

# Targeted orientation: a continuing study of the perceptions of transitioning first-year Engineering students

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## Structured abstract

### BACKGROUND

Research by others has shown that student attitudes and approaches to tertiary learning have significant dependence on their expectations of university study. Surprisingly, a longitudinal study covering 15 years, and carried out by the Centre for the Study of Higher Education, did not investigate the transitioning student's expectations of learning and teaching practices at tertiary institutions. In a pilot study by two of the authors attempted to rectify this oversight by focusing on the pedagogical expectations of first-year engineering students at a tertiary institution.

### PURPOSE

The investigation reported in this paper focuses on the effects of a targeted orientation programme for first-year domestic and international engineering students.

### DESIGN/METHOD

In 2013 following the presentation of a targeted orientation program (which was in response to student feedback obtained in 2010), an anonymous survey canvassed 160 students on their expectations of the university environment, their approach to learning and the teaching approach during their first year at university. The majority of questions required a response on a 5-point Likert scale. The last question on the survey was open-ended and canvassed students' opinions on what they thought should be covered in future transition programs that forms part of their institution's orientation program.

### RESULTS

Even though the 2013 first semester cohort mix (primarily novices to tertiary education) was different to the group that was surveyed in the second semester 2010, who had at least one semester of tertiary studies (experienced students), results from student expectation surveys indicated that exposure to a targeted orientation course (2013 cohort) had little effect on their perception. They reported experiencing difficulty with taking notes during lectures; and subsequently using these notes to study successfully.

### CONCLUSIONS

These outcomes highlight that while benefits from transition courses may not be perceived as beneficial by those who participated in them; anecdotal evidence indicates that such groups of students cope better on a day-to-day basis than students who do not get exposed to a targeted orientation course.

### KEYWORDS

First-year transition; student perception; targeted orientation programme.

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## Introduction

The objective of this pilot study was to explore the possible effects on the expectations of tertiary learning and teaching by first-year engineering students, after they have attended a targeted orientation program that was offered before the start of their first semester of studies. An anonymous survey was used to solicit their expectations of the teaching and the learning styles that they were exposed to in their first semester of their course.

The first Australian national study, involving seven institutions, which focused on the experiences of first-year undergraduate students was completed in 1994 (McInnis, James, & McNaught, 1995). It was an attempt to respond “to increasing international recognition that students’ initial experiences were pivotal in establishing attitudes, outlooks and approaches to learning” (McInnis, James, & Hartley, 2000: 1). Subsequently, over a fifteen year period the study was repeated at five-yearly intervals by the Centre for the Study of Higher Education (CSHE) at the University of Melbourne (James, Krause, & Jennings, 2010; Krause, Hartley, James, & McInnis, 2005; McInnis et al., 2000; McInnis et al., 1995). In 2004 the number of participating institutions was expanded to nine, in order “to capture the growing diversity of the higher education sector” (James et al., 2010: 9). The collected data from each study was analysed with the aim of obtaining a snapshot of the academic and social experiences of first-year university students. The participants’ selection process was random and an attempt was made to have them “stratified by field of study from each of ... [the participating] universities” (McInnis et al., 2000: 5). The results of these longitudinal studies should reflect transitioning engineering student perceptions as well.

Unfortunately, there are some issues of particular concern to this last cohort that were not investigated by the study, namely:

- proficiency for student-centred learning, which is significantly different to what they have experienced during their secondary education (McInnis et al., 1995).
- there are no Year 11 and/or Year 12 school subjects that directly link to discipline-specific tertiary subjects for engineering courses (Fullarton & Ainley, 2000);
- the students’ existing level of exposure to new technologies may have a direct effect on their ability to comprehend new concepts (Banky, 2013).

