Flexible pathways to the future: articulation at the University of South Australia

Kevin J. McDermott, Özdemir Göl & Andrew Nafalski

University of South Australia
Adelaide, Australia

ABSTRACT: Engineering promotes mobility, but with mobility comes the need for higher levels of education. This can be efficiently achieved by articulation. Economic necessity dictates that advanced credit in existing programmes is more common than special conversion programmes. However, with careful attention to principles and planning, this approach can provide an equitable, flexible and ultimately successful pathway to a wider, better informed and more professional outlook by graduates. Epistemological issues, particularly the difficult transition between a competency-based curriculum and a content-based one, are addressed in the article. The need for adequate access, and its facilitation through intensive mode courses, are also canvassed.

INTRODUCTION

The total engineering enterprise is an activity in which merit and industriousness earn promotion; yet promotion consistently exposes gaps in academic preparation. These gaps may be in relevant theory and techniques, commercial awareness, professional attitudes and/or personal epistemology. To attempt to remedy them by commencing subsequent qualifications from scratch is inefficient, unpalatable and inappropriate. Managed articulation between successive levels of qualification is obviously desirable, yet it presents considerable difficulty for the educator.

PRESCRIPTIVE ARTICULATION

In endorsing and embracing the ideal of career mobility, professional institutions have proposed models in which prior qualifications are to be *topped up* by purpose-built additional programmes [1][2]. This is shown in Figure 1.
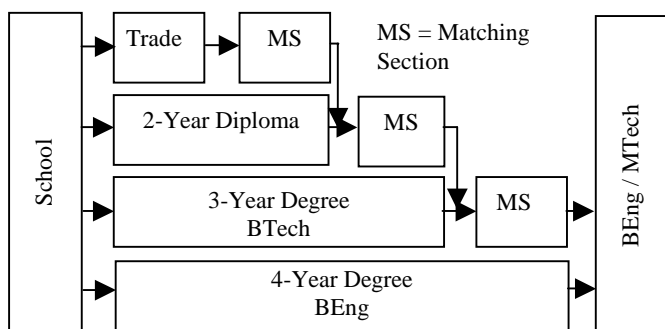

Figure 1: Prescriptive conversion process through top-up programmes.

If there were a mass market for such programmes, or if holders of lower level qualifications were habituated to self-directed

study (but they are not, that is part of the problem), it might be possible for higher education institutions to mount them within their constrained economic framework. It is far more likely that attempts will be made to match the incoming students' prior preparation with the content of existing programmes in order to provide appropriate credit transfer.

MATCHING PROBLEMS

There are immediate difficulties. Such students will generally have studied a restricted field to a fairly advanced level, although in a more applied and less abstract way that tends to restrict further development in understanding. Almost certainly, there will be a lack of analytical techniques considered necessary for further study of the topic.

Articulating students will generally appreciate this – that is part of the reason why they are there. However, these students will be frustrated by excessively familiar content that *conventional* students both need and want. Unfortunately, most technical courses (subjects) on offer will contain both the familiar and the unfamiliar, making choice for credit and for subsequent study extremely difficult.

STANDARD CREDIT

It may be that over time, standard credit will evolve for known prior qualifications, with other cases being assessed on individual merit. This is certainly the case at the University of South Australia (UniSA), Adelaide, Australia [3].

Formal agreements on cooperation negotiated over time at the highest levels of the university and the Technical and Further Education (TAFE) sector only reflect long-standing practice at the operating level [4]. While long-standing agreement exists on the quantum of credit to be given, a large academic and

administrative effort is needed to keep detailed arrangements current in the face of relentless curriculum change in both the university and TAFE institutions [5].

WORKPLACE LEARNING

A significant imponderable is what recognition should be given for prior learning in the workplace (RPL). Many articulating students will have attained positions of responsibility in their employment, but the knowledge that accompanies this can be extremely variable, and is sometimes difficult to assess.

