



Engineering Pathways Seminar A summary of the outcomes

December, 2011



Background

On Thursday 1 December 2011, Skills Australia hosted a seminar on Engineering Pathways to initiate a national dialogue between key stakeholders to discuss ways to address skills shortages in the engineering occupations. The seminar focussed on the role of engineering VET Diplomas and Advanced Diplomas, both in their own right and as potential pathways to higher education.

The purpose of this seminar was to:

- provide a forum for discussion on issues of concern for the engineering industry identified by recent research, including skills shortages;
- identify opportunities for stakeholders to work together to address these issues and;
- suggest ways to improve the supply of engineering skills for the Australian workforce.

The seminar brought together forty stakeholders representing Industry Skills Councils, VET and higher education providers, researchers, industry peak bodies and employers. It was facilitated by Professor Rod MacDonald, Ithaca Group.

Presentations were made on recent research and practice by:

- Professor Robin King, *Pathways from VET Awards to Engineering Degrees: a higher education perspective*
- Dr Louise Watson and Dr John McIntyre, *Scaling up: building engineering workforce capacity through education and training*
- Maree Roberts, NuCoal Resources, *Case study presentation*

We plan to make copies of these presentations available on the Skills Australia website (currently seeking approvals from presenters).

Alan Bradley from Engineers Australia also gave a brief presentation.

Identifying the key issues

Round table discussions focussed first on identifying and agreeing on the key issues. These were:

- Engineers not working as Engineers
- Decreasing AQF 5/6 enrolments in VET
- Roadblocks in VET-HE pathways
- Lack of clarity around the purpose of para-professional qualifications
- Demand issues - increasing the inputs
- Workforce planning and retention
- Training Package content

Outcomes of round table discussions

There was strong agreement that there is a need to attract more people into engineering studies and to consider ways to make engineering more attractive to prospective students, in both VET and higher education. The “value proposition” for working in engineering occupations needs to be clearly articulated and more widely understood.

In relation to paraprofessional qualifications at Australian Qualifications Framework (AQF) levels 5 and 6 there is a need to better define their purpose and job outcomes. This would assist in attracting people into paraprofessional engineering occupations and in

differentiating paraprofessional qualifications from both trade and professional qualifications. It was considered that they need to have a clear purpose and occupational outcome in their own right, not just as pathways.

One of the critical issues exposed was that few providers are offering technician level training in civil engineering. In recent years there has not been a single enrolment in the training package Advanced Diploma in Civil Engineering, though there have been enrolments in national accredited courses. The Associate Degree in Civil Engineering, a higher education qualification, taught by universities and two TAFE institutes may be providing an alternative preparation for both para-professional occupations and entry to Bachelor Degrees.

In relation to pathways it was agreed that Certificates III/IV provided fertile ground in which to encourage students to progress to higher qualifications in engineering. Foundation skills, especially maths, were seen as critical cornerstones for all engineering qualifications and especially important for students progressing to higher education. Pathways were seen to be difficult to navigate, although some providers have negotiated arrangements to facilitate progression. It was also noted that the differential funding models for VET and higher education in areas such as student fees, income support and loan arrangements “muddy the waters” and may be affecting student choice.

Workplace issues were also seen to be critical in addressing skills shortages, and employers needed to find strategies to attract and then retain engineering graduates. There was a need to use the skills of employees effectively so they were not overstretched or underutilised. Employers also need to ensure workplace culture is inclusive; in particular that it supports women in engineering occupations.

A more detailed summary of the points raised at the seminar by participants is provided at TAB A.

Ways forward

At the end of the round table discussions the seminar participants agreed the following strategies might constitute “ways forward”. It was agreed that the importance of employment /labour market structures was an overarching consideration that should be taken into account.

- Make engineering a stronger value proposition
- Clarify exactly what maths is needed
- Use certificate III/IV as fertile ground for growing the engineering technicians and professionals of the future
- Ensure the quality and relevance of higher level VET qualifications
- Employers to make better use of the skills of their engineering workforce

Next steps

Participants agreed it had been productive to bring the key stakeholders together and there should be ongoing discussion. Skills Australia recommends the issues raised be taken forward by the Industry Skills Councils, the Australian Council of Engineering Deans (ACED), the Australian National Engineering Taskforce (ANET) and Engineers Australia. ANET is holding a series of workshop in 2012 which will provide an opportunity to further progress the issues raised in the seminar. The recently announced Senate inquiry into *the shortage of engineering and related employment skills* also provides a vehicle for further analysis and action.

Outcomes of round table discussions

The facilitator tasked each table with an issue to discuss. The following points reflect the outcomes of each round table discussion.

Engineers not working as Engineers

- The core issue is getting people into the engineering profession.
- This wouldn't be an issue if we had enough supply.
- The actual opportunities an engineering degree provides have not been clearly conveyed.

Decreasing AQF 5/6 enrolments in VET.

- Are there jobs that relate to these qualifications?
- Should AQF 5/6 qualifications be promoted in their own right? i.e. not just as an articulation pathway.
- Need to understand why students choose or do not choose to enrol in these courses
 - Is there research data available that identifies what influences choices at the school level?
 - What are the aspirations of students enrolling in these courses?
 - What role do parents and career counsellors play?
 - Parents typically encourage children to apply to university rather than into VET. VET is still considered a second choice.
- Maths capability of school leavers limits the pool of talent.
- The depth and rigor of VET qualifications needs to be assured.
- Some engineering programs in VET were wound down in the 1990's and now the facilities and technology and teaching expertise has been lost.