In 2010, Banky, Richards and Blicblau (2011) conducted a survey on a total of 161 first-year students. This sample consisted of 114 (70.8%) domestic and 47 (29.2%) international students. The final open ended question asked the students to suggest, upon reflection of their perceptions of learning styles and approaches to their studies, suitable content for a targeted orientation program for transitioning students. The question was answered by a total of 46 (28.6%) participating students who showed a clear preference for an introductory course that would cover *‘lecture-note taking’* and *‘time management’*. The study concluded that “these outcomes highlight the need for more targeted orientation of students who are about to commence their tertiary courses” (Banky et al., 2011: p. 1). Two unpublished 2012 surveys confirmed these earlier findings and highlighted the participants’ need for coping skills for other issues - such as *‘social isolation’*, *‘study skills’*, *‘details on how and what the students need to begin university’*, *‘learning how to navigate the workload’*, *‘independence’* and *‘becoming autonomous’*. Furthermore the students also indicated that they lacked the knowledge on how to seek information and get study support.

In response to the above survey findings, in 2013, the Faculty of Engineering and Industrial Sciences at Swinburne University of Technology has revamped their orientation program to target particular issues that were highlighted by the previously surveyed students.

## Purpose

How students approach their first year of university life is significant for both academic success and retention. This success depends on the attitudes, the knowledge and the skill-sets brought to tertiary life by the individual students, as well as how they enhance these to

accommodate their time at university. The ubiquitous effect of student expectations during their transitioning into tertiary study is clearly encapsulated in the statement:

*“First year students’ expectations of what it will be like to study at university are important for shaping their attitudes and approaches to the first year experience in all its dimensions.”*  
(James et al., 2010: 27)

This research investigated the effect of a targeted orientation program on transitioning first-year engineering students’ expectations of university learning and teaching at an Australian tertiary institution.

## Method

### Targeted orientation

The targeted orientation program was designed to introduce students to the social and academic aspects of university life, as well as to the multitude of resources and support that is available to them during their time at university (Mullendore & Banahan, 2005). Such programs attempt to equip students with a smooth transition into tertiary studies. In general, the strategy was based around the feedback from previously completed 2010 and 2012 surveys. The program objective was to provide an introduction to engineering problem solving, and an understanding of what is expected of the students after they enter their classrooms for the first time. Additionally, this program was designed for all commencing students (both domestic and international) irrespective of their previous experience - from school leavers and those taking a gap year or two, to mature age students who have not studied at the tertiary level. The orientation sessions covered what students needed to know and what they needed to do before commencing university (Feldman & Zimble, 2011). There were sessions dealing with *academic matters*, *student services* and *social events* aimed at achieving positive social adjustment into university life (Richardson, King, Garrett, & Wrench, 2012; Romkey, 2008; Shim & Ryan, 2012).

The “*academic matters*” sessions introduced students to the fundamentals of making a successful academic start, and it covered some of the basics of getting started at university. In addition, a “*meet and greet*” session was held so that students could put faces to the names of the key people in the faculty, as well as to meet each other. Staff from different disciplines and faculties introduced and explained some of the unfamiliar jargon used at university, and what students could expect from the academics – plus what the academics might be expecting from the students! The “*student services*” sessions provided the students with an initial “big picture” of all the services available to help them get through their studies at the university. Finally, there were a number of *social events* where students could meet with staff (for example their course coordinator) and other students (both new and experienced).

The extended program included panel presentations from university staff and experienced students on:

- tips for time management;
- how to get the most out of your lectures – taking notes etc.;
- good study habits and skills;
- asking for help.

Additionally it also had components that consisted of hands-on interactive activities in laboratory environments, such as:

- designing and constructing an electronic die;
- creating a finger joint out of different materials;
- watching demonstrations in the strong structures laboratory in order to gauge its capabilities;
- a ‘Big Bang’ theory physics event in the physics laboratory;

- an engineering design challenge (the 'egg drop') where they work in discipline specific groups, guided by an academic staff member.

Activities, such as the "egg drop" (where they had the opportunity to develop connections with others in their course and to compete against those in other courses) promote ownership and a personal perspective of themselves now that they are students of their chosen professional discipline.

