that the business administration and management faculty have selected as the top regional focus of international business programs.

As noted by Buckley (2002), specialized, multi-disciplinary, undergraduate international business degree programs are arguably a good method for developing expertise, particularly those that require regional competencies. However, overseas experience through corporate internships and study abroad programs should also be enforced within an international business curriculum. Field trips and partnering with multinational corporations greatly help students to compete more effectively in the global economy. OIPs can offer immersion experiences with a substantial so-called ‘hands on’ component.

CONCLUSION

It becomes imperative for higher education institutions to provide sound educational packages to ensure their students will successfully cope with current globalisation trends. The internationalisation process at institutions of higher learning in the United States begins as soon as they acknowledge the need to immerse themselves in today’s global economy and commit themselves to a set of best international practices. Unveiling business education overseas requires a much tighter network of cooperation that crosses academic disciplines and transcends institutional boundaries. Worldwide collaboration is only enticed when long-term partnerships among agencies, consortia, and organizations are present. Institutions of higher learning that are eager to meet the challenges imposed by a fast-changing society must begin by incorporating an international dimension into their study programs. Given their multidisciplinary nature, business

colleges and faculty seem keener to deal with international issues than other academic constituencies.

Reciprocal student exchanges, study abroad programs, and overseas corporate internships tend to be seen as substitutes to academic education in campus classrooms. In reality, they are complementary means to offer a rounded education, by allowing participating business students to gain international exposure. Interaction with fellow business students and seasoned multinational corporate managers helps them to acquire a sense of awareness that will enhance their global competency. Strategic imperatives at institutions of higher education in North America should be highly integrated within business administration and management departments and specific overseas opportunities for business majors. Subsequently, adequate and timely financial support from senior level administrators is critical to promote and fund undergraduate student participation. In addition, institutions of higher learning along with business administration and management departments should pay attention to accreditation issues like course comparability, credit transferring, and length of academic programs.

Integration of social, legal, economic, political, and technological conditions within business disciplines is a must for policy purposes and curriculum integration at higher education institutions in the United States. Business colleges and faculty should embark on the review of their undergraduate international business curriculum in light of the globalisation phenomenon. It seems overly ambitious to recommend a template of core courses to prepare undergraduate students for doing business in a global context that can be applied to all institutions of higher learning. Common sense suggests, however, the need to determine a minimum number of subjects and topics for undergraduate business students to prepare them successfully for shifting social, legal, economic, political, and technological scenarios. This would entail curriculum identification, course selection, content adjustment, and program implementation.

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Ethnic Inequalities in Education in Kenya

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This paper uses Kenya's survey data to explore ethnic inequalities in education in Kenya. It focuses on some ethnic groups that may have resources and opportunities as a result of their geographical location and ethnic proximity to the ruling elite. The factors examined to explain potential educational inequalities among ethnic groups include the Gross Enrolment Ratios, the number of schools, and the number of qualified teachers. The results suggest a close correspondence of differentials between inequalities in education and ethnic affiliation to the ruling elite. Relatively small, clearly defined ethnic groups have accumulated an advantage over the majority in the national population, in terms of the education infrastructure and resources. Based on these results, this paper argues that ethnicity should be placed at the forefront of analyses of educational development in Kenya, as well as in policy efforts to reduce inequalities in education.

Kenya, Ethnicity, Inequalities, Education, Ruling Elite.

INTRODUCTION

Attainment of Universal Primary Education has been a long-term objective for the Government of Kenya since independence. But declining gross enrolment rates and completion rates of less than 50 per cent over the past ten years present a considerable challenge to policy-makers (Abagi, 1997). This paper is motivated by the growing concern of various stakeholders about the declining achievement, enrolment and increasing drop out rates. The government, parents, non-governmental organizations, and donors recognize that although major strides have been made in education in quantitative terms, there are serious shortcomings in Kenya's education system. Despite the Kenyan government's heavy investment in education, enrolment at various levels of education is characterized by regional and gender disparities and declining gross enrolment ratios (Abagi, 1997; Government of Kenya, 1995; Ministry of Education and Human Resources Development, 1995).

