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**Abstract**  This case study presents a description of Web-based tertiary unit of study developed in collaboration with employer, industry and university stakeholders with a view to fostering skills in interactive multimedia and project management. The course utilised a range of learning approaches, including peer teaching and integrated assessment in which participants provided feedback to colleagues. The paper also discusses how electronic communications and Apple-based technologies can be used effectively to create environments for professional learning. The intention is to describe the design of the learning environment, the curriculum approach adopted, the types of learning activities and assessment tasks that were designed to foster work-related skills.

## Introduction

In response to employer expectations and economic demands, many universities in Australia are now deliberately focussing of the development of generic skills, core competencies and graduate attributes. This can be explained by the demand for knowledge in the information age, which is prerequisite for economic growth and development. The key skills included in the mission statements of most universities tend to include higher level aims relating to critical thinking, inquiry and a capacity for lifelong learning. These skills are often referred to as 'sticky', meaning that institutions will attempt to provide learners integrated, lifelong learning skills and services that enable continuous learning. These generic skills described from the basis of continual updating of skills and include the following:

- skills students need to become successful and self-sufficient learners. For example, information literacy and skills in self-regulation (eg. Candy & Crebert, 1991);

- intellectual and imaginative powers, understanding and judgement, problem solving skills, critical thinking skills and an ability to see relationships (eg. Ramsden, 1992);

- personal and interpersonal skills needed for communication, cooperative and collaborative teamwork, and leadership (eg. Assiter, 1995);

- skills required for successful work practices including time management, task management leadership and self-evaluation (eg. Collis, 1998; Nicholls, 2000).

Bennet, Dunne & Carre (1999) offer a concise model to conceptualise key skills in the higher education sector by suggesting a framework comprising four broad managerial skills. (See Table 1.) The authors argue that the important key skills are fundamentally those associated with being able to manage self, others, information and tasks. They propose that such a model can be applied "to any discipline, to any course and to the workplace and indeed to any other context" (p. 77). Table 1 displays this framework and shows the various elements within.

| *Management of Self* | *Management of Information* |
|---|---|
| Manage time effectively | Use appropriate sources of information |
| Set objectives, priorities and standards | Use appropriate technologies |
| Take responsibility for own learning | Use appropriate media |
| Listen actively with purpose | Handle large amounts of information |
| Use a range of academic skills | Use appropriate language and form |
| Develop and adapt learning strategies | Interpret a variety of information forms |
| Show intellectual flexibility | Present information competently |
| Plan/work towards long-term goals | Respond to different purposes/contexts |
| Purposefully reflect on own learning | Use information critically |
| Clarify with criticism constructively | Use information critically |
| Cope with stress | |
| *Management of Others* | *Management of Task* |
| Carry out agreed tasks | Identify key features |
| Respect the views and values of others | Conceptualise ideas |
| Work in a cooperative context | Set and maintain priorities |
| Adapt to the needs of the group | Identify strategic options |
| Defend/justify views and actions | Plan/implement a course of action |
| Take initiative and lead others | Organise sub-tasks |
| Delegate and stand back | Use and develop appropriate strategies |
| Negotiate | Assess outcomes |
| Offer constructive criticism | |
| Take the role of chairperson | |
| Learn in a collaborative context | |
| Assist/support others in learning | |

*Table 1: Project management competencies*

Underlying the current debate about generic competencies and preparation of graduates for the workplace, there is a common concern with the development of cognitive competencies such as problem solving, critical thinking, information literacy and management of information. Given these demands, it is incumbent upon tertiary educators to develop powerful environments, which encompass generic skills and lifelong competencies. But, ask Candy & Crebert (1991), "Can the learning that takes place in the cloistered atmosphere of a tertiary institution be realistically transferred into other, more rough and tumble learning contexts"? In this case study we present an example of an environment that fosters transferable skills and competencies (as depicted in Table 1) through the integration of several services that offer students a 'value chain' or enhanced experience

- Technology applications for e-learning, whereby independent learning is fostered;

- partnerships with industry that help create purpose and meaning in learning activities leading to professional skills development;

- peer partnerships, in which learners participate in an online environment where collaboration is encouraged and motivation is enhanced.

