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1st, 2nd and 3rd Generation Implementations of an eLearning Deign: Re-use from Postgraduate Law to Block/online Engineering Course

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Journal of Learning Design
DESIGNING FOR EFFECTIVE LEARNING

1ST, 2nd and 3rd Generation Implementations of an eLearning Design: Re-use from Postgraduate Law to Block/online Engineering Course

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Abstract

In order to meet the demands of postgraduate students who were time poor and unable to regularly attend face-to-face classes, one lecturer in the Faculty Law at the University of Wollongong (UOW) sought the assistance of a Learning Designer to redesign the Postgraduate Practical Legal Training (PLT) program into a flexible blended learning format, using a block/online approach. The program used an authentic workplace-simulated model that took advantage of emerging technologies to enable effective online teaching and learning. This learning design was reused to redesign two subjects within the Postgraduate Engineering Management course. To monitor the effectiveness of this approach and to ensure quality in teaching and learning the Engineering program was evaluated, with positive results.

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Introduction

In recent years there has been a rise in interest in re-useable learning designs as a way to more efficiently use educational resources. This paper outlines a successful re-use of a block/online learning design to facilitate post-graduate learning at the University of Wollongong across the Law and Engineering disciplines.

University context

The University of Wollongong, which is situated on the New South Wales south coast, 80 km south of Sydney, Australia, boasts several regional and international campuses including Dubai. There are 21,000 students of whom just under one third are studying at postgraduate level. These students along with an increasing number of their undergraduate counterparts are juggling work and study and are seeking enrolment in courses which reduce or remove the requirements of

weekly face-to-face contact. These issues, coupled with a competitive market for full-fee paying postgraduate students and a push to use technology to enhance learning, while simultaneously reducing face-to-face contact hours has led the University to examine best practice for providing flexibly delivered or blended learning courses.

It was in this context that selected postgraduate subjects within the Law and Engineering disciplines at the University of Wollongong were reviewed to incorporate a blended eLearning approach to learning. The first iteration, a Practical Legal Training (PLT) program for solicitors using authentic workplace-simulated learning tasks, became the model for subjects in other subject disciplines.

In order to provide optimal learning opportunities and to ensure best practice in teaching as evidenced by the literature, staff from CEDIR, a centrally located staff support unit of the University of Wollongong, worked with academics from two faculties (Law and Engineering) to redesign their subjects, leading to the development of a reusable learning design transferable between disciplines. The first model, which takes advantage of eTeaching technologies, uses a sequence of learning activities with authentic learning elements. The second iteration used the same model for two subjects in a postgraduate engineering management course.

This study adds to the body of research by demonstrating how learning design can be successfully re-used across different disciplines. It indicates the kind of time and support needed to work with curriculum development teams to customise and implement a particular learning design.

Literature review

A shift from distance to online teaching

Early pioneers of distance learning recognised a need for learning opportunities to be available to all (Chassie, 2002; Harting & Erthal, 2005). The development of the Internet has revolutionised the way that distance education is conducted, as new technologies emerge, they are transforming the way that higher education is delivered (Littlejohn, 2003). The fifth generation of distance education which was prophesied by Taylor has now arrived, expanding on the capabilities of the fourth generation and maximising the use of the internet and the world Wide Web (Taylor, 2001).

While the move to a flexible approach to higher education may appear to be driven by economic and technological issues, student requirements are also a major consideration. Stuparich (2002) notes that many students study through a distance education mode, even though they live near a university. Cumpston, Blakers, Evans, Maclachlan and Karmel (2001, as cited in Stuparich, 2002) found that there has been a significant increase in the number of students living in urban centres who choose distance education, because of the convenience of not having to regularly attend a university campus. Many potential postgraduate students are unable to participate in the rigid traditional modes of study, as they do not fit into their “career paths or lifestyles” (Whittington, Cook, Barratt, & Jenkins, 2004p.1800). This observation is supported by McInness (2001) who, in his study of undergraduate students, identified that classroom numbers are declining, while requests for special arrangements to balance study with employment demands are increasing.