Again, in many cases, students will know what they are after, but in other instances, will have an exaggerated idea of their capabilities and achievements. A common cultural misunderstanding arises when students trained in a competency-based system are confronted by the university's attempts to inculcate meta-learning, commercial awareness and professional attitudes.

COMPETENCIES

Worldwide, professional engineering programme accreditation currently focuses on graduates developing key qualities or attributes, as well as the quality control mechanisms in institutions to assure this [6]. This ought to lead to strong linking of objectives, content, delivery and assessment at the programme and course levels. Critical thinking about these may in turn lead to quite different views of what is appropriate in the formation of engineers for the 21st Century.

This becomes important when quality control descends to the level of competencies (that is a hierarchical verb, not a pejorative one). There is a danger that particular groups of competencies will be rendered obsolete by technological change. There is also a danger that competencies may be expressed in narrow behavioural terms, rather than encouraging wide views and courses of action. A critical opinion of competencies is that their fulfilment only exhibits the attainment of a limited skill for as long as it takes to certify its achievement. Higher order mental skills may prove more difficult to define and measure.

Colleagues in the TAFE sector lament that the wholesale and exclusive adoption of competency measures has constrained opportunities for wider intellectual development by students. Funding bases have forced TAFE institutions to teach competency-based National Training Packages, which are variously regarded as vague, mutually overlapping, outmoded and incommunicable. The differences between competency-based and content-based curriculum statements create formidable semantic obstacles in negotiating credit with universities [7].

That is the negative view. The Institution of Engineers, Australia (IEAust), the accrediting body in Australia, has progressively developed the Level 1 Competency Standard for newly graduating engineers, and the Level 2 Standard for autonomous practitioners [8]. The Level 1 Standard has not been strongly applied in Australian universities as yet, but the Level 2 Standard has been used as a benchmark for progression to Chartered Professional Engineer for the last seven years. Being well developed, the Level 2 Standard has influenced similar development elsewhere, notably within the international Institution of Electrical Engineers (IEE).

The IEAust competencies endeavour to reflect the wide awareness, intellectual agility, theoretical knowledge and social responsibility required of professional engineers. Programmes such as those in UniSA attempt to develop them in their students. This is where the clash of cultures for articulating students is most likely to occur.

EPISTEMOLOGICAL ISSUES

Despite the difficulties in negotiating appropriate credit, choosing relevant and useful courses for further study, the cultural differences, as well as work and domestic responsibilities, the evidence is that often articulating students are highly successful in further study and the general success rate is no worse than that of direct entrants from secondary schools. Some of this success can be attributed to some students having started higher education at too low a level. Some of it is laid at the door of general life experience, or more specific technical experience. It is commonly assumed to be because of enhanced motivation or reduced distraction.

It is probably false to assume that articulating students have any less sources of distraction, although the type of distraction may have changed. Motivation is a very complex issue. Some factors are initial success, clear vision, competitiveness, financial incentive and intellectual challenge. Articulating students form a self-selected high motivation group. This factor could be examined in greater detail. Here, the usually vague argument about experience being a contributing factor will receive more minute attention.

EXPERIENCE AND LEARNING

The authors have argued elsewhere that there are some things that can only be learned by experience and that learning derived from experience is commonly persistent and influential [9]. There, the case for experiential learning was made on physiological, psychological, epistemological and pragmatic grounds. Here, the authors concentrate on the epistemological issue.

Jean Piaget believed learning only took place in novel situations in which previously learned responses were inadequate. In the developing child, a *sensori motor* stage is succeeded by *preoperational*, *concrete*, and *formal* stages (see Table 1). Piaget claimed a genetic basis for his work, but one can accept the sequence without necessarily endorsing this. Faced with unfamiliar situations, adult learners retrace such steps of the sequence as are necessary to achieve understanding [10].

Table 1: Piaget's learning sequence.

