The use of Explicit Teaching Strategies for Academic Staff and Students in Bioscience Foundation Subjects

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Abstract

Many students from disadvantaged backgrounds enter university with limited educational capital and lack skills in academic literacy. These students require significant academic support and up-skilling if they are to progress in their course. This is the case with many students entering the Biomedical Sciences degree at Victoria University (VU). A factor limiting student progression is that first year bioscience foundation subjects are usually taught by sessional teaching staff with little or no teacher training. In this study, academic staff (permanent and sessional) attended a series of workshops run by staff developers who were trained to teach skills in the Advancement via Individual Determination (AVID) system and it's higher education counterpart, AVID for Higher Education (AHE). The aim of this study was to evaluate academic staff perceptions of the impact of using AHE strategies on their teaching capability and on student engagement. Of the 39 staff who responded to the surveys, 100% enjoyed using the AHE strategies and 78% believed that the AHE strategies greatly improved their sense of themselves as being a good teacher. Importantly, 90% reported that students appeared to be more engaged than previously. Whilst the results are promising, it remains to be seen whether the use of AHE strategies will lead to improved and sustained student success and retention.

Introduction

A large proportion of commencing students at Victoria University (VU) in Melbourne, Australia, have a complex mix of one or more social and cultural disadvantages that exist within the low socioeconomic (LSES) and immigrant communities (Bowden & Doughney, 2010; Mendiola, Watt & Huerta, 2010). Research has found that students with this demographic background are more vulnerable to the pressures which lead to attrition (Abbott-Chapman, 2011; Adams, Banks, Davis & Dickson, 2010; Archer & Hutchings, 2000; Collier & Morgan, 2008). In 2011, VU had a higher attrition rate of Year 1 Bachelor students (21.8%) than the state (16.3%) and sector (19.0%) averages (www.industry.gov.au/highereducation).

Demographic analysis of students commencing in the Bachelor of Biomedical Sciences found that 40% were classified as LSES, 45% were born overseas and 63% reported speaking a language other than English at home (Tangalakis, Kamphuis & Skelly, 2012). A large proportion of these students reported being overwhelmed by the volume of coursework, feeling socially isolated and experiencing difficulty in adjusting to university (Tangalakis et al. 2012). Given the national agenda to increase the proportion of LSES students participating

in, and successfully graduating from higher education (Action on Access, 2008; Bradley, Noonan, Nugent & Scales, 2008), it was critical to equip these VU students with the academic skills required for a successful outcome. An improved level of such skills, which many traditional university students already possess to varying degrees, would provide LSES students with the resources to become successful and independent learners (Ramsay, Jones & Barker, 2007; Collier & Morgan, 2008).

In the U.S.A. there have been many programs to up-skill students from underprivileged backgrounds, including 'Achieving the Dream' (www.achievingthedream.org), 'Upward Bound' and 'Gear Up' (www2.ed.gov/programs). One such program, 'Advancement via Individual Determination' (AVID) (www.avid.org) has received international recognition from the Organisation for Economic Co-operation and Development (OECD, 2012). It was cited as a case study of excellence for providing disadvantaged students with the skills required to enter and succeed at post-secondary institutions. AVID has been operating in schools across the U.S.A for over 35 years, servicing over 700,000 students across 46 U.S. states and territories.

AVID for Higher Education (AHE) (www.avid.org) is a comparatively recent program, running in the U.S.A. for the last 5 years with 48 universities currently adopting the program. In Australia, it has been trialled at two universities for the past 2 years. AHE promotes a campus-wide approach (integrating leadership, teaching, learning and student support) to increase student success. The fundamental philosophy is that students who are challenged and supported, academically and psychosocially, will succeed (Hubbard & Ottoson, 1997; Swanson, Mehan & Hubbard, 1995). The AHE strategies are developed around AVID's core learning and teaching framework known as WICOR: **W**riting and **R**eading for purpose, **I**nquiry-based methods, **C**ollaborative learning approaches and **O**rganisation skills. The AVID system develops the ability of teaching staff to understand, and make explicit to students, metacognitive processes. Thus the AHE strategies complement the work of scholars who have shown the importance of clarity in giving instructions, scaffolding of discipline knowledge and building collaborative classrooms (Cuseo, Campagne, Fecas & Thomson, 2012; Crosling, Heagney & Thomas, 2009; Devlin, Kift, Nelson, Smith & McKay, 2012; Kift, Nelson & Clarke, 2010).

