

Articulation of Chinese Students into an Australian Engineering Degree

Seeta Jaikaran-Doe, Sarah Lyden and Peter Doe.

University of Tasmania

STRUCTURED ABSTRACT

CONTEXT

Recently, there has been an increase in the number of Chinese students articulating into the third year of an engineering degree course at the University of Tasmania (UTAS). UTAS lecturers occasionally deliver relevant engineering units during two to four weeks at their home universities. Additionally, before enrolling in the engineering degree at UTAS, some of these students either spend three to five months engaging in theoretical and practical sessions in English at UTAS English Language Centre or participate in an Academic Skills Program in their home university. But despite these experiences, when the Chinese students articulate into the Australian engineering degree they encounter many challenges, such as cultural differences, social issues, poor communication with staff and students, different learning and teaching styles, and high failure rates.

PURPOSE

This paper discusses the intervention strategies of a support framework that was implemented to support newly arrived students from China enrolled in the Bachelor of Engineering degree (Honours) at the University of Tasmania. The impact of these strategies on the academic achievement of the students was closely examined at the end of their first semester. A comparison was made with the results of earlier cohorts of students who were not afforded the same level of support after articulation.

APPROACH

Intervention strategies included reducing the cultural divide between domestic and international students; informing students of expectations; enhancing communication; providing instruction on the use of the in-line learning and teaching facility; a mid semester review of progress, and engaging Chinese-speaking tutors for special additional tutorial support throughout the semester.

The performance of the Chinese students in their first semester at UTAS was evaluated through feedback from tutors and lecturers and a statistical analysis of students' results at the end of their first semester.

RESULTS

The recipients of the intervention strategies performed significantly better in their first semester than the earlier cohorts.

CONCLUSIONS

The significant improvement supports the proposition that the strategies in the support framework addressed the cultural and pedagogical factors leading to the high failure rate of the previous cohort.

KEYWORDS

Articulation, Chinese students, Engineering Degree.

Introduction

The University of Tasmania (UTAS) is the fourth public university established in Australia in 1890. Currently, it is ranked in the top 2% worldwide according to the Academic Ranking of World Universities. The total enrolment in 2014 was approximately 33,879. Almost 6,000 international students from over 80 countries form a large part of the diverse student population (Rathjen, 2016). Campuses are located in Hobart, Launceston, Cradle Coast, Sydney as well as some offshore programs in Asia.

In July 2016, the first cohort of 10 civil engineering students from a Chinese university designated UniA were enrolled in the third year of the four-year Bachelor of Engineering with Honours undergraduate degree at UTAS. These students had met the required English language standard for the issue of an Australian Certificate of Entry (direct entry) through study in China at their home university (equivalent to IELTS level 6 with no band below 5.5)

In February 2017 a cohort of electrical engineering students ($N = 19$) from another Chinese University designated UniB enrolled in the UTAS BE (Hons) course. Prior to their enrolment they participated from 5 to 20 weeks (depending on their proficiency) in an English Language program at the UTAS English Language Centre (ELC).

In July 2017, cohorts from both UniA ($N=12$) and UniB ($N=18$) enrolled by direct entry in the BE(Hons) degree. A timeline for all Chinese students enrolling in BE(Hons) is shown in Figure 1.

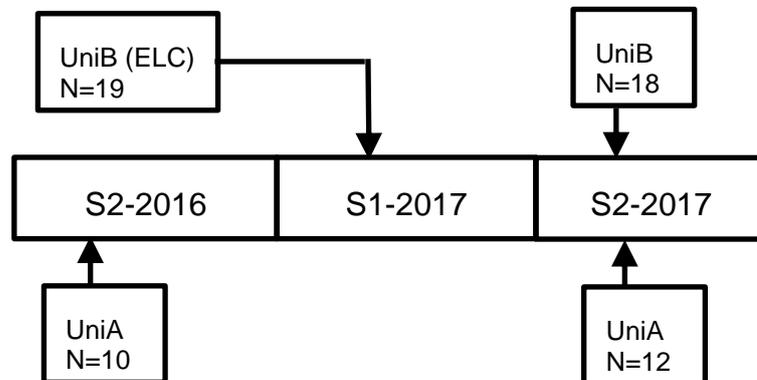


Figure 1. Timeline of enrolments in the BE(Hons) degree.

