Employer perspectives on Engineering Technician education in Australia

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***Abstract**: Both the higher education (HE) sector and the vocational education and training (VET) sector provide two year programs for Engineering Technicians, normally called Engineering Associates in Australia. Advanced Diploma programs are competency based and offered by VET institutions while the higher education Associate Degree programs were, until recently, only offered by universities. This paper reports on the results of an online questionnaire that 25 engineering employers completed during the 2010. The aim of the questionnaire was to gather information from current employers about the reasons why they have supported an employee who was studying an Engineering Technician program part-time, the level of support they provide and any barriers that inhibit the employment of additional students. The respondents were from regional and rural areas in two Australia states and represented 21 separate organisations: ten private companies, eight local authorities and three government departments. The four key findings were: (1) the majority of the employers saw their support for students as one way to address current skills shortages in their industry, particularly in government instrumentalities;(2) most of the employers said they would continue support students who graduated and then articulated into an engineering degree program; (3) they would like more engagement with education providers; and (4) they believed that federal and state governments should offer financial incentives to encourage employers to offer engineering traineeships or cadetships.*

Introduction

There are two Australian Qualifications Framework (AQF) Level 6 programs that lead to employment as an Engineering Technician, higher education (HE) Associate Degrees and Vocational Education and Training (VET) Advanced Diplomas. Both Sung (2010) and Little (2005) have highlighted the role employers play in the development and support of qualifications at this level and suggest it is critical if the programs are to successfully meet the needs of industry. This paper reports on a study of employer perspectives about one Australian Associate Degree program that is offered by distance education. The study explored a range of issues relating to the provision of this Engineering Technician program to part-time students, the majority of whom live and work in regional and rural areas in Queensland and New South Wales. The aim of the study was to identify any issues that impact on the provision of this program, and the success of the students studying the program. A series of recommendations were then developed for engineering schools, employers and governments to enhance the provision of Engineering Technician education in Australia, the equality of educational opportunity for this diverse group of students, and increased support for the students' employers. Thus the paper addresses the inclusivity theme of the Conference.

Research questions

The following research questions were addressed in the study:

- Why did employers select the USQ Associate Degree program?
- How do employers support their students?

- Does the structure and content of the USQ program meet their needs?
- What relationship would employers like to have with VET and HE providers?
- What plans do the employers have for the students when they graduate?
- What barriers inhibit the employment of additional students?

Literature review

Kaspura (2011) reports that while the overall growth in employment in Australia was 20% over the last decade, the demand for members of the engineering team rose by 52%. Because the number of engineering degree graduates produced each year by Australian universities has remained static over the same period (Godfrey & King, 2011), the demand - supply gap has been growing and contributing to the skills shortages that have been evident since 2005. By way of contrast, the graduation rates for the programs that lead to employment in the Engineering Technician category rose by 25% from 2001 – 2008, although they have since declined, adding to the unmet demand (ANET, 2011).

Dowling (2010) reported that during the period 2005-2008 there was a growth of more than 280% in commencing student enrolments in the distance education offer of the University of Southern Queensland's Associate Degree in Engineering program. This growth was attributed to an increase in the offer of cadetships/traineeships by employers, where the students work full-time and study part-time. An example of this workforce strategy is provided by ActewAGL human resources director Tania Hutchinson who reported that the utility company is concentrating on "*growing our own skilled workforce*" by offering apprenticeships, cadetships, traineeships and a graduate development program to overcome skills shortages (O'Keefe, 2011, p. 1 Weekend Professional).

A similar trend has been reported in the US where the level of internships and co-operative programs is higher for Associate Degrees and two-year college Credentials than for other higher education awards (CERI, 2011a). Although the current demand for engineering graduates is weak in the US (CERI, 2011b), internships and cooperative programs are still seen as important for the successful transition of graduates from these programs into the workplace (CERI, 2011a). The role of employers is highlighted by one of the outcomes of a Gates Foundation funded project: '*An essential component of any earn and learn program is the necessity for the alignment between the three parties: educators; learners; and employers*' (CERI, 2011a, p. 14).