The slow rate of economic growth that the country has experienced is likely to limit resources available for education (UNDP, 2001). Therefore, in order to develop education and training, the government and its partners have to ensure that the education infrastructure and resources are equally distributed and efficiently managed at both national and school levels. Because of the persistent regional disparities in access and opportunities in education, frequently acknowledged in educational analysis in Kenya (Abagi, 1997; Bakari and Yahya, 1995; Ogot and Ochieng, 1995; Oucho, 2002; Oyugi, 2000), this research focuses on the relationship between ethnicity and educational inequalities. The purpose of the study is to see whether ethnicity contributes to the educational ills of the Kenyan education system. In this way, the study contributes to the debate on identifying and addressing the causes of declining participation rates in Kenyan schools, and to

understanding why the Kenyan government has difficulties in achieving its development goals in education.

Little is known about the extent of ethnic inequalities in education in Kenya, and whether it is an important factor influencing the effectiveness of the education system. The few comparative studies of inequalities in education in Kenya stem from the 1960s and 1970s, and are mostly based on regional and socio-economic factors. These studies generally reveal large differentials but provide scant interpretation of these inequalities.

In 1974, Kinyanjui conducted a study on the pattern of regional imbalances in the distribution of educational resources and opportunities in Kenya (Kinyanjui, 1974). The study revealed significant disparities between provinces and districts, along such dimensions as the proportion of primary-age group children actually in school, the distribution of secondary-school places, the opportunity to continue with further education, and so on. These findings, however, went unexplained. According to Court (1979), Kenya's education policy emphasizes academic achievement as the criterion for advancement within the system. Court (1979) concluded that so long as access to higher quality schools is visibly related to factors other than individual ability, and regional and ethnic disparities in the provision of educational facilities are not redressed, it is difficult to accept that the Kenyan government follows an ethos of equal opportunity. Faced with these difficulties in explaining inequalities in education, and bearing in mind Noyoo's (2000) assertion, in reference to African cultures, that ethnic frameworks are most important determinants of the pattern of development projects in Africa, the question arises why ethnicity has not been considered as a factor in shaping inequalities in education.

We argue that the underlying cause of unequal access to education is the patron-client relationship between the ethnic group of the ruling elite and the government that prevails in Kenya. Political and economic power, and the wealth affiliated with it, is highly skewed to the ruling ethnic group, whose exclusionary practices have created marked inequalities in access to resources, including educational resources. Our argument is that the ruling group uses the resources of the state for the special benefit of its own ethnic community and its allies, and this would be reflected in the educational development pattern.

Kenya's administrative units were created along ethnic boundaries by the British colonial administration, and they illustrate Kenya's present ethno-geography. The British divided the Kenyan territory along ethnic lines into eight provinces; each province was subdivided into districts, often according to ethnic groups and subgroups. For example, the Luo are based mainly in Nyanza; the Luhya, in Western Province; the Kikuyu in Central Province, the Somali, in North-Eastern Province; and the Mijikenda, in the Coastal Province. The Rift Valley is dominated by the Kalenjin, but also contains the Masai and other ethnic groups (see Table 1). The post-colonial government further consolidated this ethno-political structure by aligning parliamentary constituencies with ethnic boundaries, which has remained the style of Kenyan politics and provincial administration until today. Hence, from the district to the provincial level, ethnic groups are clustered together so that regions in Kenya are ethnically distinct. An argument can be made, following Oucho (2002), that ethnicity is the fulcrum of administrative boundaries, constituencies and development pattern in Kenya.

One basic assumption of this study is that the regional infrastructure strongly influences the level of access for a provincial population to resources, and more broadly, its developmental opportunities. This occurs, for example, where physical infrastructure, like schools, is unequally distributed across areas, creating a mismatch with the clustering of communities. Given the lack of in-depth research devoted to the ethnicity factor in Kenyan society, reliable data on access to and opportunity for education for the 42 ethnic groups do not exist. We therefore focus on the

particular ethnic groups that can be broadly categorized as having, or have had, an association with the political power in the Kenyan government (such as the Kikuyu and the Kalenjin), and those ethnic groups that have not held, or been associated with, political power in the government (such as the Swahili and the Somalis).