In the Biomedical Sciences course at VU, we have employed a variety of 'bolt-on' voluntary support activities for teaching and learning, including peer-assisted study sessions (PASS) and academic skill support. It is our experience, however, that the students who most need the support often do not attend sessions which are not explicitly embedded or assessed. First year bioscience subjects at VU usually have relatively large student cohorts and many of the tutorials are run by junior permanent or sessional academic staff. Sessionals are often postgraduate students with little or no formal training in teaching. Given low ratings in student evaluations and the national Course Experience Questionnaire, it became evident that our teaching staff would benefit from professional development in teaching and learning, with an anticipated increase in student success. Although the Graduate Certificate in Tertiary Teaching is compulsory for new permanent academics, tight university budgets limit training for sessionals. Given that '*every 1% drop in [student] attrition would save Australia's public universities almost one billion dollars or up to $2.6 million per university*' (Adams et al. 2010), funding professional development for sessional teaching staff may have long-term benefits for student retention.

The aim of this study was to evaluate the perspectives of academic staff members (permanent and sessional) of the impact of using AHE strategies on their teaching capability and on student engagement. This was achieved by an assessment of the implementation of AHE strategies into the teaching of discipline knowledge and academic literacies.

Methods

At VU, staff (both permanent and sessional) from the College of Health & Biomedicine and the College of Arts, were invited to attend AHE workshops, where two AHE qualified staff developers explained and modelled 25 teaching strategies. At Edith Cowan University (ECU) in Perth, teaching staff from the discipline area of Creative Arts were also offered AHE workshops. Each of these cohorts, despite being from different disciplines, were experiencing similar teaching dissatisfaction and attrition issues. Sessionals were paid for their attendance.

In total, 54 teaching staff attended at least one workshop (VU=45, ECU=9). Of the attendees, 41 taught health or biomedicine subjects and 13 taught arts and humanities subjects. The attendees included 18 permanent staff (VU=15, ECU=3) and 36 sessionals (VU=30, ECU=6). Of the 15 permanent VU staff, 8 were experienced at teaching and 7 had limited or no teaching experience. Out of the 30 VU sessionals, 10 were relatively experienced at teaching, but held no formal teaching qualifications, and 20 had very little or no teaching experience, many of the latter being postgraduate students.

Teaching staff were taught a range of strategies, with the aim of providing a more interactive and scaffolded learning experience for students than the traditional 'stand and deliver' teaching approach. Workshop attendees were taught to make learning intentions explicit, build students' critical reading and reasoning skills, develop activities which encourage student reflection, and reinforce essential learning points before, during and after class. The importance of building a classroom community was also emphasised, with lots of community building strategies modelled.

AHE strategies were trialled by AHE workshop attendees in two core first year Biomedical Sciences subjects. In 'Foundations in Biomedical Sciences' (~100 enrolments), students learn academic literacies, including analysis of journal articles, scientific report writing and referencing. In 'Human Physiology' (~200 enrolments), students learn discipline knowledge. Both subjects have weekly tutorial classes, taught mainly by sessionals. In 2014, a series of AHE tutorials were designed and embedded into the curriculum of the Foundations subject, to specifically address the identified deficiencies in the academic literacies in the commencing student cohort. Each week, a different AHE strategy was used in the tutorials which were delivered by academics and sessionals who had attended the AHE workshops.

To determine teaching staff perceptions of the effectiveness of the AHE strategies, workshop attendees were emailed survey 1, (VU=10, ECU=2), survey 2 (VU=28, ECU=5) or both surveys (VU=7, ECU=2), depending on attendance at workshops. Surveys consisted of quantitative and qualitative questions (see Appendix). Survey 2 had more specific questions designed to ascertain which AHE strategies were trialled by teaching staff. Survey participation was voluntary and anonymous. This study was approved by VU's Human Research Ethics Committee (HRE13-068). In total 18 of 21 (86%) and 21 of 42 (50%) academic staff responded to survey 1 and survey 2 respectively, at least in part. The results from survey 1 and survey 2 were combined.