In 2000 the UK government supported the introduction of foundation degrees which were focussed on meeting industry needs for a work-related intermediate degree that provided both technical and professional skills. The aim was to address skills shortages at the associate professional and higher technician levels by attracting non-traditional students into higher education and to enable people already in the workforce to develop their skills at this level (Little, 2005). Following a 2003 study of employers' perspectives on intermediate vocational higher education in the UK, Little (2005) found that employers in the engineering and construction sectors valued these qualifications more than employers in other sectors as they were familiar with Higher National Certificate and Higher National Diploma awards. In these fields employers look to support and sponsor employees to study part-time so that they can integrate their workplace experiences with their education, although in some cases their decision was also based on other factors such as: the accreditation status of the award; the alignment of the program with their needs; or the availability of a distance education program due to the impracticality of day release programs in their circumstances (Little, 2005).

A later study found that some major employers believed foundation degrees were more work-oriented than other vocational awards and therefore more suitable for developing their existing workforce (Little, 2005). By way of contrast, Godfrey and King (2011) reported that foundation degrees are increasingly being used by Australian engineering schools as an alternative entry pathway to a degree program rather than as a qualification that leads to employment as an Engineering Technician. There is also considerable variation in the entry requirements, programs aims, structure and pedagogies of the two Australian qualifications offered by institutions at AQF Level 6, both within each sector and between the sectors. This diversity makes it difficult for students to select a program that aligns with their career goals and for employers to engage in the educational process and identify graduates, or programs, which suit their needs (Dowling, 2010).

Little (2005) noted that there is a danger that Engineering technician programs will fail to achieve their aim if graduates choose to progress directly to degree studies, rather than employment, because employers, and the relevant professional bodies, have not strongly signalled the importance and status of these awards in their industry. This stance is supported by the results a comparative study of employer engagement in vocational education in the Netherlands which found that greater employer involvement is necessary if qualifications are to retain their currency and incorporate the emerging skills required to support changes in industry (Sung, 2010). These studies emphasise the important role that employers and industry organisations play in encouraging potential and enrolled students to commit to a career in engineering, in this case at the Engineering Technician level (ANET, 2011).

Sung (2010) argued that two factors were critical in creating a sustained and effective level of employer engagement in VET qualifications in the Netherlands: the inclusion of flexible learning strategies and both theoretical knowledge and practical competency based skills in VET awards; and a system design that provides government incentives for employers who engage in the system.

Methodology

An online questionnaire was developed following consultations with senior staff at VET and HE institutions. It contained a total of 54 questions including seven questions seeking personal information. Some questions required participants to select a single response from a list of responses while others allowed them to select one or more of the listed responses. In most of these questions the participants were able to select 'Other' as an option and then give details of their option. The questionnaire also included questions that required free-format written responses.

A total of 86 employers, or student supervisors, were invited to complete the questionnaire during May 2010. They had been recruited for this and other purposes during an earlier study by the author.

Results

A total of 25 employers or supervisors completed the online questionnaire, a response rate of 29%. They were drawn from regional and rural areas in two Australia states and represented 21 separate organisations: ten private companies; eight local authorities; and three government departments. Each of the respondents had employed, or supervised, a student who was working full-time while studying the USQ Associate Degree program part-time by distance education. While the majority of the students were studying civil engineering, others were studying computer systems engineering, electrical and electronic engineering, or mechanical engineering.

All 21 organisations reported that they employ Engineering Technicians: with 20 also employing Professional Engineers; 17 employing Engineering Technologists, and 13 employing Engineering Tradespeople.

The key findings from the study are reported and discussed in the following sections.

Why did employers select the USQ Associate Degree program?

Nineteen employers said they were not aware of the details of the VET and HE programs that feed into their occupational area. This suggests there is an urgent need for greater consultation between educational institutions and industry organisations to ensure this information is easily accessible.

