Computing, Communicating and Contracting: A First Year Experience in Lifelong Learning

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Abstract

The emerging education, training and graduate work environment is exerting considerable pressure on university teaching and curriculum content. The Mission statement of the University of Ballarat addresses these pressures and is intended to inform the work of curriculum planners and teachers. This paper will describe and critically evaluate a curriculum development initiative by the Bachelor of Computing course in responding to the demands for:

- seamless pathways between post-compulsory education, further education, training and work;

- lifelong learning and transferable / generic skills;

- liberal / general education;

- vocational education;

- curriculum breadth, depth, balance and coherence;

- deep rather than surface learning / enhanced learning;

- thorough inductions into the way of knowing of a field of study; and

- informed student choice within a flexible framework.

1. Introduction

The structure of the Bachelor of Computing course offered at the University of Ballarat is designed to provide students with major studies in computing together with approved elective studies taken from other accredited degree programs of the University. Students must satisfactorily complete 26 units comprising 15 core computing units, 4 computing elective units, 2 project units and 5 non-computing units.

The unifying themes of the course are networking and communicating. In 1995 first year students were offered the non computing elective, *Technical Communication*. The majority of commencing students enrolled in this unit in first semester. The staff allocated to teach this unit redesigned the unit

in a way that specifically addressed the emerging expectations of undergraduate programs in Australian universities. The curriculum was based on cognitive learning theories and experiential learning facilitated by teachers.

2. What are the Emerging Expectations of Undergraduate Courses?

A range of national reports have been prepared and initiatives funded that have sought to identify the purposes of higher education in Australia today and into the 21st Century. In clarifying the purpose of higher education, these reports have listed the characteristics and attributes that graduates should have as a result of their higher education experience. (Baldwin, 1991; Bates *et al.,* 1992; Carmichael, 1992; Chubb, 1992; Dawkins, 1988; Finn, 1991; Mayer, 1992; Ramsden, 1992).

2.1 Graduate characteristics

In these reports government agencies and professional associations are tending to emphasise the connections between higher education and employment. These connections rest on the idea that graduates should be lifelong learners who have both discipline specific knowledge and skills as well as a range of generic skills or competencies. Chubb (1992, p. 22) summarised these personal competencies, attributes or qualities as:

> ...critical thinking, intellectual curiosity, problem solving, logical and independent thought, effective communication, and related skills in identifying, accessing and managing information: personal attributes such as intellectual rigor, creativity and imagination; and values such as ethical practice, integrity and tolerance.

The Mayer Committee (1992) documented the *Key Competencies* to be developed during the compulsory years of education for the individual's effective participation in the emerging patterns of work and work organisation. These *Key Competencies* are generic in nature in that they apply to work generally rather than being specific to work in particular industries. This characteristic means that the *Key Competencies* are not only essential for effective participation in work but are also essential for effective participation in further education and in adult life in general.

The Mayer competencies for employment expect students to be able to:

- collect, analyse and organise ideas and information;

- express ideas and information—communication (oral, written and graphic);

- plan and organise activities;

- work with others and in teams;

- use mathematical ideas and techniques;

- solve problems; and

- use technology.

At the University of Ballarat the view is taken that our graduates need a range of discipline-specific knowledge and skills, generic skills and an orientation to lifelong learning. The Mission and Goals statement of the University is explicit about this expectation of our courses and the type of graduate from Ballarat.

The National Board of Employment, Education and Training (NBEET) released a report in 1994 that detailed the profile of a lifelong learner. The report (Candy, Crebert and O'Leary, 1994) suggests that the qualities or characteristics of the lifelong learner would be:

- an inquiring mind, a sense of curiosity and question asking;

- helicopter vision, a sense of the interconnectedness of fields;

- information literacy, ability to locate, evaluate, manage and use information in a range of contexts;

- a sense of personal agency, a positive concept of oneself as capable and autonomous; and

- a repertoire of learning skills, a range of strategies for learning in whatever context one finds oneself.

Moses and Trigwell (1993) believe that in the past fifteen years there has been a reconceptualisation of professional work. The technical knowledge gained by taking professional courses at higher education is now taken as a pre-requisite. This is emphasised by the increased number of students going onto higher education and the increased credentialling for initial employment. Successful professionals exhibit effective generic or transferable skills, have a professional attitude towards their work and understand the codes of ethical behaviour.

3. How is Undergraduate Curriculum Designed to Meet These Expectations?

A model for systematically addressing many of these factors has been developed by the National Board of Employment, Education and Training in their report *Developing Lifelong Learning Through Undergraduate Education* (Candy et al, 1994). This model recommends that lifelong learning skills should form a part of the core of any and every undergraduate degree, and that this emphasis should be spelled out in course aims and objectives.