VET/Higher education pathways

- Certificate III and IVs are fertile ground to encourage student to progress to further study and into para-professional occupations. It is important to market para-professional qualifications to holders of Certificate III and IVs, not just to school leavers.
- Foundation skills are needed for a successful transfer from Cert III/IV to higher level qualifications.
- Pathways need to be employer driven eg cadetships. Employers need to be accountable and not just rely on government.
- How relevant are higher level VET qualifications to industry? Do they provide a good end point, not just as a pathway? Need to better define the value and use to industry of VET higher level quals.
- Is there a desire for a higher level 'master trade' qualification? If so is it rewarded?
- How can industry be questioning training packages when they design them?
- There are weak pathways overall but some stand out providers.

Is para-professional shortage the problem?

- The branding of the para-professional is an issue. How are para-professionals positioned in industry and what does a globally competent technician do.
- How attractive is the para-professional occupation to students?
- There are substantial funding differences between VET and Higher Education sectors particularly around Associate Degrees. Differential fees and other funding support may be having an impact on student choice and distorting the "market".

- The quality of maths in pathways to Associate Degrees is an issue. There was consensus that school students needed to receive a strong message about the consequences of dropping maths in school and that, as a result, some jobs may be excluded to them.
- Is the para-professional qualification an end point or a starting point for a career?
- Training packages are constructed by ISCs but delivered by RTOs. Does this “division of responsibility” create problems?

Demand – increasing the inputs

- What is the value proposition for students? Identify the benefits of a career in engineering and then “sell it”.
- There is a high return on investment but take up is low.
- At present universities are taking as many people as meet entry requirements.
- There is a need to examine the consequences of engineering shortages to the economy. Some are very clear such as low productivity and low innovation.
- Poor perception of what an engineer is.
- More community involvement and better communication about the value of doing engineering is required.
- There is a persistent perception of a shortage and people need to be made aware of the value of investing in this profession.
- Engineering is a more attractive occupation in other countries. Why is this not the case in Australia?
- There is a need to fix the pathway option. Studying part time for 7 years is not an attractive option for a young tradesperson or para-professional.
- A need to strengthen maths and science at all levels was identified. Currently there is concern that there is not enough of an emphasis on maths and science. But also a question about how much maths and science is really needed?
- Why isn't there a 'talent focus' in TAFEs and schools to encourage high achieving students to embark on careers in engineering? Why not a talent management strategy?
- What incentive is there to attract qualified engineers back into an engineering occupation?
- What are the work place conditions in engineering companies like?
- How inclusive are these workplaces e.g. for women?
 - It was noted that in the 1980s there were lots of women in chemical and electrical engineering but now it seems not enough. Factors influencing this may include the lack of universities offering these disciplines, and that women may not follow a career path if they perceive it is not conducive to their future aspirations, such as raising a family.
 - Women may not see the culture as welcoming – it's up to employers to create the right workplace.
 - There is a low proportion of young women doing maths at school.
- Find out why engineers leave – are they jumping ship or going to better pastures?

Workforce planning and retention

- The work culture of engineering professionals needs to be more attractive and inclusive. Do we know enough about workplace culture and why people are leaving?
- We need to make workplaces attractive to a diverse range of people.
- Retention of women is a problem.
- There is a need to attract women back into the engineering workforce and provide more flexible workplaces.

- An attractive job is very important and merely providing extra pathways is not enough. Need to have clear job outcomes.
- Engineers used to be under paid and the message that they are now higher paid does not flow down to younger generations when they are making career decisions.
- Need to have a focus on workforce planning and a closer matching of skills to the job.
- Need a change in thinking of companies – does the role actually require an engineer?
- Professional engineers are sometimes working in jobs for which they are overqualified and sometimes in roles they are not qualified for – need accountability.
- Engineers are working as project managers on engineering projects rather than working as engineers
- There is a need to target specialist engineers.
- Workplaces need to identify what they really need – how many professionals and para-professionals.
- Content of units of study might not be relevant.
- Match the job to the qualifications.

Training Package content

- Articulation pathways are important. Strong articulation pathways enable progress through VET qualifications.
- Para-professional training packages appear to be developed from the trades. Are they meeting the need for paraprofessionals well enough?
- Civic engineering is a particular problem. There are no trade equivalents for civil engineers and there are few providers offering technician level training in civil engineering.
- There is concern by some in industry that training packages are not meeting their needs–. However, it was acknowledged that training packages are developed in consultation with industry.
- Concerns were raised about the mathematical ability of school leavers and the job opportunities and prospects once they have completed an AQF 5/6.
- Some trades at the Certificate III level have high outcomes. Can these outcomes be converted to the Diploma level?
- It was important to consider how the qualification is valued, i.e. what is motivating students to do the para-professional level qualification?
- Trade work is different to technician work.
- There used to be a fantastic engineering cadetship program, however Government policies are now more focused on the foundation level qualifications.
- Articulation between Diploma and Advanced Diploma is fine, but there is a large gulf between these qualifications and HE.
- Every qualification level is looked at separately, e.g. apprenticeships focus on a hands-on qualification linked to a job. There is insufficient focus on preparing for the next level qualification.
- Some RTOS use courses “sitting on their shelves” rather than training packages.
- Training packages specify the required competency outcomes and providers can build theoretical content into their delivery.
- The idea of a master tradesperson may be attractive but is there an occupational outcome? Are people remunerated at this level?