Seventeen of the employers stated that they had advised their students to study the Associate Degree in Engineering. The main reasons for selecting the program were: the university has a good reputation; the program has a good reputation; or that their students were interested in studying the program. Ten of the employers said that they had considered other programs, with the majority indicating that they had considered programs offered by other universities including Associate, Bachelor of Technology, and Bachelor of Engineering degrees. Only four employers had considered VET sector Associate Degrees, Advanced Diplomas or Diplomas. Thirteen of the 25 employers stated that there were institutions offering on-campus programs in their location.

How do employers support their students?

All of the employers said that their organisations formally supported their employees in their studies, although the level and type of support provided varies from organisation to organisation. Figure 1 provides a summary of the types of support provided by the participating organisations.

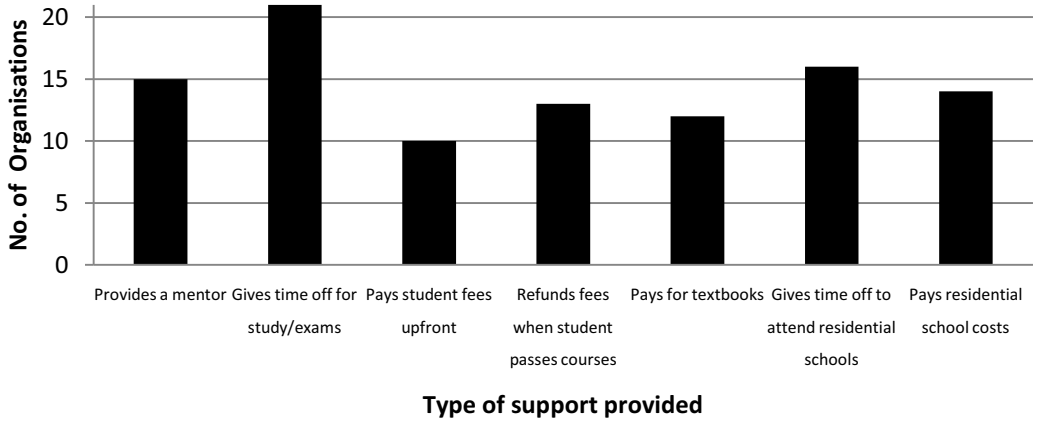

Figure 1: The types of support provided by the participating organisations.

All employers agreed that the ideal length of time for a cadetship was four years or less, and 22 believed the maximum time should be six years or less. Sixteen of the employers stated they had employed their students as a trainee or cadet and another reported they had cadetships in the past. Their reasons for offering cadetships were synthesised into the following statements:

- They are used to address critical skills shortages in the industry.
- They provide an opportunity for the employee to gain a formal qualification whilst also learning from their experienced colleagues. This means that they are trained in the real world and better able to meet the demands of the workplace.
- There is a need to replace an aging workforce, so cadetships are used to both recruit and retain employees, especially in the public sector. Local councils and state authorities find it difficult to recruit fully qualified engineering graduates. They know they will lose employees to higher paying positions in the private sector. They believe the training programs benefit both sectors.
- They appear to be the best strategy for recruiting designers.

These findings informed the development of three recommendations in the Australian National Engineering Taskforce report (ANET, 2011).

- *3E: Employers in engineering-related fields should provide employment-based cadetships to employees and students enrolled in paraprofessional qualifications.*
- *4A: Employers experiencing skills shortages in regional economic contexts should explore the potential of distance learning to upgrade the skills of their existing and potential workforce at both the para-professional and professional level.*
- *4B: Registered Training Organisations (RTOs) and higher education providers should assist regional employers to address skills shortages in engineering through the provision of distance learning and mechanisms to involve senior engineering employees in aspects of course delivery and assessment.*

Does the structure and content of the USQ program meet their needs?

The 22 employers who responded to the questions about the structure and content of the program agreed that their employees will have the knowledge and skills required for the role they will undertake when they graduate, and they believed that all of the courses in the current program were relevant for their engineering specialisation. However, seven employers noted the need for additional courses in their specialisation and all seven suggested that a course in project management should be included. Fifteen of the employers believed that it was very important that the program is accredited

by Engineers Australia; seven believed this was important, and the remaining three noted that while they would like to see it accredited but it was not important for their organisation.