### Data collection

The data was collected using a cross-sectional anonymous survey, which aimed to provide indication on the entire student population. First-year engineering students enrolled in the first year of their studies agreed to participate in the research by completing the survey online. The survey comprised of eight Likert-scale items which examined perceptions both before commencing first-year studies at university and after completing one semester of those studies. The response to each item was on a scale of SA, A, N, D and SD (corresponding to a numerical scaling of 5 to 1, where 5 = strongly agree; 4 = agree; 3 = neutral; 2 = disagree and 1 = strongly disagree). The concept of the five response-alternatives is based on the scaling proposal by Likert (1932) which he did not intend to be a summated one. However, there is an underlying assumption of a variable, the value of which represents attitudes and opinions (Clason & Dormody, 1994). In order to acknowledge this discrete nature, the analyses compared the proportions of the responses in each category rather than consider the means and standard deviations of the ensuing distributions.

A final open ended question asked the students to suggest content for a course in tertiary study techniques upon reflection of their perceptions of learning styles and approaches to their studies. The rest of the questions required a yes/no answer to define the students' academic and demographic background as well as if their expectations of learning styles were met.

## Results

### Raw results

A quantitative methodology based on a survey questionnaire was employed to collect data.

In 2013, a total of 173 students were surveyed in their first semester at the university. This sample consisted of 155 (89.6%) domestic and 18 (10.4%) international students. While in 2010 a total of 161 students were surveyed in their second semester of their studies. This sample consisted of 114 (70.8%) domestic and 47 (29.2%) international students. The differences in the domestic and international student numbers respectively reflect the fact that more international students tend to commence their studies in the middle of the year in Australian universities.

Table 1 summarises the perceptions at the commencement of their tertiary studies by responding students to *Question 7* (a multi-part Likert question). Table 2 summarises the responses of the students to *Question 9* (a similar multi-part Likert question) by those who had completed at least one semester of their studies.

In 2013, *Question 10* (a free-form question asking them to suggest topics for an orientation course) was answered by 167 (97.7%) students. Their responses indicated a clear preference for an orientation course to cover:

- lecture-note taking – what is important and what is not;
- time management – organizational skills;
- applying the material covered;
- approaching engineering projects;
- finding/creating study groups;
- how to know what to ask when you don't understand the material;
- study techniques to achieve understanding;

- getting value from Blackboard.

**Table 1: Student responses to Question 7 of the survey**

<b>Skills - commencement of tertiary studies</b>	<b>2010 (n=161)</b>	<b>2013 (n=173)</b>
(a) <i>I was able to take class notes successfully</i>	68%	72%
(b) <i>I was able to use my class notes to study</i>	72%	67%
(c) <i>I was able use my text book to study</i>	78%	73%
(d) <i>I was able to gain understanding from completing problem</i>	85%	87%
(e) <i>I was able to combine different topics to gain deeper understanding</i>	67%	69%
(f) <i>I was able to apply theorems presented in the class</i>	70%	64%
(g) <i>I was able to avoid getting lost in the subject content</i>	61%	51%
(h) <i>I was able to use Blackboard</i>	46%	42%

**Table 2: Student responses to Question 9 of the survey**

<b>Skills - in second semester</b>	<b>2010 (n=118)</b>	<b>2013 (n=45)</b>
(a) <i>I was able to take class notes successfully</i>	81%	60%
(b) <i>I was able to use my class notes to study</i>	80%	67%
(c) <i>I was able use my text book to study</i>	77%	67%
(d) <i>I was able to gain understanding from completing problem</i>	90%	77%
(e) <i>I was able to combine different topics to gain deeper understanding</i>	67%	77%
(f) <i>I was able to apply theorems presented in the lectures</i>	74%	39.5%
(g) <i>I was able to avoid getting lost in the subject content</i>	66%	40%
(h) <i>I was able to use Blackboard</i>	90%	81%

### **Data analysis-Regression results**

We examined the perception of student's ability to gain understanding by completing academic problems by using their text books, class notes, writing their own notes and also being a domestic student. We found that there was little difference between the perceptions of international student and domestic student's in the 2013 cohort. Both relationships were significant but the relationships were very weak which led us to believe that other factors were having an effect on the student's perceptions. If students are feeling confident in their ability to successfully navigate the first year of university regardless of their cultural backgrounds, then this does not explain the difference in the perceptions of the cohort.

