Elisa Bone, Robert Reid
First course at university: assessing the impact of student age, nationality and learning style
International Journal of First Year in Higher Education, 2013; 4(1):95-107

Originally published at:
http://doi.org/10.5204/intfye.vi1.156

FYHE
INTERNATIONAL JOURNAL

The International Journal of the First Year in Higher Education
ISSN: 1838-2959
Volume 4, Issue 1, pp. 95-107
April 2013

First course at university: Assessing the impact of student age, nationality and learning style

Elisa Bone[1] and **Robert Reid**
University of Adelaide, Adelaide, Australia

Abstract

Designing curricula and teaching styles for students entering university is complicated by the diversity of student backgrounds and prior learning styles. We examined a range of factors that might influence success in the first course at university to try to identify those that were most important. Data were obtained for a first year Biology course at a large Australian university. Factors having a significant impact on final marks included student age, whether the students were local or international, time since high school and the learning strategy adopted. Taking a gap year or a longer break after high school was found to be detrimental to performance. Students taking Biology in their first semester performed better than those who did the course in their second or a later semester. International students attained higher grades than local students. Shallow or reproducing learning styles appeared to be as effective to grade achievement as strategies that led to a measurably deeper understanding of the subject matter.

Please cite this article as:

Bone, E., & Reid, R. (2013). First course at university: Assessing the impact of student age, nationality and learning style. *The International Journal of the First Year in Higher Education, 4*(1). 95-107. doi: 10.5204/intjfyhe.v4i1.156

This article has been peer reviewed and accepted for publication in *Int J FYHE.* Please see the Editorial Policies under the 'About' section of the Journal website for further information.

[1] Present address: Department of Ecology, Evolution and Environmental Biology, Columbia University, 1200 Amsterdam Ave, New York, NY 10027, USA

Introduction

The university learning environment is very different to that which final-year high school students experience. Students in their first year must deal with a range of transition issues (Krause, Hartley, James & McInnis, 2005; Schrader & Brown, 2008), all of which can significantly influence their ability to function well in the unfamiliar university environment. They are at an extremely vulnerable stage (Cook & Leckey, 1999), both personally and academically, and their methods of dealing with these issues can influence how well they settle in to the required learning pathways of university. Although a large body of research has focussed on the unique position of students experiencing the transition from high school to university—and improvements are being seen in student experience at Australian institutions (Krause et al.)—the social and academic backgrounds of students, as well as the ways in which they learn can still influence their learning experiences, their performance, and their assessment of university courses (Crisp et al., 2009). Moreover, these attributes may also be influenced by teaching methods and course presentation, which can have a profound effect on their university experience and ultimate academic performance.

The first year at university often provides students with a broad-brush overview of tertiary-level learning, comprising courses that present foundation concepts in, for example, biology, chemistry, physics or psychology, to a large number of students. These courses may act as "feeder" courses for more specialised programs, pooling students from a large number of degree programs and presenting challenges for both instructors and students (Baldwin & Koh, 2012). Differences in the social backgrounds of students can compound transition and learning issues and make it very difficult for instructors to tailor course delivery and assessment tasks to suit the learning needs of a diverse student cohort. In the present study, we examined a number of aspects of a student's background that were considered likely to influence their performance in their first semester at university. Specifically, we considered: whether the student progressed directly from high school, took a gap year or returned to study after a longer break as a mature age student; whether the student completed the course in their first semester or later in their degree; whether the student was local or international, and the influence of the student's learning styles. For this, we selected the first-semester biology course *Molecules, Genes and Cells* (MGC), the largest science course at the University of Adelaide with enrolments exceeding 800 in 2012, comparing groups of students across the 2008 and 2012 academic years. The curriculum was unchanged in this period, but there were significant changes in assessment, most notably a shift from written exams and quizzes to more numerous online multiple choice questionnaires. Other "innovations" such as the provision of iPads to all Bachelor of Science students, and greater provision of online learning material, were also instituted between these years.

This study builds upon a previous recent investigation of the influence of course selection in Year 12 on performance at University (Bone & Reid, 2011). This analysis showed, surprisingly, that students who completed biology in Year 12, but did not take chemistry, received lower marks in MGC than students with no prior study of biology, but who had completed chemistry.