Table 1. Distribution of Ethnic Groups in Kenya by Province

Province	Total Provincial Population	Dominant Ethnic Group		
		Name	Population Size	Percentage
Nairobi	1,324,570	Kikuyu	428,775	32.4
Central	3,112,053	Kikuyu	2,919,730	93.8
Coast	1,829,191	Mijikenda	994,098	54.4
Eastern	3,768,677	Kamba	2, 031,704	53.9
North-Eastern	371,391	Ogaden	133, 536	36.0
Nyanza	3,507,162	Luo	2,030, 278	57.9
Rift Valley	4,981,613	Kalenjin	2,309, 577	46.4
Western	2,544,329	Luhya	2,192,244	86.2

Source: Central Bureau of Statistics (1994)

The next section of the paper reviews the literature on ethnicity and inequalities in Africa, to illuminate the importance of ethnic frameworks in Africa. It will be followed by a brief discussion on the historical background of education in Kenya, and how it was shaped with regard to ethnicity. In section four we use descriptive statistics to assess the present inequalities in education in the different provinces, and the last section concludes the paper.

ETHNICITY AND SOCIAL INEQUALITIES IN AFRICA

Work on inequalities and education in Africa has mainly focused on gender, socio-economic status, or geographical location. The principal limitation with existing research exploring ethnic inequalities in education is that many studies fail to account for the role of political structure in the relationship between ethnicity and education, and in particular, the role of the ruling elites in African states and the impact of their exclusionary practices along ethnic lines.

Recent writing on ethnicity in Africa stresses the role of the colonial state as the architect of ethnic groups, through the creation of administrative units that were subsequently labelled in ethnic terms (Oucho, 2002). This approach has emphasised the extent to which ethnic consciousness was externally imposed in a context of unequal power relations. The colonial legacy in Africa created uneven development in agrarian commercialization, transport investment and educational opportunity, and thus the location of an ethnic group's home territory determined its access of public goods, such as education. Groups located near the colonial capital, a rail line or port, or centres of colonial commerce were well situated to take advantage of these opportunities. Members of such groups were frequently found in schools, government offices, and commercial houses established in these areas (Horowitz 1985, p.151). In other instances, colonial powers favoured ethnic groups more systematically and deliberately. The Germans clearly favoured the Ewe in Togo, the English the Baganda in Uganda, and the Belgians the Tutsi in Rwanda and Burundi and the Lulua in Congo. These groups became more educated in comparison with their fellow countrymen and -women, a situation that helped build resentment and frustration among the excluded groups (Platteau, 2000). Even though ethnic groups were constructed by colonial administrations, the advantage or disadvantage of belonging to a particular ethnic group soon consolidated ethnic difference into material ethnic divides.

While theoretical debates about the definition of ethnicity continue (eg. Schildkrout, 1978; Weinreich, 1973; Banton, 1998), this paper adopts a constructionist perspective on ethnicity, which argues that ethnic identity is not primordial or fixed, but "the product of human agency, a creative social act through which such commonalities as speech code, cultural practices,

ecological adaptation, and political organization become woven into a consciousness of shared identity" (Young, 1994, pp.79-80, quoted in Yeros, 1999, p.4). Once constructed, ethnic identity appears to be natural, primordial, and essential. In this paper, however, we are less concerned with ethnic identity as such; rather, we are interested in how ethnic markers such as language, skin colour, or heritage become material as a result of political practices.

Relevant to these questions is a body of empirical work on the relationship between ethnic inequalities and social and economic opportunities and exclusions in Africa. Gurr's (1993) quantitative study, which attempts to make cross-regional global comparisons, indicates that Sub-Saharan Africa is the region with the largest number of politicized communal or ethnic groups, defined as groups which "experience economic or political discrimination", according to defined criteria, or groups which "have taken political action in support of their collective interests", and that these groups comprise more than 40 per cent of the population of the region (Gurr, 1993). Another study, by Gore (1994, p.1), in Africa, lists possible forms of ethnic inequalities arising from exclusions from access to land, to production factors (labour, inputs), to formal and informal employment, and to organizations and representation. Numerous examples of ethnic tension and violence in the African countryside are rooted in severe conflicts over access to scarce resources – including the conflicts between local Nuni and Mossi immigrants in western Burkina Faso, between farmers and Masai herders in Kenya and Tanzania, and between local fishermen from Kayar and migrant fishermen from Saint-Louis in Senegal (Platteau, 2000).

