Level 3

Volume 4 | Issue 1 Article 3

2006

Moving a Part-time Engineering Course to a Student-centred Paradigm

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This paper is a further reflection on two conference papers presented at the World Conference for Continuing Engineering Education (WCCEE) in Vienna in April 2006 and National University of Ireland (NUI) Galway Conference: The Challenge of Diversity: Teaching, Support and Student Learning , June 2006. Both conference papers dealt with different aspects of my experiences of the theoretical and pedagogical changes required in re-design and delivery of a part-time engineering programme for the continuing education development of electrical engineers in the workforce.

The course setting

The course under consideration in this paper is the four-year, part-time Bachelor of Technology, Ordinary Degree in Electrical Services Engineering, provided and accredited by the Dublin Institute of Technology (DIT). It generally has about 150 participants. The DIT also provides and accredits a more traditional, part-time, Honours Degree, Bachelor of Engineering in Electrical Engineering which is approved by the professional body, Engineers Ireland, as fulfilling the academic requirements for Chartered Engineer. This second degree generally has 50 students enrolled.

Participants on the part-time ordinary degree programme are all mature students who generally have prior training as electricians, usually through an apprenticeship route, and who have considerable experience of working in the trade. The part-time Ordinary Degree, therefore, is significantly different to the part-time *ab initio* honours degree in the following respects:

- Its participants have generally successfully completed their phases of apprenticeship as electricians
- Participants have considerable work experience in the trade
- Participants have work-contexts with which to relate their class-based learning

- Participants normally have considerable experiential learning which they can present for the purposes of recognition for credits and exemptions from programme modules.

My particular perspective on the innovative paradigm informing the programme is coloured by my involvement as programme leader for the first delivery of the part-time ordinary degree from 2001, and my reflections are generally longitudinal and synthesised. In this paper I briefly set out the socio-economic context in which the degree was developed and the changing landscape of learning at work. I then consider why a paradigm shift in teaching and learning was urgently needed and how we as a team implemented that shift using adult learning theories and theories of work-based learning. Finally I draw some lessons from my experience around the nature of sustainable pedagogical change for part-time, mature learners in the workforce.

The socio-economic context

The context of the development of the part-time ordinary degree is the exponential growth in the Irish economy since the early 1990s and the deliberate moves towards a knowledge economy (ESRI 2005). It is also the context of increasing immigration to Ireland from the EU accession countries to fill the skills gaps in the financial, construction, medical and services sectors (Forfas 2005). Additionally, the decade prior to the development of the degree saw participation in higher education increase form elite to mass, to universal levels, and unemployment fall from over 18 per cent to under 4 per cent, despite the increase in the labour force numbers.

The context also includes the recognition that adults in the labour force have had differential opportunities to participate in higher education and to benefit from it. The idea of 'second chance' or even 'first chance' higher education was well promoted by the White Paper on Education (Department of Education and Science 2000) which set targets of participation by adults at 15 per cent by 2005. A series of National Development Programmes also regarded educational opportunities as key to a more just and prosperous society. Additionally, in 2001 the newly launched national qualifications authority promised mechanisms for access, transfer and progression for learners and for recognition of learning regardless of where or how it was achieved. In this regard, the recognition of prior experiential learning would be key to progression,

and this concept was a key component in the design of the part-time ordinary degree in question here.

The Ordinary Degree and its pedagogical challenges

The part-time Electrical Services Engineering Ordinary Degree now takes 60 students in the first year instead of the original 50 envisaged. Retention rates are relatively high, resulting in larger numbers on the entire programme than had been originally anticipated. There is provision for participants to move between the part-time and full-time ordinary degree programmes to enable quicker completion.

The delivery of the degree involved a number of pedagogical adjustments, the most significant of which were as follows:

- Increased use of information technology
- Active engagement of participants rather than the traditional transmission--acquisition model generally associated with the trades area
- Constructivist underpinning of teaching approaches
- Facilitating the development of learning-to-learning skills
- A focus on meta-cognitive skills
- Peer support and collaborative learning
- Building on the experiential learning of participants
- Relating content to the real-world work place.