Methods

Student background – Age, course timing and citizenship

We analysed final grades for the first-semester Biology course MGC during 2008 and 2012 and considered the following factors: Age (5 levels), Gap year (4 levels: no gap, 1 year since high school, 2 years, >2 years), Course timing (2 levels: MGC completed first semester at university, course completed later than first semester), and Citizenship (2 levels: international, local). The data were initially filtered to remove those students who did not sit the final exam. The course was taken by students from a number of different degrees, for example, science, arts, agriculture, engineering, as well as medical students. This latter group are generally high achievers and are subjected to a rigorous selection process for entry. As they achieved grades significantly higher than the remainder of students, their data were omitted so as not to bias the analyses. Differences in final grades between paired groups of students within each of the factor sets were analysed using *t*-tests.

Student learning styles

We distributed a survey to a subset of students completing MGC in 2008 with the aim of identifying the primary learning orientations of students, differentiating between deep (meaning), strategic (achieving) and surface (reproducing) learning styles. The survey incorporated statements from the *Learning Styles Inventory* and the *Course Perceptions Questionnaire* formulated by Entwistle and Ramsden (1983), with some modifications (e.g. "department" replaced with "course") and consisted of 24 statements—18 relating to learning styles and 6 relating to course perceptions. Of the 18 statements concerning learning styles, 7 evaluated the meaning orientation, 6 the achieving orientation, and 5 the reproducing orientation. Students scored their perceptions of each statement on a 5-point Likert scale. The survey was designed to give a general background on the attitudes and learning styles of the students and their relationships with their perception of the course. As it collected no data that could identify the student, the survey was not subject to approval by the Human Research Ethics committee at the University of Adelaide.

A student's overall dominant learning style was that which showed the highest average score across the three categories of questions. Correlations were performed between paired variables, and linear regression analyses were done to measure the effect of scores for each learning style on the course perceptions score. Mean scores for meaning orientations and reproducing orientations were also compared to gauge the effectiveness of the questions for assessing differences in learning styles, and given their very different theoretical profiles, were expected to show a negative relationship.

Of the 121 students that completed the survey, 109 (12.97% of total course enrolment of 842 students) provided their student numbers, through which we were able to note their final MGC mark at the end of 2008. Differences between final MGC grades, according to dominant learning style, were analysed using one-way analysis of variance, with learning style as a fixed factor.

Results

Student background – Age

As a general observation, the variation in MGC grades was low for students coming directly from high school, but increased in each of the older age classes. Grades were generally highest for the younger student age classes of 19 years or less in both 2008 and 2012 (see Figure 1). In both 2008 and 2012, students aged 22–24 obtained significantly lower marks than the mean (2008: p = .021, d = 0.161; 2012: p = .03, d = 0.131). Students 25 years and older achieved significantly lower grades than the mean in 2008 (p = .011, d = 0.162), but in 2012 gained grades similar to the youngest students that were also no different to the mean for that year (see Figure 1).

Student background – Course timing

In 2008, MGC grades were very similar for those who proceeded directly from high school to university and those who took a single gap year (see Table 1). Grades for students with a gap of 2 years or more were lower than the mean, but owing to small sample sizes and high variation, were only significantly lower in the group that took a gap of over 2 years. In 2012, gaps of 1 or 2 years were detrimental to performance, with the difference between no gap and 2 gap years being particularly large (64.6 versus 56.7).