Post-colonial undemocratically elected governments in Africa, often brought into power by an interest group or ethnic group, are responsible for creating inequalities among the communities through exclusionary practices. Their weak legitimacy incites them to adopt a divide and rule approach, and to create marked inequalities in access to resources, frequently manipulating and exacerbating the language of ethnicity (Sindzingre, 1999). According to Bardhan (1997), the political machinery of patronage is used in many African states to exclude certain groups from decision-making at all levels, whether local, regional or national.

An example of the material effect of preferential access to resources along ethnic lines is the study conducted by Brockerhoff and Hewett (1998). They found ethnicity to be a significant factor in explaining the pattern of child mortality in Kenya, where children of the ethnic group of the country's president, the Kalenjin, were 50 per cent less likely to die before age five years than others, despite their almost exclusively rural residence. The researchers also discovered that levels of complete childhood immunization were significantly higher among groups with high-level government representation, because such political influence gave them better access to health clinics and well-paved roads. Stewart (2002) equally observed that social and economic inequalities in Uganda were predominantly between the centre/south and the north, and between the Bantu and non-Bantu-speaking peoples.

According to Oucho (2002) and Oyugi (2000), the allocation of government resources in post-colonial Kenya has followed an ethnic pattern, in which important political and administrative individuals have favoured the home region, own tribe or clan. During President Kenyatta's regime (1963- 1978), certain parts of the Kikuyu community gained considerably, while President Moi (1978 – 2002) granted similar advantages to his tribe - the Kalenjin. These practices resulted in seriously unbalanced modern development and inequalities in the country, and contributed to ethnicity becoming an important site of identification and conflict.

This review section has shown that ethnicity is the important criterion according to which groups define and identify themselves in Africa. It is through this ethnic identification that competition for influence in the state and in the allocation of resources takes place. Our general concern with the relationship of state policy and issues of inequalities is explicit within the educational arena.

The next section focuses on education in Kenya, to explore the relationship between ethnicity and educational opportunities and access.

A BRIEF HISTORY OF EDUCATION IN KENYA

As in many other colonised countries, missionaries laid the foundation for formal education in Kenya. They introduced reading to spread Christianity and taught practical subjects such as carpentry and gardening. These early educational activities began around the mid 1800s along the Kenyan coast. Expansion inland did not occur until the country's interior was opened up by the construction of the Uganda railroad at the end of the century. Sheffield (1973), in his work in education in Kenya, observed that the educational work of the Church Missionary Society foreshadowed some of the main dichotomies of education in Kenya in the twentieth century. Several studies have since contributed to an understanding of how missionaries influenced the process whereby the education system they fostered introduced strained racial relations (Battle and Lyons, 1970, Sheffield, 1973, Ghai and Court, 1974, Bakari and Yahya, 1995).

By 1910, 35 mission schools had been founded in Kenya. A British government-sponsored study of education in East Africa, the *Frazer Report of 1909*, proposed that separate educational systems should be maintained for Europeans, Asians, and Africans. In 1924 came the establishment of separate advisory committees for the three racial groups in the colony, which formalized the means by which the colonialists shaped the education systems (Anderson, 1970). During this period the expenditure per pupil was more than five times higher for Europeans than for Africans (Table 2), but when seen in relation to the total population, the imbalances were even greater.

Table 2. Education Department Expenditure by Race, 1930

	Pupils (In State and State-aided schools only)	Total Expenditure (in US Dollars)	Expenditure per Pupil (in US Dollars)
African	6948	232,293	33.4
Asian	1900	70,329	37.0
European	776	140,041	180.5
Total	9624	442,663	46.0

Source: Kenya, Education Department Annual Report, 1930, quoted in Sheffield, 1973

After independence in 1963, the Kenyatta government made several attempts to address the ills that afflicted the education system in general. The Kenya Education Commission was set up in 1964 under Professor Ominde to promote social equality and national unity, and recommended in its first Report that educational facilities be located in underprivileged regions, and the religious convictions of all people be safeguarded and respected. The latter recommendation was aimed at curbing the evangelical activities of the Christian missionary schools the government had inherited from the colonial administration. However, despite these recommendations, inequalities in educational provision and opportunities persisted in measurable factors such as the distribution of government schools in the country, national examination performance and university admission records (Ghai and Court 1974). The Ominde Commission had recommended expansion of educational facilities for those districts and provinces that had been educationally disadvantaged in terms of numbers of schools and enrolments so that they might catch up. As Table 3 indicates, the Central Province maintained its position as the province with the highest enrolment rates during this period.