Results

Academic perceptions

Of the 39 respondents, 38 staff (97%) reported using AHE strategies to teach academic literacies and discipline knowledge. Of these, 19 staff (50%) used a strategy in 1-3 classes, 14 staff (37%) used a strategy in 4-6 classes and 5 staff (13%) used a strategy in more than 6 classes.

Of the 32 respondents who completed this section, 100% reported that they enjoyed using the AHE strategies, with 25 staff (78%) reporting that they greatly enjoyed using the strategies. In addition, 25 staff (78%) reported that using the AHE strategies had improved their sense of themselves as being a good teacher.

Comments regarding the workshops included:

"Far more engaging and useful than 99% of training I have been to for Uni."
"It's incredibly helpful to have a range of strategies and tools to engage students with and make teaching easier and more fun."
"AHE strategies are a great way for teachers to identify the problems and help us to reflect and improve our teaching."

Student Engagement

Of 30 respondents, 27 (90%) thought that their use of AHE strategies engaged students more or very much more than previously.

Comments regarding the AHE strategies in general and student engagement included:

"I think the AHE program is an excellent way to engage students in learning."
"Activities were successful in that the students were talkative, animated, and excited."
"AHE [explicit teaching] strategies have helped me to facilitate activities that are interactive and engaging."

Of 29 respondents only 8 (28%) believed that retention had improved from the previous semester, while 20 respondents (69%) believed it had not changed.

AHE Strategies

Of the 25 AHE strategies taught to staff, the most popular are shown in Table 1. 'Community building' activities help build social integration amongst students in order to facilitate the building of a strong classroom community. With 'quick writes', students write freely in response to a prompt and are used to introduce new topics or revise learned material. 'Critical reading' strategies teach students how to decode and analyse complex texts, increasing the retention of concepts and ideas. 'Think-Pair-Share' is a collaborative strategy where students work alone, then in a pair, then with the whole group to share responses to questions of increasing complexity. When time is limited, 'jigsaws' work well because different sections of a text are assigned to different student groups for analysis. With 'philosophical chairs', students argue for or against a contention. The discussion that ensues improves oral and scientific language skills and develops critical thinking skills.

Table 1: The six most used AHE strategies, the number and percentage of respondents who used the strategies and respondents' perception of their success in students' learning of discipline knowledge and academic literacies.

AHE strategy	Respondents who used the strategy (out of 31)	Not Successful	Fairly successful	Successful	Very successful	Extremely successful
Community building	26 (84%)	0	1(4%)	8 (31%)	11 (42%)	6 (23%)
Quick-writes	20 (68%)	1 (5%)	3 (15%)	3 (15%)	8 (40%)	5 (25%)
Critical reading	18 (58%)	0	4 (22%)	3 (17%)	5 (28%)	6 (33%)
Think-Pair-Share	15 (48%)	0	0	5 (33%)	4 (27%)	6 (40%)
Jigsaws	14 (45%)	0	1 (7%)	2 (14%)	4 (29%)	7 (50%)
Philosophical chairs	13 (42%)	0	0	2 (15%)	5 (39%)	6 (46%)

Comments from teachers who used AHE strategies in their classes included:
"I felt that the students really opened up and bonded well with each other during these activities."
"Provided a framework for understanding what readings we provided to them and the capacity to engage in discussion."
"Some of the activities have worked really well – philosophical chairs gave the usual debate another dimension."

Student Evaluations
Compared with the previous year (2013, n=37), student evaluations of the subject 'Foundation in Biomedical Sciences' for 2014 (n=43) showed a significant improvement in: teaching satisfaction (46% vs 75%), usefulness of learning activities (42% vs 80%), well planned learning activities (41% vs 90%) and an understanding of what was expected (54% vs 75%).

Discussion

In this study, we found that a very high proportion of the survey respondents implemented an AHE strategy and that all enjoyed using the strategies. This was reflected by the extremely positive comments that were made in the surveys. Most respondents also believed that AHE strategies made a positive contribution to their teaching capability and to student engagement. This is the first study to implement AHE in an Australian context. Whilst the results are promising, it remains to be seen whether the use of AHE strategies will lead to improved student success and retention.