## Using technology to facilitate e-learning

Today, computer software programs are examples of exceptionally powerful cognitive tools (Jonassen, 1996a; Lajoie & Derry, 1993). Also referred to as "cognitive technologies" (Pea, 1985), "partners in cognition" (Salomon, Perkins, & Globerson, 1991), and "mindtools" (Jonassen & peck, 1999), they are not simply delivery vehicles for prepackaged knowledge. As computers have become more and more common in education, researchers have begun to explore the impact of software as cognitive tools, and of designs and environments that engage learners (Reeves, 1994). Computers as intellectual partners represent quite a different approach from technology as vehicles for educational communications. In the case of a partnership between learners and technology, the cognitive responsibility for performing is distributed to the part of the partnership that performs it best. Web-based environments may be intentionally adapted and developed to function as intellectual partners to enable and facilitate critical thinking and higher order learning (McLoughlin & Luca, 2000; Oliver & McLoughlin, 2001).

How do Web tools enhance the quality of the learning experience? Technology is more than hardware, and become a tool to support knowledge construction. Several qualities of the Web are having an impact on e-learning:

- technologies become intellectual partners in the learning process when they share the cognitive responsibility for learning. For example, the technology can store and retrieve information and enable easy access to data

- technologies are partners when they neither prescribe nor control learning. In the case study presented here, the conferencing environment of the Listserv, scaffolds learning by supporting communication

- technology acts as learning partner by supporting learning by reflection by enabling learners to represent what they have learned and how they came to know it.

In the case study described in this paper, Apple-based technologies enable a definable set of activities that engage learners in active, constructive, intentional, authentic and cooperative learning. In this environment, instead of using narrowly defined learning outcomes tested by examinations, technology offers a total environment where real life skills, such as project management and verbal communication, collaboration and team work can be assessed by the team and tutor by giving learners multiple channels of expression, such as visualisation, multimedia presentations, audio and video. Thus, the technology was able to provide the 5E's of quality learning (Oblinger, 2001).

**Exploration:** The Web offers e-learners a range of tools to access and explore data, information and resources

**Ease of use:** The World Wide Web is easy to use and the navigation capabilities enable learners to access and

**Engagement**: The World Wide Web enables teachers to create engaging and motivating environments for learning by applying constructivist approaches.

**Empowerment**: The Web gives learners greater control over the learning experience and provides choice and self-paced learning.

**Experience**: Assuming that instructors give adequate attention to instructional design, the Web offers learners a total learning experience that encompasses communication,

collaboration, synchronous and asynchronous learning opportunities, information access, self-pacing and personalisation of content.

## Peer learning at university

Traditional university education has operated within a "transmissive paradigm", emphasising the transfer of knowledge from lecturer to student. Such a view of learning is not conducive to meaningful, active learning where students take a pro-active role in questioning, sharing ideas and applying prior knowledge to new ideas. However, the increased emphasis on generic transferable skills has required a re-alignment of teaching practices with desired learning outcomes (Biggs, 1999). This means that if independent lifelong learning and critical skills are expected of graduates, teaching methods must foster such processes and skills. Figure 1 summarises the potential of peer learning to support transferable skills.

In contemporary education one influential group of researchers has identified students' approaches to be either surface level or deep level (Biggs, 1994; Ramsden, 1992). A deep learning approach is consistent with a search for knowledge and understanding, whereas a surface learner is concerned only with passing exams by memorising facts. Applied to assessment and teaching approaches in higher education, the implication is that the creation of an appropriate learning environment can foster a deep approach. This can be achieved by enabling learners to take an active role in learning by initiating, managing, monitoring, reflecting and evaluating learning tasks and processes. Gibbs (1992) emphasises that a focus on process, rather than content, is essential in promoting active learning and that evaluation and assessment procedures are central to these issues as students interpret the objectives of a course of study according to the demands of the assessment system. For example, an exam requiring recall of facts will encourage learners to adopt a surface approach, whereas assessment of collaborative problem-solving or teamwork on a project will emphasise communication skills, planning and decision making and foster a deep approach.