Educational programs allowing students to remain in full time employment can help address the need for postgraduate students to juggle study, work and family commitments. The development of the Internet has transformed distance education from the traditional didactic approach, linking students and academic staff in diverse geographic locations to create a learning community (Stacey & Visser, 2005; Whittington, Cook, Barratt, & Jenkins, 2004). The term blended learning is commonly used to describe the combination of face-to-face learning with a technology based component (Stubbs, Martin, & Endlar, 2006) and in some cases a blended mode of delivery was the main reason for students choice of their course (Whittington, Cook, Barratt, & Jenkins, 2004).

Beyond the issues of ease of access, blended learning has also shown it can produce the same or better learning outcomes for students. Data from the University of Central Florida indicates that students who participated in blended courses achieved higher grades than their counterparts who participated either solely on-line or face-to-face (Garnham & Kaleta 2002 cited in Dunkle & Leite, 2004), and there is evidence to suggest that students who are instructed under a blended model are more independent and mature in their interactions with other students (Spilka 2002 cited in Dunkle & Leite, 2004). Over time, the line between face-to-face classroom sessions and the distance education experience is becoming less distinct, with hybrid/blended learning offering the advantages of both modes of delivery (Soules, 1999).

The shift from face to face to a blended flexible approach is a long term commitment for the University of Wollongong, which was a joint winner of the 2000-2001 Good Universities Guide in the area "Preparing Graduates for the e-World". This commitment is reflected it is Draft Strategic Plan, which targets student learning in the e-World. Objectives 1 and 2 demonstrate the emphasis being placed on blended learning activities and learning design:

> Objective 1: By 2010, the University will expand the **blending** of face-to-face and online teaching from 40% of subjects to 80% of subjects so that teachers and students are operating **flexibly** in **Extended Classrooms**
>
> Objective 2: The University will increase the number of learning experiences that are **active and collaborative** in part by appropriate use of technology and by attention to **learning design** (University of Wollongong, 2007 pp 3-4).

Eynon identified that the level of use of technology depends not only on the subject, but also the motivation and ability of the academic to incorporate it into their teaching practice (Eynon, 2006). Palmer concurs, finding that the "single most important IT issue confronting higher education institutions is assisting staff to integrate technology into teaching" (Palmer, 2002 p.5) and that it is unrealistic to expect academic staff with variations in skills and expertise and often having limited knowledge of instructional design to produce quality Internet courseware without appropriate staff support opportunities (Palmer, 2002).

Professional requirements

Employers' requirements for graduates to be cognisant with communications, technology and group work skills are also providing impetus for the move to eLearning, forcing many academic disciplines to rethink their traditional face-to-face methods of teaching. The use of computers has been identified as a central skill for engineers (Palmer, 2002); while Paliwala (1999, cited in Gramling, Galligan, & Derco, 2000) identifies that traditional learning tools cannot sustain the development of a global legal practice. In order to remain viable, law schools must listen to employer and student demands and adopt the more flexible approaches facilitated by web-based delivery (Gramling, Galligan, & Derco, 2000). A number of universities have developed their own standards to address the growing need for computer literacy skills in the workplace which can be facilitated by computer-based eLearning experiences.

Reusable learning designs

Dalziel (2005) muses that historically e-learning has predominantly focused on content development and delivery, providing links to content while ignoring the potential for e-learning to "use and re-use collaborative activities". The rise of eLearning has been paralleled by an increasing interest in the use of reusable learning designs, as within the tight economic framework of universities, it is important to "collectively share strategies and tools" (Lambert & Brown, 2007 p.239). A number of initiatives have been developed to explore ways of developing, sharing and reusing digital learning resources (Littlejohn, 2003) including an Australian federally funded initiative which aimed to produce high quality reusable learning design resources (Wills,

Agostinho, Harper, Oliver, & Hedberg, 2002). An outcome from the project was a website of exemplars to provide a set of resources to support the development of flexibly delivered high quality learning experiences for students (AUTC, 2003). Problem based learning has been recognised as one learning design that can be reused with positive results. Research indicates that knowledge taught in schools and universities which uses a didactic approach does not transfer to real life situations because learning and context are separated (Herrington & Oliver, 2000), and that instructional design models which are situational problem solving environments are critical for the learning and application of skills (Herrington & Oliver, 2000; Mariappan, Shih, & Schrader, 2004). Hmelo-silver (2004) supports this theory, positing that a problem based learning approach helps students become active learners by situating learning in real world situations and encouraging students to be responsible for their own learning. While in theory this is a solid argument, in practice it is much more difficult to develop and sustain the type of interaction required to successfully present these types of learning approaches.