Due to its infancy, there has been very little work published on AHE. Compared with 2 or 4 year post-secondary institutions' populations, retention rates have been shown to be higher (Huerta, Watt & Reyes, 2013), time to graduate lower (Mendiola et al. 2010) and peer to peer relationships stronger (Watt, Huerta & Alkan, 2011) for students who attended an AVID secondary school. A case study (Watt, Huerta & Alkan, 2012) of a post-secondary

community college which implemented AHE found that some Faculty staff were enthusiastic about AHE and that students thought AHE helped them become more organized and motivated to continue with their studies. Watt, Butcher and Ramirez (2013) investigated AHE at a community college with a high proportion of first-generation Hispanic students. They compared grade point average and retention rates from students taught by AHE teachers with those taught by non-AHE teachers and found that there were no significant differences. However, their qualitative data showed that students benefitted from the support they received in the AHE classes. Although preliminary, our results also indicate that students, many of whom are first-generation, benefitted from interaction with our AHE workshop attendees.

We found that 84% of attendees used an AHE community building activity in their classes. This may be because the AHE activity was superior to previously used activities, community building was stressed in the workshops or they are relatively simple to instigate. Regardless, community building strategies are vital for building social engagement and cohesion, particularly within culturally and linguistically diverse student cohorts. Perhaps that is why 65% of respondents reported their use as very, or extremely, successful. They give students a sense of belonging and build a learning context where students are supported by staff and peers (Devlin et al. 2012; Tinto, 1997; Ramsay et al. 2007). Examples of simple community building strategies used included: dividing students into groups and asking them to talk about the origin of their name, or to arrange themselves according to the alphabetical listing of their first name/favourite food/suburb in which they reside, or asking students to find fellow students with similar likes or attributes in a game of personal bingo.

We found that collaborative strategies were used by the majority of staff. 'Quick-writes', 'critical reading', 'think-pair-share', 'jigsaws' and 'philosophical chairs' were reported to be very, or extremely, successful by 61-85% of survey respondents. 'Quick-writes' and 'think-pair-share' strategies were used to assess students' discipline knowledge (e.g. blood pressure regulation) at the start and end of tutorial classes, and to help students reflect on what they had learnt. The Socratic seminar/discussion is an example of a critical reading, collaborative learning strategy, which we have shown in a pilot study, improves students' critical thinking score, based on Bloom's taxonomy (Burder, Tangalakis & Skelly, 2014). In the Foundations subject, Socratic seminars were used to demystify and 'unpack' scientific journal articles - an intimidating task for many students. Students were asked to do a 'quick-write' on a topic, for example, the link between Diabetes Mellitus and Alzheimer's disease. They were then given a scientific paper on the topic and asked to number the paragraphs, underline key claims, note who was making the claims and circle any words or phrases they did not understand. After sharing their responses with a partner (via 'think-pair-share'), students were directed to stand in a circle and discuss the topic, prompted by an open-ended question asked by the academic. Students were required to back up their comments with data from the text or from their previous knowledge. Often the discussion centred on complexities in the text, or misunderstandings. Crucially, the academic stayed outside the circle, allowing the discussion to develop in an organic way, yet providing guidance if the participants failed to observe Socratic protocols (such as taking turns, paraphrasing the previous point and not having 'side chats'). At completion of the discussion, students were asked to do another 'quick-write' highlighting what they had learnt on the topic. If time was limited, student pairs analysed a section of the text and then relayed the main points of that section to the whole class in a 'jigsaw' format, followed by a discussion. By analysing a journal article as a whole class activity and providing the steps (and reasons behind each step), students were given the tools and strategies needed to successfully undertake this important scientific task.   Through

analysis and group discussion, students gained a deeper understanding of the author's intent (i.e. inform, argue), with concepts and ideas being made more accessible. Students were also able to express any misconceptions within a supportive environment. If the journal article had an ethical aspect to it (e.g. childhood immunization: community wellbeing vs individual choice), 'philosophical chairs' was preferable. Our work substantiates that of other scholars who have highlighted the benefits of interactive, student-centred learning approaches in improving student engagement and promoting deep learning (Crosling et al. 2009; Cuseo et al. 2012).

In conclusion, this study has provided a 'toolkit' of effective teaching strategies which can be used towards improving teaching quality and student engagement. Training permanent and sessional staff to implement AHE strategies in their teaching and embedding tailored AHE tutorials into the curriculum of the Foundations subject are the first steps towards whole curriculum change. Experienced academics who participated in this study have started to lead change in their discipline areas and formed communities of practice. In response, student satisfaction with teaching appears to be improving.