UTAS lecturers and tutors are confident in their content knowledge but lack adequate pedagogical knowledge and skills to bridge the gap between the delivery of content in English for the domestic students and the acquisition of the content knowledge for international students who had English as their second language. Additionally, it was very difficult for the domestic students to fully embrace the Chinese students because of the strong collegial bonds previously formed in the first and second year at UTAS. Cross-cultural interactions and collaborative learning among the diverse groups of students were not enhanced.

Prior to the arrival of the direct entry students in July 2016, UTAS Discipline of Engineering staff and tutors attended a meeting where two UTAS staff members recounted their recent experience in the delivery of second year engineering units at UniB. Some of the issues discussed were: students' lack of understanding of technical terminologies; large classes; impact of formative assessment with quizziz (www.quizziz.com), students' engagement with phones during lectures; and the issue of less motivated students sitting at the back of the class. One of the authors of this paper, Dr Sarah Lyden, provided feedback on some of the results of data analysed from a recent survey she conducted with the electrical engineering students from UniB. Language (particularly technical terms), student-centred learning styles at UTAS, and social/cultural issues were implicated in UniB students' poor performance in their first semester at UTAS.

The meeting was a lens for lecturers and tutors to gain first-hand knowledge of the learning environment at the Chinese universities. At the same time they were alerted of some challenges to be encountered by the new students who were scheduled to arrive only a few days before the start of the semester from UniA. The Head of School and lecturing staff supported intervention strategies to encourage a smooth transition from their home university to UTAS. Expectations were that the strategies would bring an atmosphere of collegiality among the domestic and Chinese students as well

as prevent the high failure rate experienced by the first cohort. The intervention strategies were continued for the July 2017 intakes. This paper will discuss these strategies and their outcomes.

Literature Review

Increasingly, over the past 20 years, full-fee paying international students provide a significant component of Australian universities' income (Min & Falvey, 2018). In fact, the international education industry contributes \$17 million and support 125,000 jobs (Access Economics, 2009). Therefore, value for money should be reflected by the Australian universities producing quality education to students.

Curriculum programs must be engendered to increase technical English and overcome the different teaching and learning styles (Heffernan, Morrison, Basu & Sweeney, 2010). At the University of Western Australia a collaboration between content and language experts was adopted to improve the outcomes for international students studying a professional engineering course (Stappenbelt & Barrett-Lennard, 2008). This approach aligns well with observations that even though English language support may be available centrally, international students may be hesitant to seek this help and general English language support may not be able to enhance students' learning.

Motivation, social and cultural adjustment, academic adjustment, and English language skills are common themes arising in previous studies relating to international students in Australian universities (McGee & Lawrence, 2009; Arkoudis, 2012). While there often appears to be a segregation between domestic and international students both in classrooms and social settings (Malau-Aduli, 2011), perhaps breaking down some of these barriers may have positive impacts on the education of both groups of students. Richardson and Sun (2016) highlighted that the culture of the students themselves and the context within which they are studying are key influencing factors, and that after a few months the perceptions of the international students may start to converge with those of the domestic students. Wong (2004) and Malau-Aduli (2011) recommended a semester long orientation to improve the outcomes of newly arrived international students in a medical degree.

There are some misconceptions among Australian academics and administrators concerning the learning and study practices of international students from China in Australia. The view that Chinese students are surface learners, not willing to engage in class, and prefer the company of their cultural peers has been challenged (Chalmers & Volet, 2006; Kember, 2000). The Chinese education system is designed to facilitate large classes. Students are taught from young to respect their teachers. This attribute results in little or no disciplinary problems in the classroom. Content is delivered in a manner that may appear to outsiders to be rote learning, however, students learn to repeat and memorise content for understanding. Thus, they develop deep approaches in learning. Another difference is the support that students receive at the Chinese universities where most students at tertiary level live on campus. There is a strong peer support as well as access to teachers outside the classroom (On, 1996).