The actual cost of delivery of online subjects can be difficult to calculate. Littlejohn (2003) reflects that the convenience offered by the flexibility of eLearning is offset by considerable staff and university investment required to create the resources necessary for online course delivery. Palmer (2002) reflects that personnel costs can outweigh that of technology, while Johnstone & Poulin (2002 cited in Palmer, 2002) contend that the cost of a subject can increase if technology is simply tacked on. The University of Southern Queensland found that highly interactive online education was resource intense, pondering the question of whether, with tighter management controls, the model that they used would be economically sustainable (Postle, Sturman, Mangubhai, & Cronk, 2003). The current premise of learning design theory is that it can describe both individual and collaborative learning tasks, and that it allows for sequences of events (both individual and collaborative) to be "described, captured, stored, discovered, shared, re-used, and adapted (Dalziel, 2005).

It was within this context that Learning Designers at the University of Wollongong introduced a learning design model for blended learning to work with an academic from the Faculty of Law, then modified the design for use in a subject within the Faculty of Engineering and then the Faculty of Health and Behavioural Sciences.

1st generation learning design: block/online for training solicitors

The Practical Legal Training (PLT) program was a small class with less than 30 students, its growth limited by students' ability to be able to be available in Wollongong for six intensive weekend sessions. In 2004 the program was redesigned to address the needs of the students, the majority of whom were professionals working full time in either Wollongong or Sydney.

The project undertaken by the Faculty of Law staff in collaboration with a Learning Designer (primary author) at a central staff support unit of the University of Wollongong was centrally funded via a Faculty Service Agreement. It aimed to develop a consistent online approach for the program to allow for quality learning outcomes with two weekends of face-to-face seminars and supported by rich online learning activities and feedback. Within the revised structure individual tasks such as reading and responding were incorporated into the online environment. The online student activities and assessments sought to develop students' skills in drafting legal documents, negotiation, and clarifying legal concepts, freeing up the two weekend seminars to focus on the compulsory "present" or "appear" tasks simulating a mock court, where students were assessed by a either a panel of practitioners or a magistrate. The authentic workplace simulated learning activities with peers and teachers were essential in order to meet the professional requirements for the course and were highly valued by the students. The revised program, implemented in 2005 proved successful in meeting the needs of working students by reducing face-to-face contact hours without compromising learning outcomes and professional competencies.