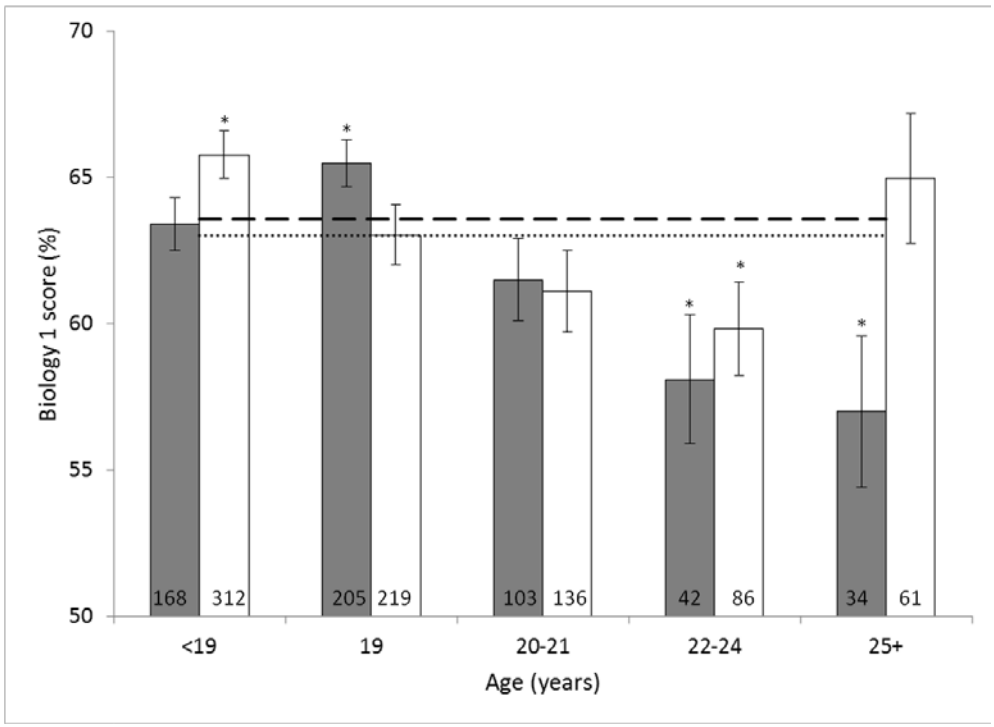

Figure 1 **Influence of student age on achievement in *Biology 1: Molecules, Genes and Cells* for academic years 2008 (closed bars) and 2012 (open bars). Data are presented as means ± s.e. Sample sizes are shown at the base of each bar. Mean grades of all students combined for each year are shown by dotted (2008) and dashed (2012) lines. Asterisks indicate a significant difference (*t*-test, $p < .05$) from the mean score of all students for that year.**

However, the grades of students who took more than 2 gap years were not significantly different to those coming directly from school. To try to separate the impacts of adjusting to a changed academic environment from the different expectations for passing a subject, grades were analysed for those students for whom MGC was their first subject at university, and for those who had done other courses before undertaking MGC.

Most students who took MGC did so in their first semester of university. For those who commenced the course one or more semesters of study after enrolment, grades were significantly lower in both 2008 and 2012 (see Table 2).

To try to separate the impacts of adjusting to a changed academic environment from the different expectations for passing a subject, grades were analysed for those students for whom MGC was their first subject at university, and for those who had done other courses before undertaking MGC. Most students who took MGC did so in their first semester of university. For those who commenced the course one or more semesters of study after enrolment, grades were significantly lower in both 2008 and 2012 (see Table 2).

Student background – Citizenship

The University of Adelaide attracts large numbers of students from overseas, particularly Asia. Many of these students struggle with English and experience problems adjusting to the culture. Despite these potential difficulties, international students performed significantly better than local students (see Table 3).

Comparing the grades of international students from countries in which English is not an official language or the language of instruction in schools (predominantly China and Korea), with those from countries with an English background (predominantly Malaysia, Hong Kong and Sri Lanka) showed that the former group performed significantly worse (see Table 4), but still as well as local students.

Table 1: ***Comparison of grades in Molecules, Genes and Cells for students who continued directly from high school (no gap) and those who took a break of 1 or more years before taking the subject. Data are means ± s.e. with sample numbers in parentheses. Different superscript letters in the same row indicate significant differences between pairs (p<.05).***

	Grade (%)			
Year	No gap	1 year	2 years	>2 years
2008	62.0 ± 0.6 (289)[a]	62.6 ± 1.4 (92)[a]	58.0 ± 3.2 (24)[a]	58.1 ± 1.8 (64)[b]
2012	64.6 ± 0.7 (419)[a]	61.2 ± 1.4 (122)[b]	56.7 ± 2.2 (50)[b]	62.3 ± 1.5 (113)[a]

Table 2: ***Final grades for students who completed Molecules, Genes and Cells in their first semester at university compared to those who completed 1 or more semesters of study before taking the course. Data are means ± s.e. with sample numbers in parentheses.***

	Grade (%)		
	Semesters since first enrolment		
Year	0	>0	*p* value (*t*-test)
2008	63.2 ± 0.7 (362)	56.3 ± 1.6 (59)	.0001
2012	63.6 ± 0.6 (634)	59.6 ± 1.9 (80)	.0279

Table 3: ***Comparison of the performance of international and local student in Biology1: Molecules, Genes and Cells. Data are means ± s.e. with sample numbers in parentheses.***

