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Towards a sustainable support strategy for online students

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Helping first year students develop the sociological competencies required of 21st century engineers, such as professional reflection, effective teamwork and cross-cultural sensitivity, remains a challenge, particularly for external students. This paper reports on the experience of conducting an online engineering practice course, which focusses on these competencies, for external students and on the strategies adopted to support and encourage student participation. Some of the strategies and practices which were implemented were successful in the short term, but many will not be sustainable. However, it is hoped that the lessons learnt from this development will improve future offerings of the course and generally enhance the way we support online students.

Keywords: supporting online learning, Group work

Introduction

In 2012, The University of South Australia offered full time external students the opportunity to complete a professional practice course *Sustainable Engineering Practice*. This course introduces students to the engineering profession and how it is practised within a 'sustainable' context. They learn about their possible future roles, the current engineering work environment, professional attributes of engineers, engineering ethics and sustainability. The embedding of these concepts into the course learning outcomes at an early stage is important, because it introduces students to the notions and processes required to manage their future careers. The course also aims to develop core professional skills and personal attributes, such as sourcing and using information, critical analysis and reflective practice, effective teamwork, cross-cultural sensitivity, engineering report writing, and effective presentations. The teaching and learning strategies are centred on team and collaborative project work, consultation with cultural and professional advisers and problem based learning, as students work on real engineering problems in Australian and international contexts.

Helping first year engineering students develop such skills presents difficulties and challenges, since cohorts are diverse and many students enter their degree program with a narrow view of engineering and poor communication skills (Kelly, Smith & Ford, 2012). However, the challenges become even more pronounced when presenting courses which develop these skills in off-campus students and, due to the practical difficulties involved, this is an area which is largely neglected in online engineering courses and subjects (McIntosh & Weaver, 2008). Online learners may also feel a sense of isolation that can lead to lack of engagement and an unsuccessful learning environment for them, but this can be minimised if a sense of community exists in the online course and productive social interaction can occur (McInnerney & Roberts 2004). A feeling of belonging, enjoyment and interest in the tasks will all help with engagement in online courses (Libbey 2004, Furlong 2003 & Kahu 2011)

Assessment strategies

Student achievement of the *Sustainable Engineering Practice (SEP)* course learning outcomes is measured by three assessment tasks, as shown in Table 1. The first task involves the submission of an individual report and forum discussion contributions which focus on the role of the engineer within local communities and the importance of communication and cross-cultural sensitivity within engineering projects. Students must define their ideas of culture and communication, present their own perspectives, and reflect on the perspectives of others.

The second task requires students to work progressively on a learning journal, and to begin their own professional development plan for the skills, attributes and knowledge they will need to develop before entering the profession.

The final assessment task is an authentic project based learning task in which students work in teams to develop a sustainable engineering solution to an Engineers Without Borders problem (EWB, 2012). The design projects are based in locations and subject areas which are unfamiliar to the students, and for which the design solutions require considerable research, creativity, teamwork and communication.

Each assessment as described above is thoroughly scaffolded, with detailed instructions and support resources. Within this type of supportive environment, the progressive development of student skills has been mostly successful for on-campus students; however, as can be seen from the discussion below, replicating this success within a purely online environment has been difficult.

Table 1: 2012 Assessment breakdown for [Course Name]

Assessment Task	Description
Individual Report 15%	1000-1500 word report on the role of the engineer and importance of cross-cultural awareness and communication in team work.
Development Portfolio 35%	• Engage with the lecture videos and set readings to complete a series of quizzes; • To work progressively on a learning journal submitting at least 5 entries; • To reflect on their own professional development by producing a resume and preparing a development plan for the skills, attributes and knowledge they will need to develop before entering the profession.
Engineers Without Borders Group Project 50%	Work in groups of 4 to 6 to complete a project report and presentation.

Student Engagement

At commencement of teaching, 39 students were enrolled in the course. By Week 6, 29 students were still enrolled. By the final week (week 13), this had dropped to 24 students. Unfortunately, only 6 out of the 24 students passed the course. This was despite extensive measures put into place by the teaching staff to contact, encourage, engage and support students to help create a sense of community and an opportunity for students to develop a sense of online self. Some of those measures included:

- Extensions of assignment deadlines with no penalty
- Provision of formative feedback for all assignments, to improve final submissions
- Email, personal messaging and personal telephone contact with the students
- Adjusting of submission methods and group reassignment
- Reduction of minimum group numbers, to make collaboration easier
- Staff assistance and support with group work, including management of collaboration tools
- Posting of continuous reminders and warnings about module work, assignment work and deadlines.
- Provision of live online helpdesk sessions via Adobe Connect virtual classrooms.
- Monitoring of forums and personal journals and messages of those students who have not participated, encouraging them to involve in activities.
- Monitoring of group work online tools.
- Simplification of some tasks to encourage motivation.

However, despite this support and encouragement, the majority of students did not engage with the course. The numbers of students who were motivated to study and were submitting work progressively declined over time. Through casual conversations with other external course teaching staff, teaching staff realised that a 30% success rate is common in fully external courses. While teaching staff were able to implement these support measures for the relatively low numbers in this course, this level of personal interaction would obviously be unsustainable for large classes.

Methods used to support student engagement and development of reflective practice, cross cultural sensitivity and teamwork activities are discussed in more detail below.