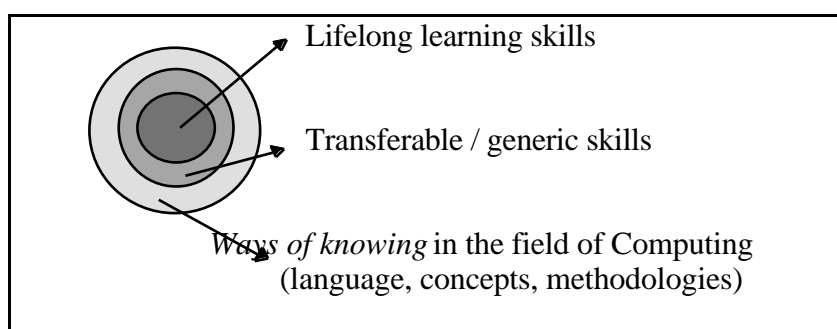### 3.1 Bachelor of Computing course and unit design model

Figure 1. Course and unit design model.

The unit, *Technical Communication,* was designed to enable students to develop the characteristics of employable graduates and to emphasis learning as a lifelong process. The unit objectives were explicit about the knowledge, skills and attitudes the students would develop by participation in the unit.

3.2 Unit content

The content of the unit was focussed around three key questions with related focus questions:

- What is effective communication?

    How do people effectively communicate?
    What ways do people use to communicate?
    How is technology used to communicate?

- How are problems solved?

    What is problem based learning?
    What is creativity?
    What is innovation?
    How do you draw mind maps and concept maps?
    What is the purpose of these maps?

- How do professionals work?

    How do professionals work independently?
    How do effective teams work?
    What is time management?
    What is reflective practice?
    What is system thinking?
    How do you evaluate individual and team work?
    Why is learning a lifelong process?

3.3 Purpose of learning tasks

The objectives of the unit were designed to be achieved by students as they completed the set learning tasks. Learning tasks are carefully crafted, worthwhile tasks students are required to complete that include both a learning process and a work product. Cognitive learning theories suggest effective learning requires learners to be active learners who have control over the learning process. Learning is enhanced by designing learning tasks that develop the metacognitive ability of learners. Metacognition is thinking about, and reflecting on, the learning process.

The selected learning tasks were designed to have students:

- develop communication skills;

- work individually and in teams;

- think about their learning;

- manage and organise their time;

- self and peer evaluate;

- solve problems;

- use multimedia technology appropriately;

- commence a CV that documented these skills; and

- provide a framework for them as lifelong learners.

3.4 What learning tasks did the students complete?

The unit workload was described under the following learning tasks:

- introductory activities designed to introduce students to each other and to develop interpersonal skills;

- compiling a resource folder containing all class notes and reflective comments;

- developing an individual portfolio of employment characteristics that identified the student's skills in each desirable graduate skill category;

- a learning contract designed and completed by a team and related to the unit objectives;

- oral presentations by the team on the outcomes of the learning contract; and

- a written report reflecting on, and evaluating, the individual and team learning outcomes from the learning contract.

The assessment of satisfactory completion of the learning tasks utilised self, peer and tutor assessment. This provided students with experience in evaluating and providing feedback to themselves and their peers.

4. How was the Unit Delivered?

The first phase of the unit was delivered using a traditional lecture and tutorial model. The purpose of this phase was to provide information to students about graduate employment surveys, approaches to concept and mindmapping, creative thinking based on Edward de Bono's six thinking hats (de Bono, 1995), reflecting on previous learning experiences, resource facilities available for information literacy development, and writing and researching skills for academic purposes. The time in tutorials was used to apply the information gained in lectures and to have the tutorial groups form into teams to complete learning tasks.

4.1 Student perceptions of desirable graduate characteristics

In the first session students were asked to complete a survey based on a report from the National Board of Employment, Education and Training, *Skills Sought by Employers of Graduates* (NBEET, 1992).   This report researched those graduate abilities that were sought by employers of graduates. Students enrolled in the unit were asked to rank these abilities in their priority order. This provided the basis to ground the unit content and teaching strategies in the perceived priority order of employers and students.

Characteristic	Business rank	Academics' rank	Students' rank
Theoretical knowledge in the profession	7	1	5
Ability to apply knowledge to the workplace	5	4	1
Broad background of general knowledge	=11	10	9
Specific work skills	=11	9	6
Decision making and problem solving	4	3	4
Capacity to work with minimum supervision	6	6	7
Capacity to learn new skills and procedures	2	5	=2*
Capacity to use computer technology	8	2	8
General business knowledge	10	11	10
Capacity for cooperation and teamwork	3	8	3*
Communication skills	1	7	=2*
Understanding of business ethics	9	12	11

	1992 data	1995 data
*These items were only separated by a single point.		