	Grade (%)		
Year	Local	International	*p* value (*t*-test)
2008	61.4 ± 0.6 (463)	68.4 ± 2.0 (50)	.0007
2012	63.0 ± 0.6 (707)	67.1 ± 1.4 (108)	.0005

Student learning styles

Mean scores for most questions did not deviate markedly from the median, neutral response of 3, with the exception of those for two survey questions. The question *I like to be told precisely what to do in essays and other assignments*, representing how bound to the syllabus students are, and forming part of the reproducing orientation score, generated the highest overall strongly positive response, with a mean score of 4.28(±0.07 s.e.) out of 5. The question *I spend a good deal of my spare time finding out more about interesting topics which have been discussed in class*, representing a measure of intrinsic motivation and forming part of the meaning orientation score, generated the lowest overall strongly negative response, with a mean score of 2.41(±0.09 s.e.) out of 5. Most students (n = 67, 55.37%) showed a dominant reproducing orientation (e.g. rote learning), with 28 students (23.14%) showing an achievement orientation (e.g. strategic learning), and 26 students (19.01%) a dominant meaning orientation (e.g. interest in the material, application of information). Three students (2.48%) were recorded as not having a dominant learning style.

Mean scores for course perceptions were significantly positively associated with those for meaning orientation ($F_{1,119}$ = 18.128, p < .001, r^2 = 0.132). Course perception scores were positively correlated with achieving orientation scores (r = 0.273) and negatively correlated with reproducing orientation scores (r = –0.119), but these linear relationships were not significant. Reproducing and meaning orientations showed a weak, non-significant negative relationship (r = –0.199), and 17 students recorded a positive mean score for both meaning and reproducing orientations.

Of the 109 students surveyed, 100 completed MGC and recorded a final grade for the course. Students with a dominant meaning learning orientation had the highest overall MGC grade, but there were no significant differences between final MGC grades for students with dominant reproducing (n = 55), achievement (n = 26) and meaning (n = 19) orientations ($F_{2,98}$ = 1.809, p = .169; see Figure 2).

Table 4: ***Comparison of the performance of international students from an English-speaking background with those from countries where English is not an official language or a language of instruction in schools. Data are means ± s.e. with sample numbers in parentheses.***

	Grade (%)		
Year	English speaking	Non-English speaking	*p* value (*t*-test)
2008	72.0 ± 2.3 (31)	61.1 ± 4.6 (15)	.021
2012	73.1 ±1.7 (41)	65.0 ± 2.4 (37)	.006

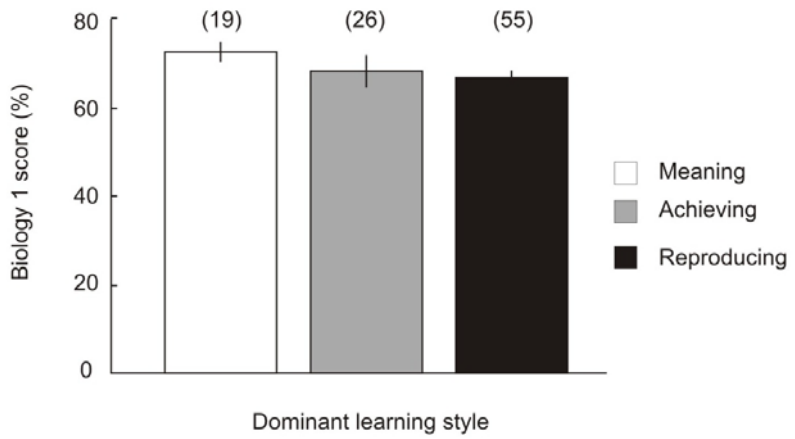

Figure 2: **Influence of prior learning style on achievement in *Biology 1: Molecules, Genes and Cells* for academic year 2008. Data are presented as means ± s.e.**

Discussion

Student background – Age and course timing

In a previous paper examining the same student cohort (Bone & Reid, 2011), we showed that students with biology learning in high school did not have significantly higher grades in *Molecules, Genes and Cells* in their first year at university. Potential differences in teaching styles and curriculum within the two learning environments are the most likely influences on how well students are able to adjust to the transition. In this current paper, we have focussed on several aspects of a student's background that could be expected to influence performance. The data show that younger students are generally more likely to do better than older students, which may have more to do with continuity of study than with age *per se*. This perception is supported by the data on gaps between high school and university, which showed that students who progressed directly to university obtained higher marks than those who took gap years. However, a sharp reversal of this trend was seen in 2012 for students aged 25 and over; in this group, marks were higher than the overall average.