Holmes (2004) followed the progress of 13 Chinese students studying Business at a New Zealand University. She found that 'students were not prepared for the dialogic nature of classroom communication'. This posed challenges for local students, teachers and universities 'to find ways of developing diversity awareness and appreciation'. Sawir, Marginson, Deumert, Nyland, & Ramia (2008) reported that a majority (two thirds) of 200 Chinese students studying in Australia had experienced 'problems of loneliness and/or isolation, especially in the early months'.

One of the authors of this paper surveyed electrical engineering students ($N=22$) who were participating in the third year units at the University of Tasmania (S.Lyden, personal communication, 23 May 2016). They had previously completed two years of an electrical engineering degree course at UniB. The study identified some of the reasons for students' poor performance in their first semester at UTAS. When asked "Which factor has been most difficult to adjust to in studying in Australia?", 68% responded 'Language', 18% responded 'Teaching and Learning Styles', 10% responded 'Social' and the remaining responded 'Other - I think they are all problems when I first came here'. Most of these students had undertaken English language studies at UTAS for periods of five to 20 weeks in order to meet the standard of English language required for admission to the engineering degree course. Birrell (2006) reported that the standard of English of one third of international graduates who had permanent residence in Australia was below that normally required for professional employment.

Other universities have implemented support strategies such as voluntary weekly tests with similar questions to what the students would see on an exam to firstly determine what they are struggling with

and secondly identify ways to improve their learning outcomes (Gornisiewicz & Báss, 2011). Diversity provides great potential for both domestic and international students to interact with peers from different cultural and linguistic backgrounds. The interaction can lead to “increased awareness and understanding of different perspectives; better preparation for the workplace; improved English language skills of international students; and a greater feeling of belonging” (Arkoudis, 2010, p.6). In a discipline like engineering, which is increasingly becoming globalized, successful engineers benefit greatly from an understanding of other cultures and countries (Parkinson, 2007).

Methodology

A support framework was first implemented in July 2016 to support the 10 newly arrived civil engineering students from UniA. The impact of these strategies on the academic achievement of the students was closely evaluated at the end 2016. As a result, support was extended in 2017 to include the newly arrived electrical engineering students from UniB.

This investigation was guided by the following research questions:

1. To what extent did the support framework impact upon the end-of-semester results of Chinese students during their first semester at UTAS?
2. What other factors may have impacted student's first semester performance.

Ethics approval was obtained in June 2017 allowing access to (unidentified) Chinese students' results in their first semesters in the BE(Hons) course at UTAS.

Intervention strategies in 2016

Experiences learned from the poor performance of Chinese students from UniB in 2015, prompted the provision of resources for a support framework for communication (Figure 2). Six one-hour sessions to plan, design and implement strategies to support the students were delivered to newly arrived civil engineering students from UniA by the lead author (SJ-D). Simultaneously, tutors who were fluent in Mandarin and English provided a one-hour tutorial per week for each unit in which the students were enrolled. SJ-D conducted a special session on pedagogical strategies to guide the tutors in the delivery of their tutorials.

Activities for the Chinese students were not conducted in isolation. Since they would be working and studying with domestic students, it was important to involve the domestic students in some of the activities. SJ-D conducted three separate in-class sessions varying from 45-30 minutes in the third year civil engineering units. The activities were designed to reduce the cultural divide between the two cohorts of students, encourage communication, and bring an atmosphere of collegiality.

In addition, four separate one-hour sessions were conducted for only the Chinese students by SJ-D to inform them about plagiarism, academic misconduct, Work Health and Safety, assessment procedures, and how to access and use the Learning Management System, MyLO. An ‘International Student Induction Manual’ detailing important matters that students need to know about the academic culture of the school was distributed and explained to them. WeChat was used for easy communication among tutors, SJ-D, students, and the S-JD.