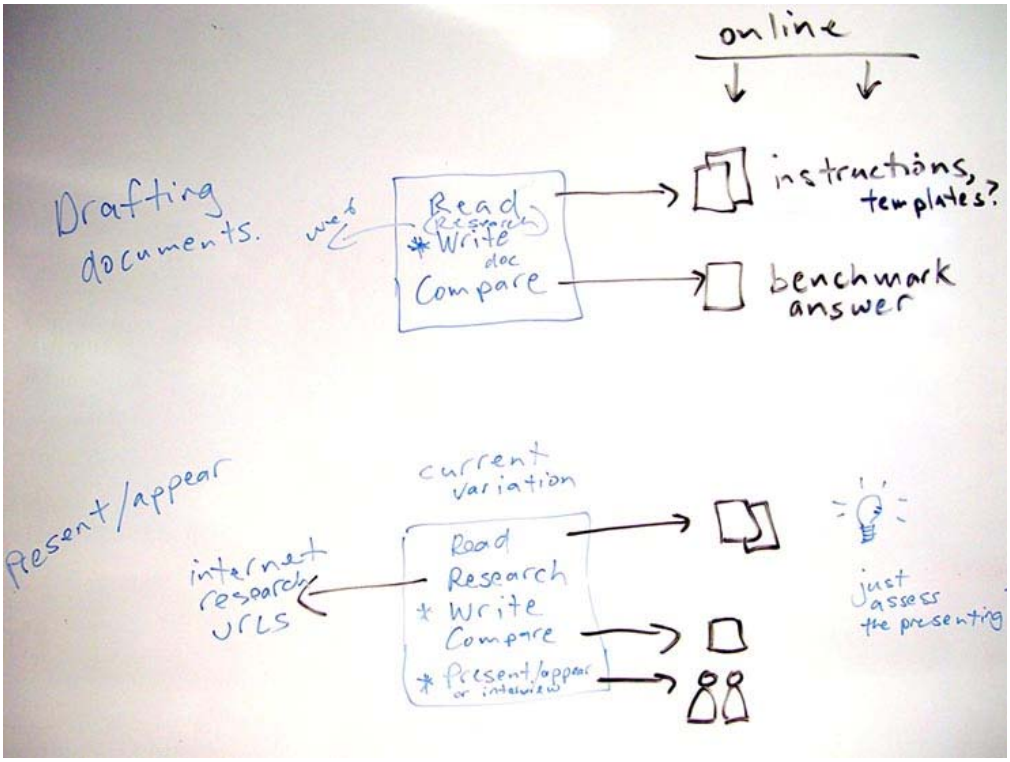

Figure 1: The existing student activities and assessments in the PLT course fell into 4 broad types: Drafting documents, Present or Appear, Negotiate, Clarify concepts. The first 2 are shown in this image taken from the whiteboard at one of the planning meetings.

2nd generation learning design: block/online for engineering managers: ENGG957 Project Implementation and Outsourcing

In 2005 the primary author worked with an Academic staff member from the Faculty of Engineering to redesign two post-graduate engineering subjects into a block/online model of teaching. The considerations of the project were identical to that of the PLT program in that the class size was small (less than thirty students), students were mostly working full time, and had limited availability to attend classes. Based on the successful reception of the PLT program, the author showcased that program to the Engineering Academic, who was extremely interested in the authentic workplace simulated learning activities. While one of the engineering subjects retained a traditional distance education learning design (students used their workplace as a case study for application and theory, read set texts and demonstrated understanding and application by submitting essays), the second subject (ENGG957) was redesigned to introduce authentic and collaborative learning challenges whilst implementing a block/online mode of delivery.

Student tasks and team formation

Students worked in teams of two to complete the assessment tasks for the subject. To facilitate effective team formation students were matched according to their demographics, based on a questionnaire administered at the commencement of the subject. The aim of the team formation was to match students with business or research skills with students who had engineering skills. During the first face-to-face class students completed a brief questionnaire designed to elicit information on the strengths of each student. Teams were formed based on engineering and management skills and expertise, physical location and meeting availability. See Figure 2 for a sample of the team formation questionnaire from one of the students. This particular sample shows a preference for lunchtime face-to-face meeting availability, and an online availability on a

Thursday (when the student did not go to work.) Other students with preferences for after work meetings were matched up with others who worked in their area. We wanted to make it easy for students to meet in person to complete the project, as well as online and via email. This aspect was a new feature of the learning design, and was necessary as the tasks moved from individual to a collaborative project.

Meeting availability (in person)

Home suburb/postcode: Allawah 2218 Work suburb/postcode: _____

In the following table indicate the convenience of meeting at that time using the following key:

✓✓ = convenient to meet ✓ = may be possible to meet ✖ = impossible to meet

	Monday	Tuesday	Wed'sday	Thursday	Friday	Saturday	Sunday
Before work	✓	✓	✓✓	✗	✗	✓ am / pm	✓ am / pm
Lunchtime	✓✓	✓✓	✓✓	✗	✓✓	✓ am / pm	✓ am / pm
After work	✓	✓	✓	✗	✗	✗ am / pm	✗ am / pm

Online availability (online meetings, check progress and queries via website, email)

In the following table indicate the convenience of working at that time using the following key:

✓✓ = convenient to work ✓ = may be possible to work ✖ = impossible to work

	Monday	Tuesday	Wed'sday	Thursday	Friday	Saturday	Sunday
daytime	✗	✗	✗	✓	✗	✓	✓
evenings	✓	✓	✓	✓✓	✓	✓✓	✓✓

Figure 2: Portion of the team formation survey showing student's work and study patterns

The major project required of the students for this subject (ENGG957) was designed to simulate working in an engineering management team for the purposes of understanding the needs of a realistic engineering firm. The first task had students working in pairs as either a business developer or maintenance engineer to prepare a request for tender document on behalf of a fictitious company *Golden Fields Plate Mill*. Guest lectures in the first block face-to-face session addressed concepts that underpinned the case and approach to its solution, as well as providing an orientation to group-work expectations and using the website. Materials from the block sessions were made available for review on the project website (see Figures 3 and 4). The final block session provided the opportunity to debrief the major project, clarification of queries ahead of the written exam, and a formal evaluation of the subject (results discussed later in this paper).

