Assessment of Prior Workplace Learning: A Case Study

Key words: Self-assessment; Self-directed learning; Reflective practice; Negotiated curriculum; Workplace learning; Graduate attributes.

Abstract

Many experienced Engineering Technologists work at the Professional Engineer level and seek the formal qualifications to enable them to practice at this level. The Master of Engineering Practice is a distance education program designed to enable them to achieve this goal by using their workplace learning to demonstrate achievement of up to half of the defined graduate attributes. The program is accredited by the Institution of Engineers, Australia, which operates as Engineers Australia.

The pedagogical design is based on principles drawn from the scholarship of learning and teaching, particularly from the fields of adult learning, reflective practice and the assessment of workplace learning. The first course requires students to use reflective practice to assess their learning against the graduate attributes and then prepare and negotiate an individual Pathway to Graduation Plan. As each student brings a unique set of learning experiences to the program the Plan is tailored to their learning needs and designed to enable them to demonstrate achievement of all of the required attributes.

The student response has been extremely positive and the first students graduated at the end of 2007. This paper describes the program structure and assessment processes, and then discusses student and staff experiences with those processes. In particular, it addresses the self-assessment process which some students have found to be a complex and demanding process. The paper draws on the results of two student surveys and describes actions taken to simplify the assessment processes while at the same time enhancing the quality and efficiency of the processes from both staff and student perspectives.

Introduction

The Faculty of Engineering and Surveying at the University of Southern Queensland (USQ) has more than 2200 students enrolled in its three undergraduate engineering programs: the four-year Bachelor of Engineering, the three-year Bachelor of Engineering Technology and the two-year Associate Degree in Engineering. These highly articulated programs offer existing members of the engineering workforce, and those who are new to engineering, a range of educational options to achieve their career aspirations, as shown in Figure 1. More than 80% of the students in these programs study off-campus through the distance education mode.

In 2002 the Articulation Committee of Engineers Australia (EA) requested the Faculty to consider the development of a distance education program that would enable experienced Engineering Technologists to become Professional Engineers. The key criterion was that students should be able to use their workplace learning to demonstrate achievement of the objectives in up to half of the courses in the program. Such a program would provide an alternative to the only existing option, a Bachelor of Engineering program, a pathway that often required experienced Engineering Technologists to study basic engineering that they had previously studied or that was not relevant to their current employment or future career paths.

Importantly, the members of the Articulation Committee recognised that the graduates of the proposed program would have different knowledge and skills than those of graduates from traditional Bachelor of Engineering programs. They also recognised that whilst these graduates would be different, their knowledge and skills would be at the level required for them work as Professional Engineers in their chosen field. The acceptance of this principle enabled EA to, firstly, encourage the development of this ground breaking program and then, secondly, to accredit it prior to its implementation.

During 2003, a conceptual model for the Master of Engineering Practice (MEP) program was developed and endorsed by the Faculty's Program Development Team, which included members of Engineers Australia's Articulation Committee. The detailed design of the outcomes focussed curricula was based on the theories and practices associated with distance education, adult learning, reflective practice, negotiated curriculum, and the self-assessment of workplace learning (Dowling 2006). The MEP program was accredited by the University and Engineers Australia in 2004, and was offered for the first time in 2005.