Changes made to MGC between 2008 and 2012 may have been of benefit to students older than 25. In 2012, the curriculum and teaching staff were the same but assessment modes were altered and access to online material was made easier. These students most probably returned to study after an extended period in the workforce, and thus were more likely to have family and financial pressures that limited their attendance at university. By 2012, all lectures were made available online in a number of formats which, coupled with cheaper and faster internet services, would have provided a greater flexibility for these

students, with respect to when and how they accessed lectures. McKenzie and Gow (2004) also showed that learning strategies of mature age students may be more influential than their academic background, suggesting that continued strategies to improve access to materials, along with measures to increase engagement within these groups, may enhance performance in MGC. It is now obvious from numbers of all student groups attending lectures in the course that many are choosing to watch lectures online rather than live in a lecture theatre.

The transition to university involves both adjustment to a different learning environment and an understanding of how to approach assessment tasks to achieve the best outcome (Krause et al., 2005; Rennie, Goodrum & Hackling, 2001). In high school, attendance and assessments are closely monitored, and there is a close relationship between teacher and student. The university situation is quite different—independent learning is encouraged and the student is expected to be much more self-reliant (Crisp et al., 2009; Krause et al., 2005; Terenzini et al., 1994). Attendance at lectures is generally recommended but not made compulsory, and there are few safety nets for students who struggle; this issue is now being addressed in some institutions via first-year mentoring and other programs (e.g. Schrader & Brown, 2008). If students take a semester or two to adjust to changes, we might expect them to perform better in the same subject taken later in the degree program. However, this does not appear to be the case for MGC, with students who took the course in later semesters achieving significantly lower grades than those for students who completed it in their first semester. Interpretation of these data is complicated by the possibility that those who completed MGC later did so as it was not core to their chosen academic pathway. Such introductory biology subjects are frequently selected by students in humanities and engineering degrees to broaden their knowledge, but most do not progress to biology in second or third years.

Student background – Citizenship

International university students face far greater challenges than domestic students, both academically and socially (Sawir, 2005), and these challenges may be at their most imposing in first semester. For most students, the first semester of university will be the first time that they have lived in a foreign country and for many, the first time they have lived away from home. For those coming from non-English-speaking backgrounds, there are the additional difficulties in dealing with language and accent that may influence their ability to understand lecturers, and to complete written assessments in a new learning environment (Ramsay, Baker, & Jones, 1999; Sawir 2005). Other challenges such as settling into accommodation, adjusting to local social norms and building support networks are likely to influence academic performance, and more profoundly in the early stages, with access to support services often critical to their level of engagement (Ramsay et al.). Hence, there are many reasons to expect that international students would struggle in their first semester. Yet the data show the opposite outcome, with international students performing better than local students, 7% better in 2008 and 4% in 2012. Separation of students into those from countries in which English is an official language or a language of instruction in schools, and those in which it was not, revealed that language was a

significant factor. Scores of students from non-English-speaking backgrounds were no higher, but also no lower, than those of domestic students. When considered independently, international students from English-speaking countries achieved grades that were around 10% higher than local students in both 2008 and 2012. Lower language proficiency therefore appears to be a strong impediment to grade achievement for students from non-English-speaking countries in MGC. This outcome could potentially originate from lower levels of confidence, or from differences in the use of language in their prior and current study experiences (Sawir). Regular use of lectures and other didactic styles can also exacerbate language issues (Ramsay et al.). Further examination of the performance of these student groups in later semesters would be beneficial, as one would expect the language skills of all international students to improve with time.

Without a much larger sample group and use of different research methods, we cannot identify with confidence the main factors contributing to higher performance in international students. Prior studies have suggested that international students may show higher levels of both intrinsic motivation (Niles, 1995; Ramburuth & McCormick, 2001) and motivation to seek family approval (Niles). Within our study group, another important difference between local and international students likely had a strong bearing on success. Most domestic students pay only a minor proportion of their tuition costs, and can defer payment until the end of their degree. In contrast, most of the international students are full-fee-paying and therefore have early financial pressures to succeed. Other likely influences on students' motivation are a desire to return to family as early as possible, and the high cost of living in Australia compared to their home country. These considerations would provide students with a greater incentive to succeed and therefore to work harder and seek help more often.