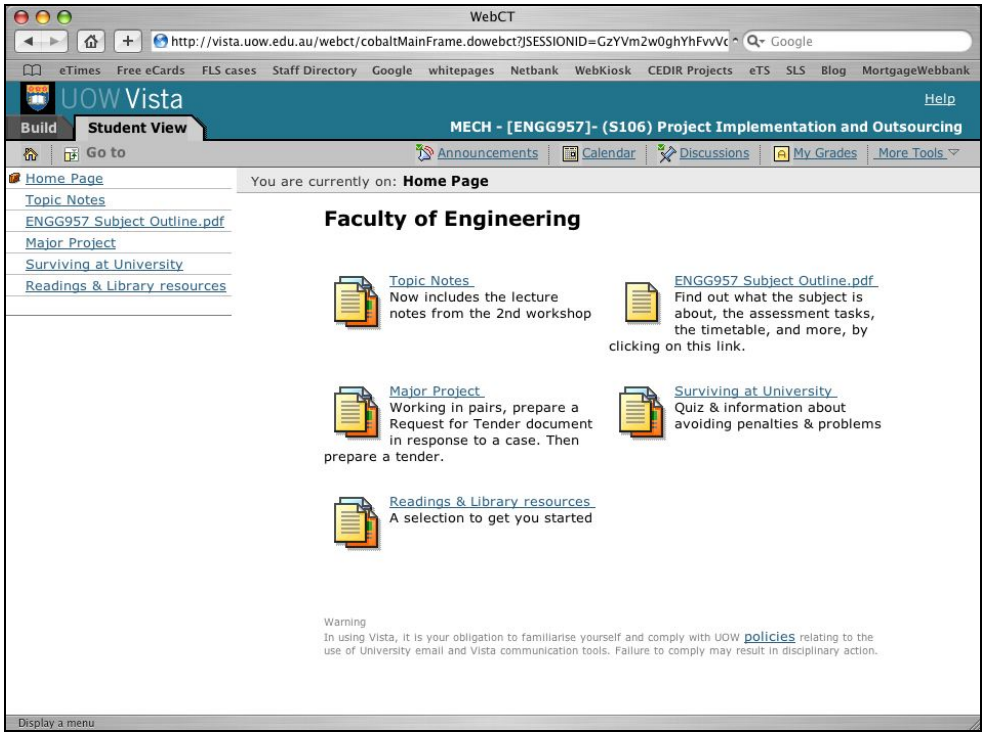

Figure 3: WebCt Vista homepage setup for the students

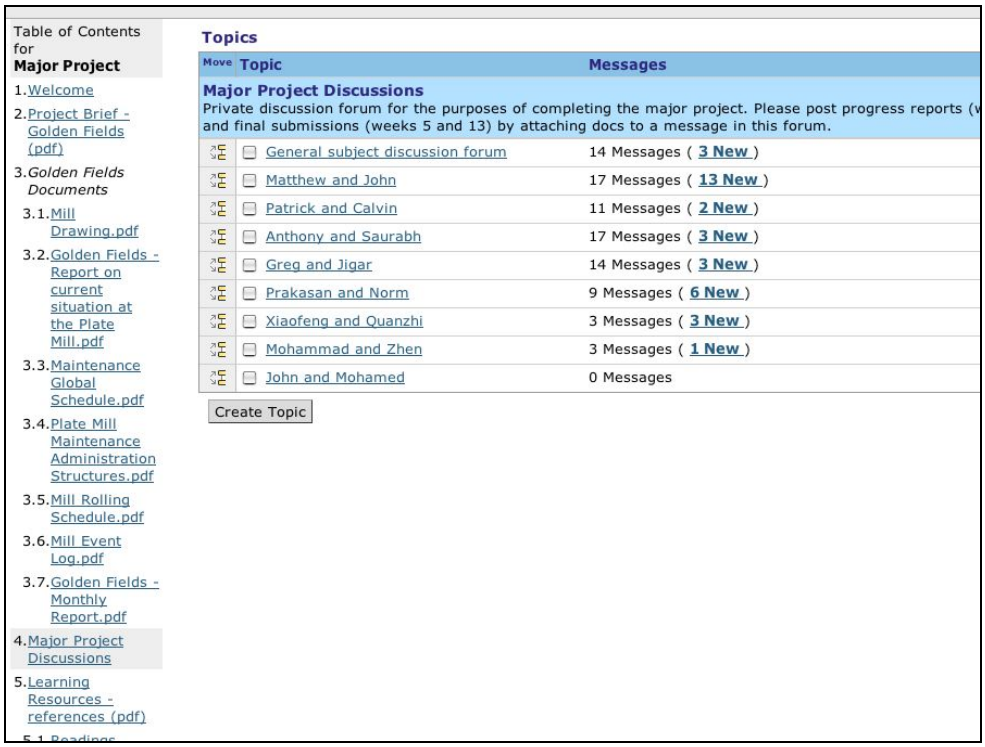

Figure 4: Private discussion forums set up for the students were embedded in a learning module which also held the Major Project resources.

The second task saw the same student groups adopt different roles to develop a response to tender submission for the *Golden Fields Plate Mill*, based on the tender request that was forwarded from another team. This allowed students to informally compare their own group's Request for Tender document with that of another group, highlighting complexity and differences of approaches. During this phase students assumed the role of the business development manager or maintenance services manager. The aim was to provide a response to a tender document from a management perspective. A website and private discussion areas established for the students (Figures 3 and 4) continued to be used during this second part of the task, with the lecturer reviewing progress in the discussion forum from time to time.