Level	Learning
Sensori motor	Experiments with objects
Preoperational	Experiments with words representing objects
Concrete	Classifies objects using language
Formal	Logical operations on classes

An inference from this theory is that articulating students will generally have a wide experience with objects and language that relate to their further studies. They are then able to progress rapidly and confidently to subsequent levels of

learning. Mismanaged, this can lead to frustration (matching problems, *supra*). Managed correctly, the knowledge of these students can become a valuable resource in the teaching and learning environment. In disseminating their experience to others, these students will systematise their knowledge, and also progress in the acquisition of important generic skills.

VALUABLE INDICATORS

Opinions were sought from a group of students articulating from a diploma to an electrical and electronic engineering degree at UniSA's geographically remote Whyalla campus. First, they ranked certain aspects of the programme, then they participated in structured interviews that were designed to amplify and elucidate their responses. The number of respondents was small (n = 5), so few of the collective responses were statistically significant. However, some valuable points were made.

Student Progress

Delayed progression was mainly attributed to work demands, causing course withdrawals or significant absences. Intensive courses meant students were less exposed to variations in work schedules, and if they were affected, only one course suffered instead of many. Experiments in intensive mode course delivery are reported elsewhere [11].

Access

Flexible attendance arrangements were considered vital. One student had a 400 km round trip to commute to the campus. While onerous, this was catered for in various ways. Unfortunately, because the student was in an advanced level, student numbers did not justify the academic effort involved in a full-scale electronic course presentation.

Once again, intensive courses were considered advantageous. Electronic resources were valued. In particular, the format of this particular programme, which featured an honours-type final year with an average of only four contact hours per week, and an emphasis on industry-based project work and literature searches, was considered an enormous asset. The rationale for this programme is described elsewhere [12].

Credit

Paradoxically, two students simultaneously approved of the system for determining credit, while disapproving its application in their case. On investigation, it transpired that, although standard credit for previous qualifications had been given, recommendations on RPL had been partially ignored by an inexperienced administrator. This had led to disputes that had not been resolved in a timely fashion. There are plain inferences to be drawn from this experience.

Motivation

Interestingly, motivators, such as promotion, prestige and financial reward, did not rate highly in the responses. Students valued most the opportunity to:

- Reflect critically on familiar work practices;
- Encompass commercial realities;
- Develop a sense of professionalism.

Yet these elements were not seen as qualities encouraged in the workplace. This was a most satisfying outcome for the University, but there is an interesting inference for the practice of sending regular full-time students into industry for exactly these reasons. Plainly, on this evidence, unstructured work experience *per se* may not achieve its objectives.

Relevance

Perhaps predictably, students found studies closely related to their normal range of work most useful. However, it does come as a bit of a surprise given their previous familiarity with the subject matter. The oral explanations were along the lines of, *Now I understand why we do this*, or *Now I know how to solve this problem.*

CONCLUSION

In spite of the difficulties, the School of Electrical and Information Engineering at the University of South Australia has succeeded in providing appropriate pathways for articulation and can point, with pride, to some real success stories. The achievements of these outstanding graduates gives further weight to theoretical considerations on the value of experiential learning accompanied by opportunities for reflection and redirection [9]. There are many more stories of less conspicuous success, satisfying for the students and making a useful social contribution to the community.

Although perhaps matching sections or their equivalent are a more elegant solution to the issue of articulation, granting credit in existing courses provides an economic and flexible method of achieving the same end. Provided care is taken in the choice of courses to be studied, paying full attention to both the level and nature of previous qualifications, and to the recognition of workplace learning: provided, too, that the decisions taken are transparent, defensible and clearly communicated, a comprehensible and defensible programme of study can be planned and adhered to.

It will help for universities to become more familiar with the dialogue of competencies. It will also help if more courses are offered in intensive mode. Articulating students can be a potent asset to teachers and peers if their expertise is exploited and not ignored. But that expertise still requires refinement by reflection, and further understandings if these committed students are to make their full contribution to society. Articulation provides the pathway for this to happen.

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