What relationship would employers like to have with VET and HE providers?

While thirteen of the organisations reported that they actively seek partnerships with education and training providers, only five organisations have been approached by an institution to provide input into curriculum content, qualification structure or credit transfers. They believed that greater consultation is needed between industry, VET institutions, and universities to ensure that the skills and knowledge gained during the qualification correspond to industry needs, and that articulation pathways are aligned to steps in career progression pathways within organisations. While fourteen of the employers see a role for industry in the development and sustainability of articulation pathways; only two reported they had been approached by an education provider for this purpose.

Fourteen employers believed that graduates with university qualifications are prepared for their workplace role, while eleven believed they were not prepared. Only seven employers believed that graduates with VET qualifications are prepared for their workplace role, while thirteen believed they were not prepared.

What plans do the employers have for the students when they graduate?

Nineteen of the employers stated that their employees would be promoted and receive a pay rise when they graduated from the Associate Degree in Engineering program. The main roles they would undertake included: Engineering drafting and design; leadership in technical design teams; engineering project management; membership of the management team; contract costing/management costing; and process specialist. Twenty three of the employers stated that they would continue to support their employees if, after completing the Associate Degree in Engineering, they enrolled in an engineering degree program.

What barriers inhibit the employment of additional students?

Eighteen employers listed actions they believed the federal or state governments could take to help employers offer cadetships or support part-time engineering students with their studies. Their responses were synthesised into the following statements:

- Governments should recognise and support these students in the same way that they recognise and support apprentices.
- Governments should provide incentives for employers so they are encouraged to offer cadetships. The suggested incentives included: reduction or elimination of student fees; removal of GST on textbooks and equipment; and tax relief.
- Governments should encourage or mandate larger organisations to offer cadetships so that the training burden is shared by all industry sectors. There is little incentive for organisations to train staff if they are going to be poached by the mining or private sectors.

Nine employers listed policies, taxes or issues that they believe discourage employers from offering cadetships. Many respondents gave similar answers to those summarised above, however, a number mentioned that governments should exclude cadetships from payroll tax and fringe benefits tax liabilities.

Two other factors were found to be inhibiting the growth of cadetships in Australia. Firstly, the fact that the training burden was not being shared by all sectors of the industry has led to a loss to graduates to higher paying sectors. Secondly, the different policy and funding arrangements adopted by state and federal governments for the VET and HE sectors creates anomalies and inconsistencies for employers, employees and education institution. This finding informed the development of the following ANET (2011) recommendation:

- *3F: The Ministerial Standing Committee on Tertiary Education, Skills and Employment should review the funding of para-professional qualifications in engineering for the purpose of removing inconsistencies between the funding of VET and HE providers that could potentially distort the supply of and demand for paraprofessional qualifications at AQF Level Six.*

Sixteen employers listed actions they believe the university could take to help employers better support part-time engineering students with their studies. Their responses were synthesised into the following statements:

- The university should provide more out-of-hours support for their students.
- The university should ensure easier access to course teaching staff and reasonable response times when they ask questions.
- Where students are on formal cadetships then the university should facilitate greater employer involvement and support in program development, administration, and progression activities. This could include a regular newsletter to keep employers informed about programs and students.

Conclusion

This paper reported on a study of employer perspectives about an Australian Associate Degree program. The four key findings were:

- The majority of the employers saw their support of the students as one way to address current skills shortages in their industry, particularly in government instrumentalities;
- Most of the employers said they would continue support students who graduated and then articulated into an engineering degree program.
- The importance of employer engagement in with VET and HE providers; and
- Both federal and state governments should offer financial incentives to encourage employers to offer cadetships.

These findings informed the development of the recommendations contained in the Executive Summary and Recommendations report published by the Australian National Engineering Taskforce.

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