Although both of the assessment tasks had the same student supports, including face-to-face seminars and workshops, and access to a discussion tool, private email, face-to-face meetings and online databases, they had different student resources. Phase one included case scenarios and timeline documents, while the second part of the assessment utilised a request for tender document from another team, instructions, task and timelines document (see Figure 5).

Students received formative feedback via two progress reports, which were due to be submitted several weeks prior to the due date of each of the major tasks.

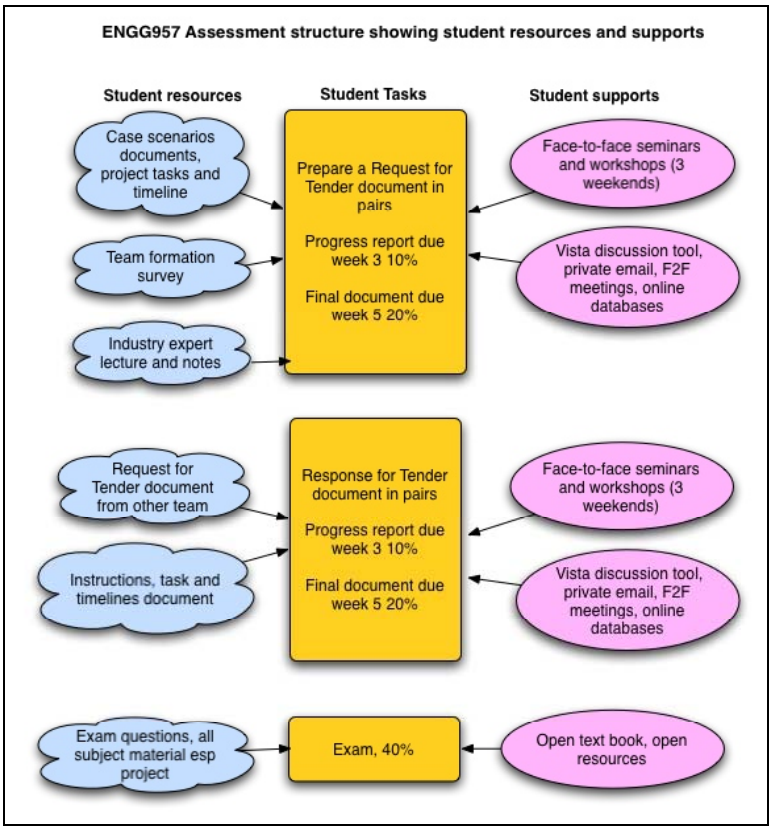

Figure 5: Diagram showing tasks, supports and resources for ENGG957

First and second generations of learning design

Both the PLT and Engineering programs used a Learning Management System (WebCT or WebCT Vista) for the distribution of learning materials and each program required the students to come on campus for a number of compulsory sessions. Although the two subjects have similarities, the Engineering program builds and expands on the PLT subject by introducing the concept of collaborative learning and group work to the Learning Design.