Student learning styles

A high proportion of the sampled 2008 cohort of MGC students appeared to be utilising approaches to learning that emphasised the superficial reproduction of course material, at the expense of a more independent learning style. Such "reproducing" or "surface" approaches to learning (Biggs, 1985; Entwistle & Ramsden, 1983; Entwistle & Tait, 1990) are common amongst students in their early tertiary years, and could potentially stem from students retaining study habits that served them well in high school (Cook & Leckey 1999). Alternatively, course material may be presented in a way that encourages surface learning and memorisation, or students may perceive material as only being able to be learnt using surface approaches (Gow & Kember, 1990; Ramsden, 1983). In first year, students are under considerable pressure and are dealing with many issues for the first time. Surface approaches to learning could therefore be adopted by students with time constraints and those that feel overloaded with information; overloading that could discourage involvement in the course, despite a general willingness to engage with the subject matter (Gow & Kember).

Included in this survey was a measure of the perceptions that students held for the course. Students with positive perceptions may also be more motivated and engaged with the subject matter, and more likely to adopt effective learning and study methods that lead to academic success (Brass,

Gunstone, & Fensham, 2003; Drysdale, Ross, & Schulz, 2001; Tinto, 1975; Watkins, 1983).

Although there are clear ongoing advantages to adopting deep approaches to learning, there was no academic benefit to adopting deep approaches in MGC. It is important to note that these approaches to learning are not fixed, with students commonly using different strategies to tackle different tasks (Eley, 1992), and tending to adopt deeper approaches as they progress through their university degrees (Gow & Kember, 1990). However, the general finding that most students were using reproducing strategies in MGC suggests that learning activities within the course may not encourage independent learning. Varied assessment and practical tasks can cater for students' different learning styles (Entwistle & Tait, 1990); changes to the way we teach can also have a positive effect on the ways that students learn, encouraging active learning and higher levels of engagement (Baldwin & Koh, 2012; Biggs, 1999) and generally improving performance (Harris et al., 2007). Providing a range of activities and assessments that encourage independent, active learning strategies is a common challenge for educators in large first-year science courses, but these changes to the curriculum can influence the dominant learning styles of students, even within the first year (Walker et al., 2010). Ongoing developments in assessment within MGC could therefore lead to improvements in students' learning approaches and performance in future years.

Conclusions

This study focussed on patterns of achievement of students who completed their first semester biology course. Our findings support the view that success at university benefits from the momentum and discipline that is carried over from high school study. However, the perception that taking a break between secondary and tertiary study can improve student focus and lead to higher grade achievement was not supported by the data obtained. Mature-age students generally achieved grades that were significantly lower than the class average in the first year of analysis. Examining the role of changing technologies in allowing greater flexibility in accessing learning material may inform ongoing strategies—particularly those that acknowledge adult learning principles—to increase engagement and productive learning styles in students with off-campus commitments. On average, international students achieved higher grades than local students, but this was more pronounced for students from English-speaking backgrounds. Further investigation of how language proficiency might enhance learning in the sciences would elucidate the differences that we found within groups of international students, and examination of motivation sources for local and international students would be informative. Students adopted a range of learning styles but all resulted in a similar level of achievement. Additional consideration of student backgrounds to these analyses will help instructors tailor their learning materials to cater to differing student needs.

Acknowledgements

This project was funded through a Learning and Teaching grant awarded to E. Bone, R. Reid and G. Booker by the Office of the Vice-Chancellor (Academic) at the University of Adelaide.

References

Baldwin, A., & Koh, E. (2012). Enhancing student engagement in large, non-disciplinary first year survey courses. *International Journal of Teaching and Learning in Higher Education, 24*(1), 113-121.

Biggs, J. (1985). The role of metalearning in study processes. *British Journal of Educational Psychology, 55*, 185-212. doi: 10.1111/j.2044-8279.1985.tb02625.x

Biggs, J. (1999). What the student does: Teaching for enhanced learning. *Higher Education Research and Development, 18*(1), 57-75. doi: 10.1080/0729436990180105

Bone, E., & Reid, R. (2011). Prior learning in biology at high school does not predict performance in the first year at university. *Higher Education Research and Development, 30*(6), 709-724. doi: 10.1080/07294360.2010.539599

Brass, C., Gunstone, R., & Fensham, P. (2003). Quality learning of physics: Conceptions held by high school and university teachers. *Research in Science Education, 33*, 245-271. doi: 10.1023/A:1025038314119

Cook, A., & Leckey, J. (1999). Do expectations meet reality? A survey of changes in first-year student opinion. *Journal of Further and Higher Education, 23*(2), 157-171. doi: 10.1080/0309877990230201

Crisp, G., Palmer, E., Turnbull, D., Nettelbeck, T., Ward, L., LeCouteur, A., Sarris, A., Strelan, P., & Schneider, L. (2009). First year student expectations: Results from a university-wide student survey. *Journal of University Teaching & Learning Practice, 6*(1), 11-26.