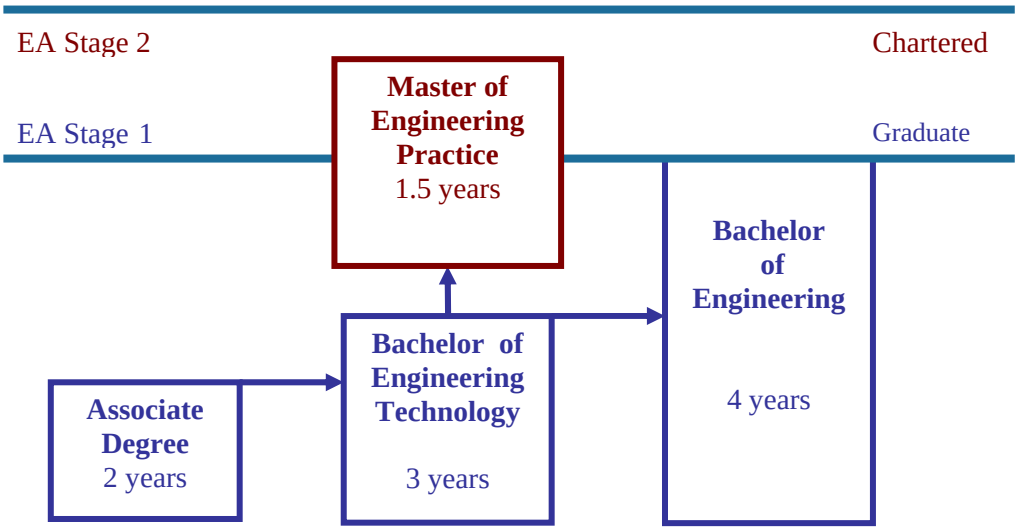

Figure 1: USQ Engineering programs

The 2005 Program Structure

At USQ a **program** consists of a number of **courses** and leads to an award such as a degree. Full-time students normally study eight courses in a year and part-time students four courses. Students normally do an average of approximately 165 hours of work to satisfactorily complete a course.

The Master of Engineering Practice consists of 12 courses and may be studied over six semesters of part-time study. Two different types of courses are included in the program:

- **Technical courses** that enable students to learn, practice, and be assessed on new knowledge and skills. These courses are drawn from the existing suite of Bachelor of Engineering courses offered by USQ. Students complete four compulsory Technical courses and must select at least two other Technical courses that are appropriate for their discipline and career aspirations.
- **Portfolio courses** that enable students to be assessed on the learning, knowledge and skills that they have acquired during their experience in the engineering industry. The Portfolio courses were specifically designed for the MEP program and students complete

three compulsory Portfolio courses and must select at least one other Portfolio course as an elective.

Students specialise in a field of engineering by selecting one of six majors: Civil Engineering; Electrical and Electronic Engineering; Environmental Engineering; Mechanical Engineering; Power Systems Engineering, and Structural Engineering

The graduate outcomes

A detailed set of graduate attribute and capability statements was developed for the program. These not only define the generic attributes and capabilities, but also a set of discipline specific attributes for each of the majors, in the program. These graduate attribute and capability statements therefore define in detail the learning outcomes of the program, and enable students to assess their prior learning and plan their individual learning pathway. This was necessary because each student enters the program with different knowledge, skills and prior learning experiences, and they therefore follow different learning pathways through to graduation.

The **generic** graduate attribute and capability statements for the MEP program were developed from those previously adopted for the Bachelor of Engineering program and from those in the National Generic Competency Standards for Chartered Professional Engineers (Stage 2), which are published by Engineers Australia (2009). Each Element of Competency (attribute) is associated with a set of Defining Activities that enable graduate engineers to self-assess and demonstrate their achievement of that competency. The Stage 2 competencies were adopted for the program because it is likely that the Technologists who would enrol in the program would already be working at the graduate engineer level in these competency domains. Therefore, the adoption of the EA competencies and assessment processes would enable students in the program to prepare the documentation they would require to apply for Chartered Status once they had graduated. This would give these graduates a considerable advantage over Bachelor of Engineering graduates who normally require 3-5 years of work experience before they are able to apply for Chartered Status.

The **discipline** attribute and capability statements were developed by the appropriate Head of Discipline in consultation with their colleagues. This was the first time that attribute and capability statements for a discipline had been defined in such detail at USQ. The discipline statements were written in the same style and format as the generic statements for the program.

The Self-assessment Portfolio

The **first** course in the program is a compulsory course, *ENG8300 Self-assessment Portfolio*. This innovative course requires students to undertake a self-assessment of their existing knowledge and skills against the graduate attributes and capabilities. To complete this activity they must reflect on their prior studies and workplace experiences to identify their learning, and then link it to the relevant Element of Competency. This requires students to demonstrate high level skills in using reflective practice.