Since the quality of education depends to a large extent on the quality of teachers, it is important to ensure that qualified teachers are equally distributed throughout the country, and perhaps more highly concentrated in regions of long-standing educational disadvantage. While recent data are not available, it is clear that by the end of the Kenyatta era, professionally qualified teachers were over-represented in the Central and Nairobi areas, the regions where the Kikuyu, the ethnic group

of the President, predominate (see Table 4). Whether this is a coincidence or further proves that ethnicity, regions and politics are intertwined (Oucho, 2002) is a question awaiting further research.

Table 3. Percentage Primary School Enrolment by Province 1969

Province	Enrolment % of 5-14yr age group in primary schools
Central	64
Nairobi	61
Eastern	47
Western	40
Coast	32
Nyanza	31
R/Valley	29
N/Eastern	4
Kenya	38.5

Source: Central Bureau of Statistics: Kenya (1994)

Table 4. Professionally Qualified Teachers in Primary Schools by Province, 1979 (as a percentage of all teachers)

Province	Nairobi	Central	R/Valley	Eastern	Nyanza	N/Eastern	Coast
Percentage	99.1	90.2	70.0	69.9	67.8	66.1	64.8

Source: Republic of Kenya, 1982, cited in Uitto, 1989

We have thus seen that the development of formal education in colonial Kenya led to a regional distribution in educational facilities and opportunities which consolidated inequalities between regions and ethnic groups in the 1960s and 1970s. The colonial period in Kenya favoured White settlers (predominantly located in the Central Province) in the allocation of government resources, and in the post-colonial years between 1963 and 1978, the Kikuyu profited most, as the main ethnic group in the Central Province, and President Kenyatta's ethnic affiliation. This supports our argument that during both periods, the ruling group used the resources of the state for their own benefit.

EDUCATIONAL INEQUALITIES IN CONTEMPORARY KENYA

While the Kenyan government's investment in education has increased since independence, both in terms of real expenditure, and the percentage of government spending allocated to education, equity is still an issue, as indicated by the *Kenya Country Report* (Government of Kenya, 1995) and the *Education For All (EFA) Assessment* Report (UNESCO, 2000). There are large regional differences in access to primary education and in the quality of primary education.

Table 5 shows the Gross Enrolment Rate (GER) as a measure of the proportion of children enrolled in a schooling level (irrespective of their age), and expressed as a percentage of the total number of children (population) in the relevant age group for that level. The GER by province for 1997 shows that there are fewer school-aged children in schools in the ethnic communities in the Coast Province, as compared with other Provinces. Even though lack of disaggregated data by ethnic groups and other relevant information, make it difficult to know the exact nature and extent of the problem, it is reasonable to assume that students of the ethnic groups in this Coast Province are at a disadvantage, as compared to other ethnic communities in other Provinces. These ethno-regional inequalities are further compounded in secondary schooling and post-school education. The Secondary and Higher schooling gross enrolment for the Coast Province indicates a high dropout rate with a low proportion proceeding to higher levels of education (Government Polytechnics and Universities). This shows that students living in the Rift Valley Province have a higher likelihood of reaching secondary or a higher level of education, and thus have an advantage over students in the Coast Province.

Table 5. Percentage distribution of gross enrolment for 1997

Province	Central	R/Valley	Eastern	Western	Nyanza	Coast
Primary	100	93.4	93.7	108.5	90.0	87.6
Secondary	33.7	29.6	20.4	22.1	38.7	14.2
Post-School Education	2.8	2.3	3.7	5.7	0.5	0.7

Source: Ministry of Education, 1995

Table 6 presents the primary school pupil-teacher ratio by Province for Kenya for 1997. Despite lower enrolment rates in the Coast Province, students also have to contend with the highest primary school pupil-teacher ratio by Province with 40 primary students per teacher, a figure that is well above the national average of 31 students per teacher. This indicates that teachers in the Coast Province are more likely to be overworked and possibly unable to provide an education of the same quality as teachers in other provinces. Rift Valley Province, from which the sitting President in the 1990s came, had the best educational opportunities and resources in terms of pupils per teacher ratio.