Reflective Practice

Students are required to submit an online learning journal containing at least five entries. Careful design and support of reflective writing is essential, so each entry is supported by scaffolded templates, including open-ended sentences for those who needed them. Students are introduced to the process of reflection and the reflective writing style via videoed lecture presentations, resources on reflection processes, and examples of good practice. Because the reflective writing style may be new for many students, early formative feedback and on-going regular feedback are crucial to increase their confidence in this writing style. Consequently, the marking is labour intensive, requiring confident, competent, empathetic markers with high level personal and professional skills (Kelly, Smith & Ford, 2012).

In the online course, teaching staff provided formative feedback for early journal submissions, and summative feedback for later submissions. Because the journal entries reflect on the students' progress and engagement with the course, they gave very early valuable feedback on the course, which teaching staff would not otherwise have received. From this feedback, the staff made early adjustments, such as modifying the online learning environment to make it easier for students to find information.

Despite intensive support and feedback from teaching staff, the online students found the progressive nature of the journal to be demanding, and many had ceased to participate in the course by the time the professional development submissions were due. The journals were an excellent way of keeping connected with the students, but they did not always provide evidence of lacking motivation or struggles with the course. The number of journal entries submitted dropped from 19 out of 24 for the first entry, down to 12 for the second, 7 for the third, 6 for the fourth and 5 for the final reflection.

Cross-Cultural Sensitivity

Engineers are required to work in multidisciplinary and multicultural teams and for a wide range of diverse clients. Consequently, a good understanding of diversity and cross-cultural awareness is important. The course integrates diversity and culture through activities which focus on the meaning and definition of culture, and the key considerations for engineers working with culturally diverse groups. Indigenous advisors and the students share perspectives on culture, and students use the learning from these sharing activities to inform their individual report assignment.

This assessment has been reasonably successful in the online course for several reasons. Course staff, advisers and developers were able to develop learning activities such as guided and moderated online discussion boards, which promoted frank and thoughtful discussion of sensitive issues such as cultural awareness. Secondly, the assessment tasks were produced as individual work, with resources provided by staff, which gave online students more flexibility and support in their research and writing. However, the intense nature of the student/teacher interaction would be difficult to sustain if this part of the program were not already supported by the Indigenous Content and Service Learning Advisors.

Supporting Teamwork

Embedding teamwork skills in an online environment is very difficult when students are scattered around the country and possibly worldwide. Six groups were allocated by staff, based on geographic location (in the hope that geographical proximity would enable group face to face meetings). To support the early stages of teamwork the following strategies were used:

- Students introduced themselves via an introductory forum where 18 out of 24 students responded
- Students then contributed to an 'ice breaker' wiki, for which 6 out of 24 students responded
- Early virtual helpdesk sessions were scheduled where students could meet teaching staff and other students, (only 4 students participated in the first three weeks of these sessions).
- Students completed a Belbin inventory, which is a personality trait test assessing team functionality. This proved popular and encouraged self-awareness, with many students discussing their results in their learning journal. Where 16 out of 24 students participated.

Out of the six groups that were established only one completed the project as a group. The other groups collapsed due to lack of participation amongst members. Consequently, several students worked on the project by themselves and only two of these completed enough work to pass the course.

Teaching staff have examined the factors which promoted the functioning of the one successful group, with the aim of replicating these factors for future groups. Several critical factors were identified. For example, this group made regular use of real time online collaboration tools (particularly the virtual classroom) to meet and

discuss the project, and to prepare the report and presentation. The group also made regular use of asynchronous collaboration tools (such as group forums) to discuss project progress and allocation of tasks. However, use of the tools alone does not explain the variation in effectiveness. After all, these tools were available to all groups, were marketed to all groups, and training was offered to all groups, but they were only used effectively by one group. The most significant success factor appeared to be that this group had an obvious leader, who motivated the members to keep on track with the project.

Steps to improve student engagement

The teaching and development staff have identified several ways in which they hope to improve the retention and engagement rates in this course. The first is by redeveloping some of the assessment and learning activities, while maintaining the integrity of the course learning outcomes. The content of the group project (although not the tasks) will be simplified, so that students can focus more on developing their teamwork, their report writing, sourcing information, reflective practice and referencing skills, rather than devoting all their efforts on providing engineering solutions. Future group report submissions will be produced using wiki and ePortfolio tools, to enable easier collaboration. Teaching and program staff are also considering an assessment model in which students have the choice of submitting work progressively through the study period, thus getting early feedback on their progress, or electing to submit all assessment items at the end of the study period, which gives them more flexibility in their study pattern. Other, more individually focused courses will be recommended as pre-requisites for this course, allowing students to become familiar with the online environment and tools before having to use these online tools for teamwork and group collaboration. Students will also be allocated to groups later in the course, once enrolments have settled and student participation is confirmed.

The second issue, which we need to approach, is that of sustainable teaching staff interaction and support. We have discussed the various extra-ordinary measures which were taken during this course to initiate contact with students, manage their study, guide their time management, support their group work, etc. These measures were possible given the small numbers of participating students, but would be difficult to sustain with large cohorts. Some possible strategies include the expansion of current tutor training to include training in producing efficient and effective formative feedback which is supportive and timely for students, and quick and easy for staff (greater use can also be made of electronic feedback tools). The online environment will be restructured to highlight collaborative tools such as forums and virtual classrooms, in the hope that this will better market them to students. Support websites will also be emphasised, to give students additional practice and training in using these collaborative tools.

Conclusion

Student retention and engagement has proven to be difficult in an online engineering course which focusses on development of professional skills and teamwork, despite an intense level of teacher support and management. However, these are essential skills for future engineers. A number of strategies have been implemented to encourage student participation and enable the development of these skills in an online environment. It is hoped that future iterations of this course will be able to intensify and sustain these strategies and offer adequate support to online students. This will be especially necessary as class sizes increase.

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