Evaluation of the ENGG957 program

Students returned to campus for a final block of teaching during the last week of session, providing an opportunity to distribute an evaluation instrument which targeted questions regarding the learning design. It was a non-compulsory evaluation and the lecturer left the room prior to distribution of the form to ensure student anonymity. A total of 12 students out of a possible 16 completed the questionnaire, a return rate of 75%.

Feedback was very positive regarding the teaching mode (Figure 5), with 83% (n=10) indicating that the mode of delivery was excellent, very good, or good. The same number also indicated that the face-to-face sessions were successful. Only one student found the online notes and the lecturer's feedback and support inadequate. Overall comments regarding the method of teaching indicated that students found it challenging to move away from the traditional "sage on the stage" approach to teaching although several appreciated the situational based approach: "*The self directed approach promotes an accountability and responsibility for achieving results similar to real life situations*"; "[the self directed learning approach was] *good, it forces us to research more detailed information and look to other peoples experiences, just like in the workforce*" and "*the self directed approach promotes an accountability and responsibility for achieving results similar to real life situations. A bit tough in the beginning but went on quite well later*".

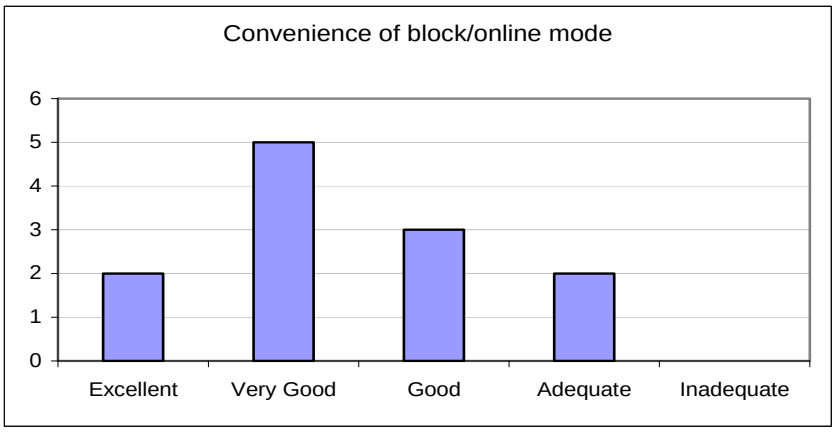

Figure 5: Convenience of block/online mode of delivery

Regarding the survey used to allocate students into equitable groups, 75% responded that the survey was excellent, very good, or good. The remaining 25% indicated that it was adequate. While one student indicated that it was challenging "*working in a team with someone you wouldn't normally pick*", another identified that one of the strengths of the course was the "*team environment, learning about issues and experiences*".

Team contact and communication between team members was pivotal for successful completion of the project. 83% of students met in person 1 to 3 times per week, indicating that the group formation survey was effective in matching according to location. 92% of respondents indicated that they used email at least weekly, and 67% used their group discussion forum in WebCT Vista at least weekly.

Students were asked to reflect on the work that they had completed. With regards to their final request for tender document 75% indicated that they felt that it ranged between excellent (n=3), very good (n=1) or good (n=5). Student perception of the quality of final tender documents was still good, although a little lower: 50% thought that their work ranged between excellent and good, the remainder indicated that their work was "adequate". This is not surprising considering the complexity of the task to prepare final tender.

In response to the question "How useful was the project in preparing you for working in professional teams?" a gratifying 92% indicated that the experience was excellent (n=2), very good (n=4) or good (n=4). The question "overall, how useful was the project in preparing you for future work challenges?" elicited positive results from 83% of respondents. The results in this area in particular indicate that the problem-based approach has been very successful in preparing this cohort for their professional pathways. Not all of the students embraced the new approach to learning. Some students found the self-directed and group learning aspects harder than anticipated. Comments in this area included "*too many materials and difficult to find direction of the projects*"; and "*good but class study is more approachable for this subject*".