Underpinning theory was drawn from adult education generally and from Knowles' ideas of self-directed learning specifically. In this regard the identity of the lecturer became one of collaborator and facilitator as well as subject-matter expert, and the lecturer's attitude became one of mutual regard and acknowledgement of the adult status of the learners and their need for independence and self-direction.

The curriculum theory was generally one informed by constructivist theories – that it should be BIG (beyond the information given) and not WIG (within the information

given). Collaborative project work was encouraged with presentations and group discussions being seen as central.

This new paradigmatic approach, however, could not entirely displace the traditional and sometimes expected delivery styles of engineering programmes. It was generally agreed among academic staff that certain kinds of knowledges should be taught and learned in the traditional way especially the mathematical and scientific subjects. In this way both the expectations of students and the perceived responsibilities of academic staff regarding the acquisition of a solid corpus of knowledge were satisfied. This was particularly so in the early stages of the degree. Student evaluations supported the gradual move to independent and more facilitated environments. Participants were also in favour of fewer formal assessments and more collaborative projects.

Arguments against the new paradigm

One of the most disturbing challenges to my own pedagogical approach was the reluctance of participants to accept that it might be a superior method to those they had previously experienced. They could not identify sufficient learning benefits for increased investment of time and energy on their part, especially since they were all working in an intensive job already.

Additionally, my experience was that self-directed learning requires a level of knowledge to enable success: if participants are required to learn something new, then they invariably revert to dependency on the academic and may suspend their right to be independent adults at the door of the academy in order to learn more successfully. They temporarily accept an unequal relationship between teacher and student and accept the authority of expert knowledge in order to be successful (Edwards *et al*. 1996).

It could be argued that engineering is essentially a curriculum-centred discipline with only limited scope for a constructivist approach to learning in the part-time mode. Silcock and Brundrett, in Middlewood and Burton (2001) offer three models of curriculum design in this regard as follows:

1 teacher/subject centred
2 partnership approach
3 student-centred.

In terms of curricula and pedagogies, it is fair to conclude that sustainable change in approach cannot be forced on an unwilling community of academics or learners. Lumby, in Middlewood and Burton (2001) warns that managing teaching and leaning is a political as well as a technical process and that any innovation will only be accepted in proportion to the degree of support that exists or has been constructed. It must be expected that opposition will present itself and divergent views will be offered. Nonetheless, change took place on the part-time degree in a collaborative way, and a constructivist programme was designed and delivered successfully by a motivated team. The key to successful change appears to be building on a collaborative team with all stakeholders, and avoiding the imposition of new theories against the will of stakeholders.

References

Biggs, J.B. (1989) 'Approaches to the Enhancement of Tertiary Teaching', *Higher Ecucation Research and Development* 8 (1): 7–25.

Department of Education and Science (2000) *Learning for Life*: White Paper on Adult Education. Available at http://odtl.dcu.ie/mirror/irlgov/educ/adult-ed-execsummary.html (accessed July 2006).

Edwards, R., Hansin, A. and Raggatt, P. (1996) *Boundaries of Adult Learning*, London: Kogan Page.

ESRI (Economic and Social Research Institute) (2005) *Overview of the Irish Economy*. Available online at http://www.esri.ie/content.cfm?t=Irish Economy&mId=4 (accessed July 2005)

Forfas (2005) *Fourth Report of the Expert Group on Future Skills Needs*, Dublin: Government Publication.

Knowles, M., Holton, E. and Swanson, R. (1998) *The Adult Learner: A Neglected Species,* 5th edn, Houston: Gulf.

Marton, F. and Saljo, R. (1976) 'Qualitative Differences in Learning', *British Journal of Educational Psychology*, 46: 4–11.

Middlewood, D. and Burton, N. (eds) (2001) *Managing the Curriculum*, London: Paul Chapman.

Trow, M. (1999) *From Mass to Universal Access*, Louisville, KY: Minerva.