In the 2005 structure the students developed a Pathway to Graduation Plan that listed the Technical and Portfolio courses they planned to study to complete the program. After a period of negotiation with the Program Coordinator and their Head of Discipline the Plan was finalised and approved by the Faculty. The student then follows along that pathway through to graduation.

Another key element of the first Portfolio course is that students must demonstrate that they have a high level of written communication skills. This is because they will be required to demonstrate their workplace learning by writing concise and accurate Career Episode Reports (CERs) using the same format and style required by Engineers Australia.

If the assessment of a student's Pathway to Graduation Plan, and their written communication skills, demonstrate that the student does not have the required knowledge, experience, attributes or capabilities to be able to satisfactorily complete the program then the student will be cancelled from the program and counselled on alternative ways to achieve their goals, such as completing the Bachelor of Engineering program.

Student experiences

Sixteen students were admitted for the first offer of the program in February 2005, and more than 100 students have been admitted since then, with 41 being admitted during 2008. To date all of the students have been male, with the youngest applicant being 28 years old and the oldest 63.

An anonymous three page questionnaire was sent to the students in the first cohort to, firstly, gain feedback on the structure of the first course, the study materials, and the assessment processes and, secondly, to gain feedback on the structure and content of Master of Engineering Practice program. The following is a summary of the results from the seven responses received:

- Most of the students enrolled in the program in order to gain Chartered Professional Engineer status or Registration in Queensland as a Professional Engineer;
- Six of the seven students would not have enrolled in the Bachelor of Engineering program; and
- Six of the seven students either agreed or strongly agreed that the program was highly innovative.

The following informal comments were written on the responses:

"*After carrying out my Bachelor of Engineering Technology studies over 10 years* (of part-time study) *and probably not getting credit for the subjects I completed, I was not prepared to start the complete Bachelor of Engineering program."*

"*An excellent concept to recognise true experience."*

"*Congratulations on this new concept."*

"The Engineering Technologist is often working closely with, and sometimes at the same level as, a Professional Engineer. It would be frustrating not to have that experience recognised and instead have to complete a Bachelor of Engineering from scratch."

The MEP …"*gives me an avenue to continue my academic studies, and a realisation of my strengths and weaknesses as an engineer."*

This positive feedback about the program and the learning and teaching strategies being used encouraged the staff teaching into the program. They were further encouraged by an unsolicited student letter in May 2006:

"I find that the materials are concise and practical. The section on reflective practice has been extremely useful both inside and outside the realms of the course. It is especially useful when attempting to recollect my thoughts as to why, where and how I went about my tasks and how I reached pertinent goals. It has led me to reflect on what has enabled me to successfully complete my work, and the learning and pattern of thinking that has moulded my professional career."

Another survey was undertaken in late 2007 to seek student feedback on their experience in the overall program, and their opinion about some proposed changes to the program structure. Sixteen students responded, a 50% response rate and the relevant responses are shown in table 1. The number of students who **agreed** or **strongly agreed** with each of the statements is shown in the right hand column – the remaining students had **no opinion**.

Table 1: Positive student responses to survey statements

Questions	Positive Responses
The study materials clearly explained what knowledge and skills would be assessed in the course.	11
Together, the course examiner and study materials motivated me to learn how to demonstrate my workplace achievements.	13
The course examiner helped me to understand the course materials.	12
The course examiner was always willing to help me and offer advice.	14
The course examiner answered my queries promptly.	13
The course examiner showed respect and concern for me as an individual.	12
The assessments allowed me to fully demonstrate my knowledge and skills.	13
The course examiner provided appropriate and timely feedback on my assignments and my progress in the course. (13)	13
Although I have not graduated I am more than happy with the program to date.	11

Students were also given the opportunity to write comments about their experiences in the program. The following statements are indicative:

"Developing the CERs as part of the course is a fantastic way to reflect on your achievements."

"I think that the course (ENG8300) is well structured and achieves the required outcomes."

"I am enjoying studying again (so far!) and enjoyed defining my graduation pathway!"