The relevance of the process-based approach is that the adoption of learner-centred pedagogies increases learner interdependence and equips learners with professional skills and attributes as shown in Figure 1.
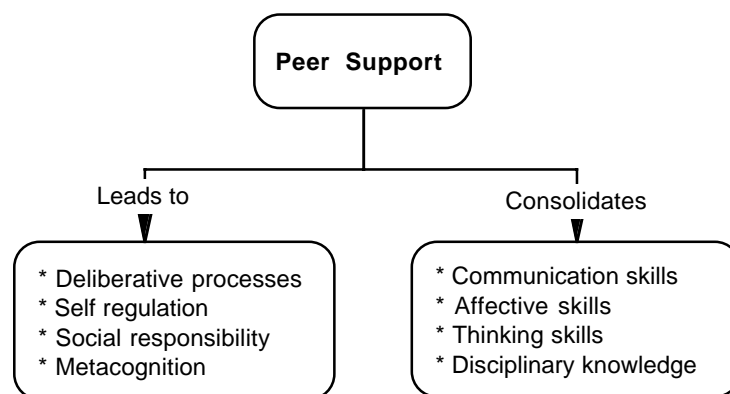


*Figure 1: Schematic overview of how peer learning approaches can support generic skills*

In addition, by integrating collaboration and peer feedback as a "learning event" that develops process knowledge we bring learners closer to the context of the workplace, where professionals are expected to have self-management skills, and be able to make judgements about their own and other's work (Erhaut, 1994).

The strengths of collaborative peer learning flows from the argument that the synergies available through group work create multiple perspectives on learning and problem solving. There is a growing body of research on group work in higher education with an emphasis on participative and peer learning, with the realisation that students are more likely to learn from experience than from transmissive pedagogies. There has also been an increased awareness so the importance of catering to the needs of diverse range of students by providing varied learning experience. Research shows that collaborative learning and peer partnerships augment learning because:

- peer learning moves away from traditional educational contexts which are transmissive;

- learning webs exist in society and are highly productive and a major source of learning;

- adult learning principles require acknowledgment of prior knowledge and sharing of ideas;

- peer work brings positive socio-emotional benefits.

(See Kitchen & McDougall, 1998; McConnell, 2000; English and Yazdani, 1999).

The relevance of these findings to enhancing the e-learning experience is that we can use the attributes of technology to increase the benefits of peer work and interdependence by designing authentic assessment tasks in order to enable the development of professional skills and attributes.

## Context of the study

At Edith Cowan University, final year multimedia students are required to complete IMM3330/4330 "Industry Project Development". The aim of the unit is to consolidate core multimedia skills learnt in other units, while at the same making industry contacts and developing a portfolio item to assist with job applications. Students are provided with industry projects made available through the Faculty, or they can negotiate a project of their own, as long as it fulfills the course requirements, that it is team-based, commercial in nature and not trivial. As part of the unit requirements, students are required to perform a needs analysis, provide a design specification, develop the web site, evaluate it, implement it and produce the required documentation (legal, procedures, metrics, templates and standards).

The unit runs over a fifteen-week semester, with three hours allocated per week for tutorials and lectures. There are no formal face-to-face classes, the unit is largely run online from a Listserv, which provides a rich arena for advice, comments and feedback as there is about one hundred participants subscribed on the List, including industry representatives and ex-students. The Listserv allows student to post questions and ideas and to receive response form industry experts to guide them in creating suitable web designs and multimedia products. This apprentice-novice was intentionally organised so that participants would be able to receive support from an industry partner. The constructivist rationale used in structuring the project work and the Listserv activities was that students should benefit from the experiences of other students, industry representatives and academic tutors in an environment that promotes collaboration, negotiation and the exchange of ideas. Figure 2 shows a screen dump of the home page.

## IMM3330
### Industry Project Development

**[Coordinator]**
Mr Joe Luca

**[Tutors]**
Mr Serge Walberg  Mr Mark McMahon  Mr David Wilson

This unit provides students with the opportunity to participate in the development of a multimedia project located in an industry environment, and to make a significant contribution to the team based development. Students negotiate with their lecturer regarding the nature of the project, which is aimed at fulfilling an industry need. The unit content includes: significant contribution to the development of a multimedia product; critical analysis of the project management method used; design and implementation of evaluation, testing, implementation and maintenance strategies; and establishing clear metrics, templates and standards.