Table 6. Primary Schools Pupil-Teacher Ratio by Province

Province	Central	Coast	Eastern	Nyanza	R/Valley	Western	**Total**
1997	33.50	40.18	28.03	30.57	27.93	35.43	30.90

Source: Ministry of Education, 1995

Regional disparities in education are closely related to, and often compounded by, other socio-economic disparities. Some provinces, like the North Eastern and Coast Provinces, have fewer schools, which are widely scattered and thus more difficult to access, and attendance is further restricted due to lack of transport facilities. It is also difficult for children to go to school if their parents cannot afford to pay their school fees, which are particularly high for secondary schooling. Education, then, acts to perpetuate economic disparities rather than bridging them, as parents in less endowed provinces, like the North Eastern and Coast Provinces, have a higher incidence of poverty than their counterparts, for example in the Rift Valley Province (Kimalu, et al, 2002).

As mentioned earlier, Kenya inherited an education system that was set up to offer unequal treatment based on racial or ethnic criteria. The greatest resources went to the so-called ‘white schools’, then the national schools, followed by provincial schools and, at the bottom of the table, district schools. This was the result of biased pupil selection, teacher posting, bursary allocation and general provision of facilities. It has been a system that encouraged social stratification among pupils and in Kenyan society more generally. Some of the specially favored national schools include the two Alliances, Mangu, Starehe, Moi Forces Academy, Kabarak, and Maseno, which are all situated in the Central and the Rift Valley Provinces. The situation has not changed 40 years later after independence. The disadvantage of students from the Swahili and Somali ethnic backgrounds is compounded by the fact that there are no national secondary schools in the Coast or NorthEastern provinces.

The analysis above has shown that the ethno-regional disparities created by the colonial and the early post-colonial periods are still significant in Kenya, and students in Provinces with little or no political power in Kenya have been disadvantaged at the expense of those where the ruling elite came from.

CONCLUSION

The paper has shown substantial difference in educational opportunity and educational resources between students from the Kenyan provinces where the ruling elite have originated, past and present. There are large differences in both access to and quality of primary education, as measured by the GER and the examination results in the different provinces. These inequities are concentrated in the North Eastern regions and the Coast Province, where the Somali and the

Swahili reside. Nairobi, the Central Province and presently the Rift Valley Province, have the highest enrolment rates in all education sectors, primary, secondary and higher. Inequalities also exist in the number of schools and higher institutions, where schools in the three better resourced provinces are more numerous than in the other provinces, and these inequities are compounded by the fact that students from other regions, like the North Eastern Province and Coast Province, are more likely to have poor parents, a poor road network, and poorly qualified teachers. The inequities in access to education between the Provinces, and hence between the ethnic groups, are reflected in the national examination performance of the students, either positively or negatively, depending on the district and Province they came from.

Kenya is ahead of many sub-Saharan African countries in terms of providing education for all. But the trends discussed in this paper show such an assessment to be incomplete or even complacent, because it rests on a tendency by the Kenya's Ministry of Education to measure progress by aggregate, quantitative indicators alone, at the expense of more disaggregated or qualitative ones. The issues of access to schools, distribution of qualified teachers and other educational resources are equity issues, which influence the persistent poor enrolment rates and educational outcomes for ethnic minority students such as the Swahili and the Somali. Inequalities in education are also likely to be a significant factor in explaining the higher levels of poverty in these ethnic communities.

The study relied on the Kenyan national surveys. While they were useful in raising questions and generating new hypothesis for testing, their results are limited by the fact that data was not gathered in ways that suit the purposes of our research. While the descriptive evidence of ethnic inequality in Kenya is conclusive, this study is exploratory with respect to understanding the determinants of education inequalities among ethnic groups in Kenya, insofar as it highlights provincial inequalities among selected groups and offers an explanation of the findings based on the limited data at its disposal. The consistent results presented here strongly support placing the notion of ethnicity at the forefront of analyses of educational policies in Kenya.

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