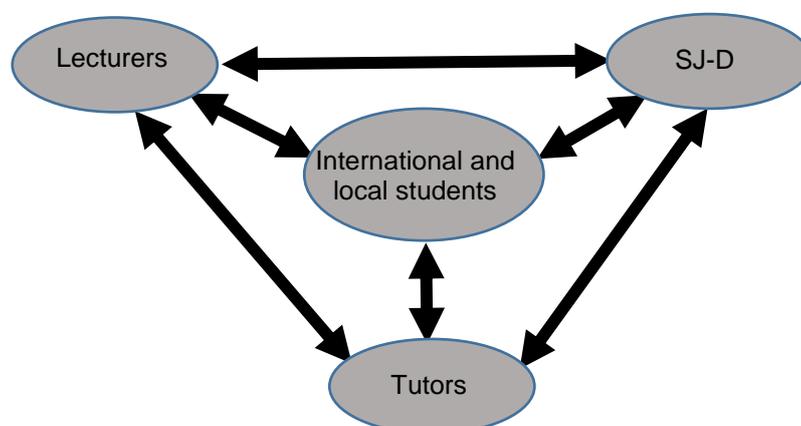


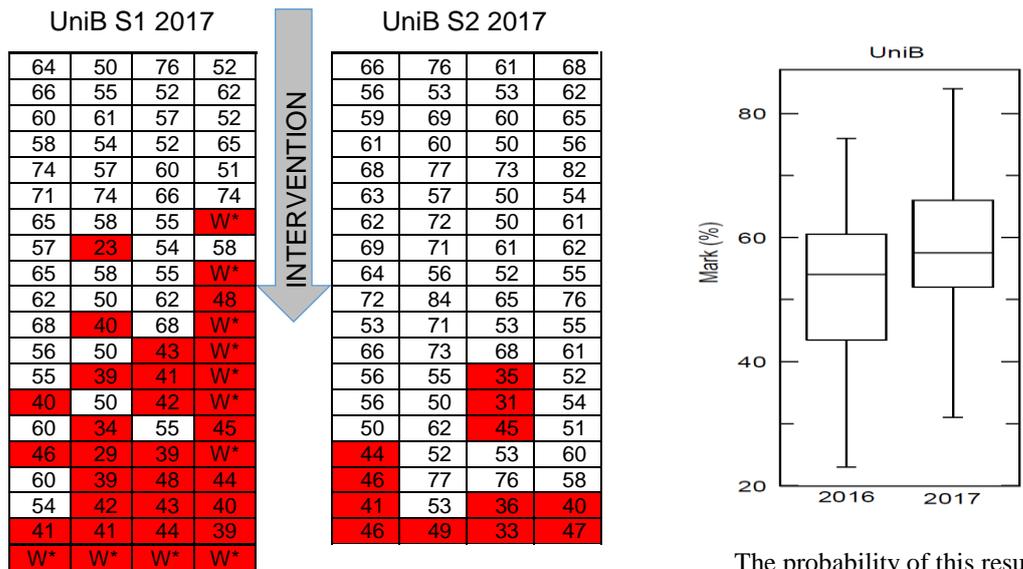
Figure 2. Support Framework for communication.

Intervention strategies in 2017

The intervention strategies were extended in 2017 to include training workshops for both international and domestic tutors. The implementation of the support framework resulted in engineering lecturers at UTAS making their lecture notes and other materials available to students on-line before the relevant class. S-JD was appointed to a part-time position within the UTAS School of Engineering as International Transitions Officer with the responsibility of recruiting, rostering and providing pedagogical advice to the Mandarin speaking tutors.

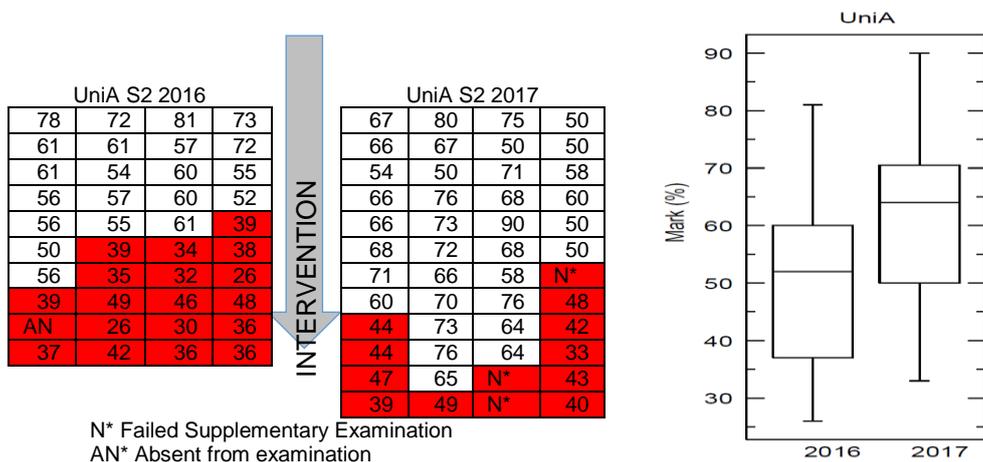
Results

Students' final marks in each of the four units they studied in their first semester at UTAS are presented in Figures 3 and 4. The box and whisker plots are from unpaired *t*-tests (Kirkman,1996).