**[other stuff]**
Unit Outline

**[messages]**

**Listserv Access**
Send email to: discussions-on@scam.ecu.edu.au and put SUBSCRIBE in the body of the messa...

**[links]**
Post an URL :

**[semester schedule]**

1  **Introduction**
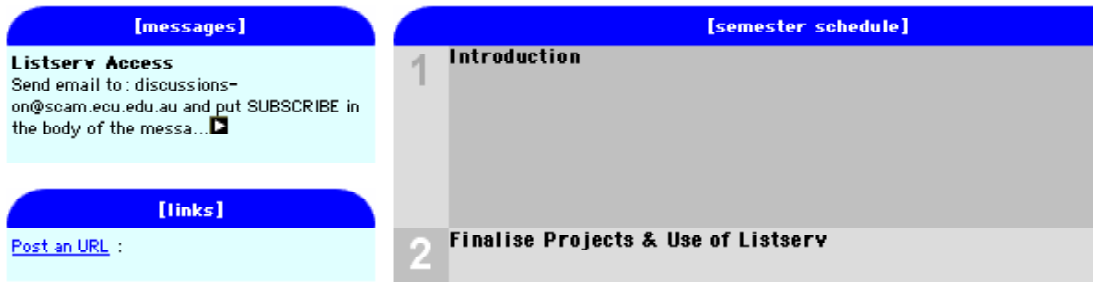
2  **Finalise Projects & Use of Listserv**

*Figure 2: Screen Dump of Web Site created using Apple Technology*

## Integrated assessment

To ensure a motivating environment, assessment acknowledges individual contributions to the listserv (eg., seeking feedback and advice) as well as team progress reports, which included students posting design ideas and prototypes to a shared workspace and requesting feedback from others. Students were given templates to use in preparing these reports as well as rules or "netiquette" they were required to use when posting information to the Listserv. Encouraging students to initially use the Listerv by monitoring postings was necessary, and where appropriate moderators responded and encourages conversations dynamics. However, in all cases, as the semester progressed, students became more comfortable with using the Listserv, and were posting on a variety of topics (Figure 3).
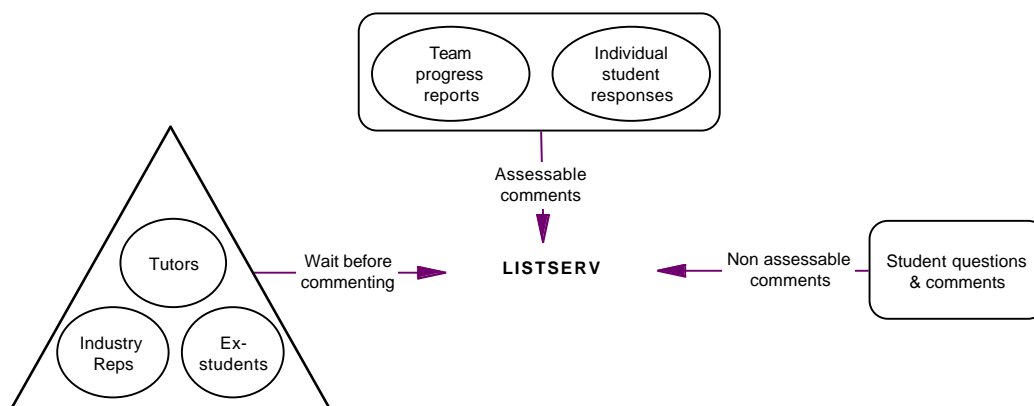
*Figure 3: A model for online discussion based on peer partnerships*

The tutors' involvement on the Listserv was structured to be non-interventionist so that they acted more as facilitators by focusing discussion, rather than as the "fonts of all wisdom". Figure 3 outlines the model used for promoting discussion on the Listserv. Issues were generated from team progress reports or from individual queries about

technical, content, procedural, client, communication, team/peer issues sent to the Listserv. Tutors, industry experts and ex–students then responded. Also, student had the opportunity to post other open questions, comments and reflective statements. As the semester progressed, students more freely contributed to the Listerv with many other issues, some of which were more philosophical in nature.