Students recognised the value of the authentic learning environment. In response to the question "what were the best things about this subject" students responded that they "*valued experience exchange from various cultures, industry and various working levels*". The authenticity of the learning environment was heavily commented on: "*a realistic circumstance in which to develop their skills*"; "*implementation and outsourcing taught me a lot about real life situations of outsourcing*"; "*it looks like a real project*" and "*freedom to develop a maintenance system, with justification, and to receive good feedback on our ideas*". Other students liked "*the workshops*"; "*mixture of face to face and project work*"; "*team environment, learning about issues and experiences*" and "*learning new maintenance and industrial strategies*".

3rd generation learning design: redesigning for undergraduate engineers

In 2006, the academic involved in the postgraduate engineering project nominated to implement a similar learning design to a 3rd year (undergraduate) Mechanical Engineering subject. The Academic independently developed a new authentic learning task, utilising collaborative learning with role and task allocation and a team formation survey modified from the postgraduate subject. By this stage, the academic had worked with a Learning Designer for over twelve months and had taught with the new blended learning design, so was able to implement the design into another subject without the support of Learning Design staff. In addition, during 2006 and 2007, several postgraduate midwifery subjects and four postgraduate rolling stock engineering subjects have been redesigned by the second author using the successful learning design model outlined in this paper.

Future developments

As experience and technology options progress, there is room for iterative development of the resources and supports of such a Learning Design. For example, resources on the WebCT Vista site could have been improved by the inclusion of additional resources, including captured lectures from guest speakers and lectures, using technology such as eduStream or vodcasting. The authors also feel that group work approach used in ENGG957 should continue to be refined and supported by modelling chat and whiteboard facilities.

The University of Wollongong is identifying increasing opportunities for subjects and/or courses to be developed into blended or fully online modes of teaching and learning. To ensure that sound pedagogical principles are applied, the authors intend to showcase the Learning Design model outlined in this paper to identify staff who may benefit from being supported in using this model. The literature review outlined the need for additional staff training, a sentiment with which the authors concur. A major issue to come out of the redesign into an online environment is the need for the academic staff members to understand their role as online moderators, and to ensure that

they have the skills to maintain a 'presence' on the site in order to maintain the motivation of the students. This should be addressed by staff training, preferably using the same blended/online approach used in the subjects, adding extra depth as the teachers would be acting as students. In 2007 the University of Wollongong introduced online role play and moderated discussions to its compulsory academic staff development University Learning & Teaching (ULT) course as a means of modelling this approach in online teaching and learning.

It is interesting to note how much time is realistically required to work with busy academics to redesign assessment tasks for blended learning. In the course of redesigning the ENGG957 subject the project team met approximately 8 times over a 6 month period, with numerous emails and reviewing of the website in between. During this time the Learning designers were modelling how to think about curriculum redesign for blended learning, using examples of good practice and specific learning design diagramming tools to map new tasks and identify resource and support gaps which needed to be filled. In the following six months, the course was taught and monitored with some additional meetings and frequent email contact. Whilst the academic involved independently redesigned a further subject, we feel that we cannot expect that academics will have the time, skills or inclination to step outside their own discipline knowledge and skills to adopt the role of a learning designer to effectively redesign their subject/course for blended learning with no additional support. Additional research is required to identify how much time and staff development is required to increase the skill level to such that they can independently achieve this, and a comparison done to weigh up that commitment with the effectiveness of centrally resourced learning design specialists.

Conclusion

From the literature review and the evidence presented in this paper it may be seen that there is a need to develop different approaches to eLearning than those used in traditional teaching and learning environments. Economic and time constraints coupled with the need to work smarter have led experts in the field to consider how resources and ideas may be shared and re-used. At the University of Wollongong, we have modelled how one Learning Design can be re-used for both postgraduate and undergraduate subjects in a number of academic disciplines. As evidenced by our research, learning designs can be re-used by Learning Designers and other educational specialists, and eventually academic staff members.

While the authors acknowledge that the learning design model discussed in this paper is only one approach to online learning, the evidence gained from the three generations is proof that learning designs can be reused across academic disciplines and levels of study. From an economic standpoint, this substantiation is a bonus for universities and their academic staff members, who although faced with burgeoning student numbers and restricted budgets, can introduce an innovative pedagogically sound approach to teaching and learning.

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