Given the complexity of factors impacting on retention (Adams et al. 2010) it is, of course, extremely difficult to isolate the impact of one classroom intervention. The next phase of the project will focus on collecting student engagement, progression and retention data, and on tracking the confidence and proficiency of academic staff. We predict that improvements in teaching quality will, in turn, lead to improved student progress rates and student satisfaction.

Acknowledgements

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Appendix: Surveys emailed to teaching staff to determine perceptions of the effectiveness of the AHE strategies.

SURVEY ONE – AVID for Higher Education
Administered June 2013

1. We're interested in getting some feedback about how AVID has worked for you in the first semester. Can we start by asking for your overall impression of AVID?
2. In how many of your classes have you used AVID strategies so far?
3. From the strategies you've used, which did you feel were the most successful?
4. How worthwhile were the community building activities (if you used them)?
5. Sometimes tutors worry about the time community building takes. Was this a concern for you?
6. Can you comment on your response to Question 5? What impact did community building have on your class? How did you accommodate the time spent?
7. Were any of these strategies unsuccessful for you? Can you name them and explain why they weren't helpful?
8. In terms of your class culture, do you think using AVID strategies has increased the levels of student engagement?
9. Can you tell us a little about how you could tell the students were - or were not - engaged?
10. This semester was your retention: Very much decreased; Decreased; About the same as last semester; Increased; Very much increased
11. If there was a change in the drop-out rate, why do you think that was?
12. Turning now to you...Overall have you enjoyed using AVID strategies?
13. Has using AVID strategies improved your sense of yourself as a good teacher?
14. How helpful did you find the AVID training provided at the start of the year?
15. And the booster half way through the semester?
16. Is there anything you'd like to share about the initial training? Or the booster?
17. Are there particular strategies you'd like to concentrate on, repeat or try out at the next training? If so, please let us know.
18. In conclusion, please feel free to add any comments or suggestions not covered in the survey so far. We're very keen to know how you're going.

SURVEY TWO– AVID for Higher Education
Administered August 2013

1. Firstly, can you tell us whether this is the first time you've used AVID in your classroom?
2. If you used AVID strategies in both semesters, how confident do you feel about using it in Semester Two?
3. Please tell us which unit(s) you taught using AVID pedagogies, and in which degree?
4. How many weeks have you used AVID strategies so far?
5. Did you use AVID strategies in consecutive weeks?
6. If you've used AVID in less than half your weekly classes, tell us why that was.

7. How often are you using AVID strategies compared to other strategies?

8. How confident do you generally feel about using AVID strategies in your classroom?

9. How might we be able to assist you to become more confident, if you feel less confident at the moment?

10. From the strategies you've used, which did you feel were the most successful?

11. Of the strategies you've tried, which worked best for you and your class? Why?

12. How worthwhile were the community building activities (if you used them)?

13. Sometimes tutors worry about the time community building takes. Was this a concern for you?

14. Please comment on your responses to questions 12 and 13. What impact did community building have on your class? How did you accommodate the time spent?

15. Were any of the strategies unsuccessful for you? Please name them and explain why they didn't work.

16. In terms of your class culture, do you think using AVID strategies has increased the level of student engagement?

17. Can you tell us a little about how you could tell the students were – or were not- engaged?

18. This semester was your retention: Very much decreased; Decreased; About the same as last semester; Increased; Very much increased

19. If there was a change in the drop-out rate, why do you think that was?

20. Have they understood concepts and theories more deeply than other classes you have taught?

21. Has AVID assisted your students to engage in deeper learning? Please explain.

22. Turning now to you…Overall have you enjoyed using AVID strategies?

23. Has using AVID strategies improved your sense of yourself as a good teacher?

24. Are there particular strategies or teaching issues you'd like to concentrate on, repeat or try out at the next training? If so, please let us know.

25. Please give us some feedback about how AVID has worked for you this semester. What is your overall impression of AVID so far?

26. In conclusion, please feel free to add any comments or suggestions not covered in the survey so far. We're keen to know how you are going. Thank you very much for taking the time to complete this survey, and helping us to improve the AVID project!