Drysdale, M., Ross, J., & Schulz, R. (2001). Cognitive learning styles and academic performance in 19 first-year university courses: Successful students versus students at risk. *Journal of Education for Students Placed at Risk*, *6*(3), 271-289. doi: 10.1207/S15327671ESPR0603_7

Entwistle, N., & Ramsden, P. (1983). *Understanding student learning*. London, UK: Croom Helm.

Entwistle, N., & Tait, H. (1990). Approaches to learning, evaluations of teaching, and preferences for contrasting academic environments. *Higher Education, 19*, 169-194. doi: 10.1007/BF00137106

Eley, M. (1992). Differential adoption of study approaches within individual students. *Higher Education, 23*(3), 231-254. doi: 10.1007/BF00145015

Gow, L., & Kember, D. (1990). Does higher education promote independent learning? *Higher Education, 19*, 307-322. doi: 10.1007/BF00133895

Harris, K-L., Krause, K-L., Gleeson, D., Peat, M., Taylor, C., & Garnett, R. (2007). *Enhancing assessment in the biological sciences: Ideas and resources for university educators.* Retrieved from www.bioassess.edu.au

Krause, K-L., Hartley, R., James, R., & McInnis, C. (2005). *The first-year experience in Australian universities: Findings from a decade of national studies*. Centre for the Study of Higher Education, University of Melbourne: Melbourne, Australia. Retrieved from http://www.griffith.edu.au/__data/assets/pdf_file/0006/37491/FYEReport05.pdf

McKenzie, K., & Gow, K. (2004). Exploring the first year academic achievement of school leavers and mature-age students through structural equation modelling. *Learning and Individual Differences, 14*, 107-123. doi: 10.1016/j.lindif.2003.10.002

Niles, F. (1995). Cultural differences in learning motivation and learning strategies: A comparison of overseas and Australian students at an Australian university. *International Journal of Intercultural Relations, 19*(3), 369-385. doi: 10.1016/0147-1767(94)00025-S

Ramsay, S., Barker, M., & Jones, E. (1999). Academic adjustment and learning processes: A comparison of international and local students in first-year university. *Higher Education Research and Development, 18*(1), 129-144.

Ramsden, P. (1983). The context of learning in academic departments. In F. Marton, D. Hounsell, & N. Entwistle (Eds.), *The experience of learning* (2nd ed., pp. 198-216). Edinburgh, UK: Scottish Academic Press.

Ramburuth, P., & McCormick, J. (2001). Learning diversity in higher education: A comparative study of Asian international and Australian students. *Higher Education, 42*(3), 333-350. doi: 10.1023/A:1017982716482

Rennie, L., Goodrum, D., & Hackling, M. (2001). Science teaching and learning in Australian schools: Results of a national study. *Research in Science Education, 31,* 455-498. doi: 10.1023/A:1013171905815

Sawir, E. (2005). Language difficulties of international students in Australia: The effects of prior learning experience. *International Education Journal, 6*(5), 567-580.

Schrader, P., & Brown, S. (2008). Evaluating the first year experience: Students' knowledge, attitudes and behaviours. *Journal of Advanced Academics, 19*(2), 310-342.

Terenzini, P., Rendon, L., Upcraft, M., Millar, S., Allison, K., Gregg, P., Jalomo, R. (1994). The transition to college: Diverse students, diverse stories. *Research in Higher Education, 35*(1),, 57-74.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125. doi: 10.3102/00346543045001089

Walker, R., Spronken-Smith, R., Bond, C., McDonald, F., Reynolds, J., & McMartin, A. (2010). The impact of curriculum change on health sciences first year students' approaches to learning. *Instructional Science, 38*(6), 707-722. doi: 10.1007/s11251-009-9092-y

Watkins, D. (1983). Depth of processing and the quality of learning outcomes. *Instructional Science, 12*, 49-58. doi: 10.1007/BF00120900