Table 1. Priority list of graduate characteristics.

The survey results provided the verification that students were aware of the need for acquiring the skills the unit had been specifically designed to develop.

4.2 Teamwork and learning contracts

The second phase of the unit had the students taking responsibility for their learning by forming teams and negotiating a learning contract with their tutor. The students used their mind mapping skills to develop the characteristics of an effective team, compared this with the thoughts of other teams and created a combined list assisted by some research on effective teams provided by the tutor. A constructivist approach (Papert, 1987) was used by the tutor in that the experiences of the students were valued, discussed and then informed by other sources.

4.3 Negotiating the learning contract

The teams then focussed on the topic of their learning contract (Boud and Feletti, 1991) by brainstorming the ideas and learning needs of the team members. The topic chosen had to be related to the unit objectives and be achievable within the semester. The topic was checked with the tutor and then the team used mind mapping to develop the framework for the formal contract details.

This approach again had the students as active participants (Bruner, 1966) in their learning and experiencing working as a team to complete a task designed to develop unit objectives. This stage of the unit gave control of the learning to the learners and the tutors became facilitators of their learning, managing each student's completion of a learning cycle (Kolb, 1984). Students identified the resources they needed to complete their contract and how they would organise themselves as a team to complete the contract. All teams negotiated contracts that developed both effective communication skills and computer related skills (Caul, 1993). The emphasis on learner control is crucial to the development of lifelong learners (Dewey, 1910).

4.4 Learning contract topics

The learning contracts were extensive in scope and diverse in the nature of the products of the contracting process. All the chosen topics were within the learning objectives of the unit and utilised a range of communication media. The students made extensive use of the available resources and the contract goals focussed on what the students identified they wanted to learn and develop in the area of multimedia communication. The topics chosen by the student teams included:

- scripting in HTML;

- promotional video production;

- *Powerpoint* presentations with multimedia technology;

- comparisons of presentation media;

- adding multimedia to *Powerpoint* presentations;

- templates for communication software;

- WWW homepage for first year student information;

- software tools for locating information electronically;

- history, coding and consequences of computer viruses;

- construction of computer demonstrations; and

- WWW homepage design and construction with links to the best WWW sites.

In completing the learning contracts, much of what the students learned was beyond the existing knowledge and skills of the tutors. This led to a teaching and learning environment that was inquiry based where all participants were learning from, and reflecting on, the experiences and understandings of each other (Schon, 1983).

4.5 Team accountability

During the next four weeks tutors and teams met weekly in the timetabled lecture and tutorial sessions. The tutor acted as a project manager and the teams became self-managing teams (Parker, 1991). The weekly meetings checked on progress and discussed any problems the team or individuals were experiencing. All the expected successes and problems arose and were handled in a realistic manner. This enabled mediated academic learning to be transformed into a situated, real experience for both the students and the tutors (Laurillard, 1993).

4.6 How were students graded?

Two of the work products from the learning tasks were used as assessment tasks to provide students with a grade for the unit. Each assessment task was given 50% weighting in the overall grade. The oral presentation on the learning contract outcomes was peer and tutor assessed. Students were provided with the assessment criteria at the start of the unit. Students and the tutors graded the performance of individual presenters. The assessment and feedback sheets were given to the presenters to enable them to reflect on their learning outcomes. The written report of the learning contract was designed to assess the ability of students to self-evaluate and evaluate the work of other team members. The tutor assessed this final written report.

5. What Feedback did the Students Provide on the Unit Content and Teaching Approaches?

On a five point scale the students strongly agreed or agreed that the unit developed their skills in:

- oral communication,

- written communication,

- time management,

- team working,

- independent learning,

- peer evaluation,

- multimedia technology, and

- self evaluation.

Students overwhelmingly found the learning contracts to be the most useful part of the unit and valued the student-tutor relationship that developed during this stage of the unit. All students were satisfied with the workload, feedback and assessment in the unit and felt that it was timely and fair.

6. Conclusion

The teaching staff believe that the learning theories and teaching approaches adopted in designing the unit enabled students to achieve the unit objectives and successfully develop discipline knowledge and skills, generic skills and the qualities of lifelong learners. Many of the teams developed knowledge and skills that the lecturers and tutors would not have been able to teach in a teacher directed traditional approach.

Academic learning in higher education is mediated learning, but cognitive learning theories and student-centred curriculum design can lead to enhanced learning for students in undergraduate courses.

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