The probability of this result, assuming the null hypothesis, is 0.0058.

Figure 3. End-of-semester examination results for all cohorts from UniB



N* Failed Supplementary Examination
AN* Absent from examination

The probability of this result, assuming the null hypothesis, is 0.0010.

Figure 4. End-of-semester examination results for all cohorts from UniA

Discussion

Research Question 1: To what extent did the support framework impact upon the end-of-semester results of Chinese students during their first semester at UTAS?

Direct entry (S2 2017) UniB electrical engineering students had significantly better results in their first semester at UTAS when compared to students from the same university who had studied English Language in Hobart before enrolling (Figure 3). Likewise, the second cohort of direct entry UniA civil engineering students (S2 2017) performed better than those who commenced a year before (Figure 4).

This supports the proposition that the strategies in the support framework addressed the pedagogical factors leading to the high failure rate of the previous cohorts. The improvement of the academic achievement can be contributed to the following intervention strategies of the support framework:

- Reducing the cultural divide between domestic and international students.
- Informing international students about expectations for teaching by providing an 'International Student Induction Manual' to all newly arrived students.
- Enhancing communication among domestic and Chinese students, tutors, lecturers, and the International Transitions Officer.
- Providing theoretical and practical information to international students of the use of the on-line learning and teaching facility at UTAS (MyLO).
- Reviewing the progress of all students in all units during mid-semester.
- Engaging Chinese-speaking tutors for special additional tutorial support throughout the semester.

Chinese students developed more confidence to communicate with teachers and tutors to discuss matters affecting them as evidenced by the Chinese students, lecturers, and students (also SJ-D) posting on MyLO discussion boards for each unit.

Research Question 2: What other factors may have impacted students' first semester performances?

There are many factors that may have impacted students' first semester performance, in particular students' preparation in China before articulating to UTAS. Australian teachers delivering both English language programs and engineering content in China are known to help with students' articulation into the UTAS BE(Hons) program although a lack of proficiency in technical English has been identified as more important than the learning style (Doe, Lyden, Jaikaran-Doe & Wang, 2018). As well, Intensive Mode Teaching in China has helped prepare the students for the student-centred learning they will experience at UTAS (Doe et al., 2017).

The overall performance of civil engineering Chinese students in their first semester of study at the University of Tasmania (UniA S2 2017) was not significantly better or worse ($DF=119$, $p=0.38$) than that of the cohort of electrical engineering students at the same time (UniB S2 2017) which implies there is little impact of engineering discipline on students' first semester performance.

The data presented in Figure 3 are for different cohorts of students' performance in the first semester (February to June) and second semester (July to November) at UTAS. The possibility of students finding units in the second semester easier or harder than those in the first semester cannot be discounted.

Recommendations for improving Chinese students learning outcomes and engagement

The strategy for improving Chinese students' engagement learning outcomes and study should focus on additional support and improved delivery both in China and Australia.

- Experience with the Chinese students' inability to write laboratory reports when they come to UTAS indicates that Australian teachers should collaborate more with the teachers of English language programs at the Chinese universities.
- After the enrolment of all international students and commencement of classes in Year 3, a time should be set aside for tutors, lecturers, and orientation/induction co-ordinator to meet and collaborate at least once every two weeks until the mid-semester break about their observation/findings or any other matter related to the international students. Test results will be available after the mid-semester break; students at risk of failure in each unit can be identified. Tutors, lecturers and the International Transitions Officer should be informed and meet to develop further support strategies for these students.
- The experience at UTAS in 2016 and 2017 is that the support framework should be continued and extended to provide better support for the newly arrived international students.

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