## Project based learning and use of multimedia technologies

As part of the project requirements, students were responsible for making contact with the client and discussing the scope and legal aspects of the development (educational software, IP, etc). These had to be negotiated so that the client had their needs satisfied, while at the same time the students were involved in producing a web-site that conformed to the requirements of an academic unit. This often involved firstly understanding the client's needs and "educating" the client about web production, maintenance and costs. In this online unit, project based learning enabled students to develop a relationship with a client, create solutions to a design problem and develop a project brief. In addition, project teams who worked on creating the had to report on progress to other teams, compare project plans and reflect on learning processes, assessment processes and team dynamics. Each of these involved partnerships with industry clients as and resulted in the development of multimedia products (usually websites) as shown in table 2. The final web site can be viewed at http://www-scam.ecu.edu.au/projects.

| Team No | Project Description |
|---------|---------------------|
|         | Oil and Gas Resource Web Site |
|         | On-line course module for Westone |
|         | Benchmark Furniture Online Catalogue |
|         | Curriculum Council web site |
|         | Medical web site for Edith Cowan University |
|         | Cancer Foundation web site |
|         | Race around Edith Cowan University |
|         | Indigenous Art 1 |
|         | Indigenous Art 2 |
|         | SCAM Website |
|         | Photomedia web site for Edith Cowan University |
|         | Ecotourism web site |
|         | Solo Travellers Club |
|         | Wine Club |
|         | iMac Touch Screen |
|         | Scammers Association |

*Table 2: Multimedia projects created by the students*

## The student learning process

The framework used in this course to promote the student-learning process is shown in Figure 3. It is focused on using learner-centred strategies, which encourage learner independence and peer support, which in turn promote the development of professional skills and process knowledge. These then directly contribute to deep and meaningful learning experiences.

Also, as part of the authentic learning task, students had to share their knowledge with their industry partners, who in many cases were not fully informed about online design and the potential of technology. This experience raised industry awareness about

opportunities for business promotion using the web, while industry partners assisted students by briefing them on market needs, business practice, commercial, legal and ethical constants. So, not only do the students gain experience by liasing with clients, but the clients also benefit by the reciprocal relationship and exchange of knowledge. In this way the learning transaction was based on the notion of partnership.

## Development of management skills online

An example of how the Listserv was used to promote peer learning and collaboration is as follows. The unit had 72 students, and the number of posts made to the Listserv over the semester was 1035 in total. In the example given below, a student is seeking help on a difficult issue i.e., how do you develop web sites which are compatible across all browsers? This problem has no real solution and is also a problem for professional developers in the industry. So this is a rich, authentic topic for discussion, in which students can assist their peers by giving their opinions or help on the issue. In this case, the students received 12 responses.

These examples shows how students support each other through a virtual community and in doing so develop skills in communication, problem solving, and giving/accepting positive criticism. In the final evaluation of the course, both industry experts and students were asked to self evaluate their own performance and to give examples of how they had demonstrated management skills. As the process had been team based, this as undertaken in teams rather than individually. The partnership approach was therefore taken to its logical conclusion and used for evaluation purposes. Rather than seeing the group as a barrier to individual learning, we saw the learning opportunities in an expanded way and give groups the opportunity to talk about their achievements. Table 3 show some comments made by students on the skills they developed.

| *Management of Self in a team context* | *Manage information to benefit the team* |
|---|---|
| Manage group time<br>Agree on objectives, priorities and standards<br>Take responsibility<br>Listen actively<br>Be patient and sensitive<br>Allow other ideas<br>Be flexible<br>Plan ahead<br>B constructive<br>Cope with conflict | Find up-to date information<br>Know ho to interpret information<br>Check that information is correct<br>Present information professionally<br>Respond to client needs<br>Test ideas first |
| *Management of others in a team context* | *Manage the task to ensure team success* |
| Listen to the views of others<br>Work cooperatively<br>Give feedback to others in the group<br>Lead by example<br>Negotiate and talk openly<br>Try to reach consensus<br>Give an take ideas<br>Try to reach agreement | Keep track of time<br>Don't; overspend<br>Set deadlines priorities<br>Identify options<br>Plan a course of action<br>Track changes<br>Assess the product |

*Table 3: Self-evaluation comments by students*

Other feedback received form student shows how they valued the partnership approach:

*The example is a brainstorming session our group had at the beginning of this multimedia skills and expertise accumulated over the period of the brief. I know you are probably saying, so what! Or that's the way it's supposed to happen! But as we all know... how well the team works as a team becomes crucial to the success of the project and/or your own personal learning and goals… In this situation the learning and/or achievements (successfully applying knowledge, skills and expertise) are not through individual pursuits but are attained only as a group. In other words, it wasn't one individual but the group as a whole that realised the depth of the problem and devised the solution for our site. A long winded way of saying that the "wheel" was a collaborative team effort where thoughts and ideas were explored, elaborated, refined, abandoned, perfected, etc, etc, etc. until a final solution was reached.*

## Critical success factors

In this partnership project, all the strands and activities were integrated so that all stakeholders felt a sense of achievement and participation. It was important too that clients felt part of the process, and this was achieved by having an evening launch of the project completed by the students, with clients and industry representatives invited to view and comment on products.

The success of the unit can be attributed to the following factors.

- A virtual community was formed through the use of a Listserv, which encouraged collective and collaborative learning rather than individualistic. The online social environments provided scope for group interaction, sharing and discussion and in depth exploration of issues.

- The content of the course was opened ended, and students had access to a website where they could add resources or choose the most relevant ones (see Figure 3). Access to relevant knowledge resources was one of the "just in time" approach to planning, i.e. the choice of selecting resources is left to students who have to identify a learning need;

- The development of networked collaborative learning requires a focus on the processes of collaboration, and the well-being and development of the collaborative group (McConnell, 2000). In summary, this involves:

  o openness in the educational process

  o self-determination in learning

  o a real purpose in the cooperative learning process

  o a supportive learning environment

  o collaborative assessment of learning

  o assessment and evaluation of the ongoing learning process.

The notion of professional development and growth was recognised by learners to be more important than learning facts, figures and project management procedures. Students had to work closely with an industry client, develop a project brief and then communicate and negotiate the final product to a group of peers. Reciprocal learning and peer partnerships enabled students to reflect on the experience and learn from it. This was

reinforced by students competing a contract in which they specified their topic, team role and project deliverables.

- The Listserv was treated as a mainstream activity which replaced face-to-face classes, and was integrated into the assessment system.

- The industry partnership involved students dealing with authentic commercial, client and technical problems in the workplace and using the Listserv to ask for advice and share experiences.

- The tutors acted as a facilitators and not experts by fostering discussion rather than responding to questions; dealing with inappropriate responses offline and identifying underlying issues and redirecting these as questions back to the Listserv for students to reflect on and discuss where appropriate.

## Evaluation of the environment

In additional to a successful useability study of the learning environment, the evaluation questionnaire conducted at the end of the unit it appeared that the students were very positive about the structure of the unit and the use of the Listserv. Almost all the students wanted to remain subscribed on the List as a form of graduate Listserv (as well as offering advice to other students who will be enrolled in the future). Grounding the industry project in a commercial environment with the use of a Listserv for inter-team and inter-student communication was clearly successful, and added value to the students' experience in this unit.

## Conclusion

The study illustrates an effective approach to developing professional skills through e-learning, which was integrated into the final year of tertiary multimedia course. Through authentic settings, students were engaged with real industry projects, clients and assessment tasks. This was complemented with a virtual environment in which students exchanged ideas and helped each other cope with these authentic tasks. The online environment, in combination with client negotiations, promoted the development of professional skills and process knowledge, which supported the process of professional knowledge building. The design of this partnership project was motivated by the realisation that the needs of learners are changing rapidly and continually in response to an environment that is characterised by change at economic, political and technological levels. There is greater pressure on universities to work more closely with employers in contributing to the development of a skilled workforce, with relevant transferable skills.

Perhaps the most significant effect of e-learning is the rise of different conceptions of learning and of knowledge production. In contrast to the value placed on factual knowledge in traditional programs, *just-in-time* developments mean that competence and skills may depend on rapid responsiveness to industry needs and opportunities. While customisation is important, student must connect with faculty and classmates and develop community via e-learning. In the case study presented here, project based learning via the Web was blended with face-to-face seminars to bring about significant learning outcomes for participants, and supported personal, professional and interpersonal skills.

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