Although, previous research demonstrates that mature age students have different approaches to their return to study when compared with school leavers (Burton, Taylor, Dowling, & Lawrence, 2009) we found that students perceived little difference in their abilities to cope and to use the resources to learn the material. We predicted that the perceptions of students' ability to understand problems would be affected, if they had completed year 12 within the last 2 years as well as completing year 12 mathematics, physics and chemistry. Contrary to expectations, we found no significant relationship for either domestic students or international students [ $F(5,165) = 1.164, p = .329$ ]. This is interesting as the responding students perceived themselves to be no less or more prepared in their ability to understand problems, apply theorems or avoid getting lost, regardless of their educational history – a result that was unexpected. Further analysis showed that there was also no difference in the

relationship between the lengths of time that has passed since completing their subjects in year 12, and those who had completed their schooling more than 2 years ago and including those students who have had more than a 5 year break from studying (mature age). Since, these students' perceptions are subjective explicit self-reports, this may require more investigation at a later date.

We also looked at the relationship between the variables to discover that if students wrote their own notes that they felt that they were able to apply the theorems learned in their classes. We found that student believed that they were able to use their notes effectively however this relationship was only a weak one [ $r = .137$ ,  $F(4,118) = 3.749$ ,  $p = .003$ ].

Teaching and learning styles of the students were considered and we examined how the students used resources, transferred their skills and used the notes that they took in class. We found a positive relationship between teaching styles and transferable skills. However while this was evident in the 2010 data [ $F(8,111) = 3.712$ ,  $p = .001$ ], it was not in the 2012 data [ $F(8,21) = 1.172$ ,  $p = .361$ ]. This may also require further investigation as to why teaching styles, learning styles and the value of learning management systems such as *Blackboard* (Blackboard Inc., Washington, DC) are perceived differently by the later cohort of students.

## Discussion

When the data for the cohort of students surveyed in 2013 was analysed there was no significant relationship between the following variables and their ability to apply theorems: avoid getting lost and understand problems through transferring skills, using the text book and using notes provided by the lecturer [ $R = .481$ ,  $F(5,25) = 1.503$ ,  $p = .225$ ]. The change in these results between the 2010 & 2013 students may have been caused by the introduction of a new transition/orientation programme, which is delivered at the start of each semester, in response to a new orientation strategy developed and implemented, in response to the need identified in student feedback from the 2010 and 2012 surveys.

A comparison of the 2010 and 2013 data in columns in both Table 1 and Table 2, concludes that the targeted orientation had little effect on the students learning skills, in fact for some skills the 2013 percentages were lower than those for the 2010 cohort. This suggests a refocusing of some topics in future orientation courses. This is further highlighted in the list of course topics that were suggested in the free-form question by the 2013 (post-course) cohort.

Further comments for consideration for planning future targeted orientation courses were to:

- placate students who feel anxious about their secondary school knowledge of mathematics and chemistry by some form of revision before and support during the semester;
- address issues with some first-year textbooks that may be "too complicated";
- clarify any confusion about the university's expectations and social issues.

Overall the targeted orientation was well received, since only three students responded that they would not attend such a program.

## Conclusions

The outcomes of both published and unpublished surveys that were conducted over the past four years confirm the need for a transition course focusing on tertiary learning and study skills (particularly those revealed by the responses to *Question 10*) should be established for both domestic and international students studying engineering. Anecdotal evidence from members of the teaching staff, has also shown an increase in student questions in classes, more engagement with support services and fewer reporting by students of feeling isolated and in need of acclimatisation. International students have also shown a willingness to ask for help and appear to have integrated well with domestic students. These observations

highlight the fact that students are often not aware of all the benefits that may result from their participation in targeted orientation activities.

While the improvements that were identified for the 2013 group (which attended a targeted orientation course) may have been disappointing, it is highly recommended that the investigation continues while the targeted orientation content is customised.

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