"My peers and my Director are very happy with the program and they have asked me to speak to the other Technologists in the office about the program."

The first students graduated from the program at the end of 2007 and one of them wrote the following comments about his experience in the program:

"I cannot speak highly enough of the program. It was ideally suited to me in that I had completed a Bachelor of Engineering Technology and had been working in the industry for many years. I knew I had the ability (and practical skills) of the qualified engineers I worked with and craved equal recognition for my work. The Master of Engineering Practice gave me an opportunity to use my knowledge and experience base to demonstrate my ability and gain formal recognition. The Self Assessment Portfolio was an excellent tool to identify deficiencies in my knowledge and to implement a strategy in the workplace to acquire the competencies to successfully complete the course. I completed the program in Semester 2, 2007, and I was promoted in February 2008 – this is a direct result of completing the Master of Engineering Practice."

Most mature age distance education students have firm career goals in mind when they enrol in one of the Faculty's programs. They also believe they know what they need to learn, and why, and they do not tolerate out-of-date content or, what they perceive to be, non-essential curricula. The positive feedback provided by the cohort of mature age students in the MEP program demonstrates that the program has achieved its goal.

Staff experiences

The Program Coordinator and the Heads have learnt that great care is required when assessing applications for admission to the program and when advising students about the most suitable pathways for them to achieve their career goals. They have found it difficult to properly assess the breadth and depth of an applicant's work experience from the CV provided with the application. This is critical as students who do not have the required breadth and depth of experience will not be able to demonstrate the required Elements of Competency.

The academic staff who have assessed self-assessment portfolios and Career Episode Reports have also been on a steep learning curve because of their lack of experience in assessing workplace learning. There have also been difficulties in identifying staff who have sufficient experience in the field a student has written about, and who are available to mark the portfolio when it arrives. Because the educational and work experiences of each student are different each of the self-assessment portfolios are different, and all of the resulting Pathways to Graduation is different. This adds to the assessment load and meant that initially staff were spending up to 20 hours assessing the items submitted by each student during the semester. This increased assignment turn-around times and this sometimes meant that students had to be given extensions for the following assignments.

These problems have been largely overcome as staff have gained experience and passed on that experience to other staff through annual staff development workshops**.** This experience was invaluable when the program was reviewed in 2007 and the changes made in 2008 have reduced the complexity of the assessment processes and also the time required to assess student work.

The 2008 Program Structure

The Master of Engineering Practice (MEPR) program is a 12-unit program made up of the following two components (USQ 2009):

Schedule A: All students complete the five core courses (a total of seven units of study)

ENG8300 Self-assessment Portfolio
ENG8311 Workplace Portfolio Part 1 (2 Units)
ENG8312 Workplace Portfolio Part 2 (2 Units)
MAT1502 Engineering Mathematics 2
ENG3103 Engineering Problem Solving 3

Schedule B: Students complete a maximum of five Technical courses in their major

During the preparation of their Pathway to Graduation Plan students must nominate how they are going to demonstrate achievement of the objectives of each of the **Technical Courses** defined for their major and listed in this Schedule. They may do this by studying the courses or by demonstrating achievement of the objectives of the courses in their Workplace Portfolio. A student may study a maximum of **five** of the **Technical Courses** listed in this Schedule.

The revised structure ensures that all students achieved Elements of Competencies defined for their major. It also increases the flexibility as highly experienced students are able to decrease the number of Technical courses they study by choosing to demonstrate the relevant Elements of Competency in their Workplace Portfolio.

Conclusion

The Master of Engineering Practice program was developed to provide experienced Engineering Technologists with an alternative pathway to become Professional Engineers. The program was designed to enable them to use their workplace learning to demonstrate their competence in many of the courses in the program. Following a consultative process involving staff and students the program was modified in 2008 to increase the flexibility for students and to decrease the assessment load for staff. The changes also decreased the complexity of the program structure and the assessment tasks. The increasing number of students enrolled in the program, and the consistently positive feedback those students provide to the University, demonstrate that the program is achieving its aims. More importantly, the program is enabling students to achieve their career goals.

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