

# International Students' Employment Outcomes: Cause for Concern

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***Abstract:** Skills shortages were widely reported by engineering industries in Australia in 2006. This paper reviews 2006 census data to examine the stock of engineering graduates in Australia at that time and compares the employment and occupational profiles of migrants with the locally born. The results show that there was a large pool of engineering graduates in Australia who were not employed in engineering occupations, even at a time of acute engineering skill shortages. Migrants, experienced different labour market outcomes from locals whether they had Australian or foreign engineering qualifications. Migrants from several regions who came to Australia for their university engineering education were much less likely to be working in engineering occupations than those who arrived in Australia aged 18 or those who gained their qualifications before migrating. The findings strongly suggest that international students from certain backgrounds need special support if they are to fulfil their ambitions and have a similar chance of gaining engineering-related employment as locals. Interview data from some migrants who graduated in Australia and were seeking engineering work revealed inappropriate job-seeking skills and significant misunderstandings about the needs of employers. Without closer attention to their particular educational needs, international students graduating in Australia may not be the answer to predicted future skills shortages.*

## Reports of Skill Shortages

Until the current financial problems started to affect engineering activities in late 2008, there were many reports that Australia was experiencing an acute shortage of engineering skills: companies were finding it very difficult to attract and retain engineers, both at graduate and experienced levels. These skill shortages have been blamed for cost increases and delays in engineering projects. Recent reports suggest that skill shortages are expected to recur in the coming few years.

The Australian government responded to the skills shortages by making it easier for engineers to migrate to Australia (Birrell, Dobson, Rapson, & Smith, 2001; Engineers Australia, 2008). Engineering classifications were added to the migration-on-demand-list (MODL) which means that appropriately qualified engineers could accumulate sufficient points for a skilled migration visa more easily (Department of Immigration and Citizenship, 2008a). In addition, the Australian government opened an opportunity for sponsored temporary migrants to fill positions which cannot be filled by any other means (type 457 visa) (Department of Immigration and Citizenship, 2008b). The government has also increased the number of funded places in engineering schools.

Anecdotal evidence suggests that many qualified engineers, including many of those who have migrated to Australia, are not working in engineering occupations (Little, 2010). Reports like this motivated a study of census statistics and a longitudinal study of our own graduates (Tilli & Trevelyan, 2008). One could ask whether Australia manages to retain sufficient numbers of

engineering graduates in related occupations, and whether this lack of retention accounts for skills shortages experienced in the workplace.

In a study of engineering graduates in Australia, Trevelyan (2010) revealed that a large proportion of those graduates (up to 70% or more of migrants from certain regions) were not working in engineering-related occupations at the time of the 2006 Census, even at the peak of the reported skills shortage. Gaining an Australian engineering degree does not seem to have improved employment outcomes for migrants. In some cases migrants with Australian qualifications were *much less likely* to be in engineering-related employment than their compatriots with foreign qualifications.

This paper, therefore, examines some of the possible reasons for this result.

These results raise significant issues for engineering educators, employers, social policy makers and the engineering profession. The supply of graduates from Australian universities will increase significantly over the next few years following large enrolment increases in the pipeline. However, these graduates may find that their dreams of engineering employment may not be met unless prompt action is taken to improve advice to students in the pipeline. An Australian education is highly rated and large numbers of foreign students have come to Australia as a result of this reputation for quality. However, if students find it harder to gain employment in their field of students than compatriots who were educated at home, many may eventually question the quality of courses provided in Australia.

## Recent literature on Australian migration issues

Birrell and Healy (2008) commented that “there is a large body of evidence showing that migrants with professional qualifications from Non-English-Speaking Countries (NESC) have, in the past, struggled to find professional employment in Australia” (p2). Migrant engineers in Australia can be added to this category (Hawthorne, 1994). This difficulty finding employment was one reason why, in 1999, applications for migration from international students who had completed their studies in Australia were given precedence over applicants who had not completed their degree in Australia, and later these former international students were exempt from the entry requirement of work experience in their profession (Birrell & Healy, 2008, p2). Birrell and Healy (2008) also showed that, despite the measures taken by the government to increase the intake of skilled migrants with Australian qualifications to meet the demands of employers, those migrants from non-English speaking backgrounds (NESB) (who constitute the majority of visa entries) struggled to find employment in professional or managerial positions (p8). In particular “Those born in China, North-East Asia, South Asia (mainly India, Pakistan, Sri Lanka, Bangladesh) are experiencing the greatest problems in finding professional and managerial positions, particularly among those in the 20 to 29-year-old age group.” (p8)

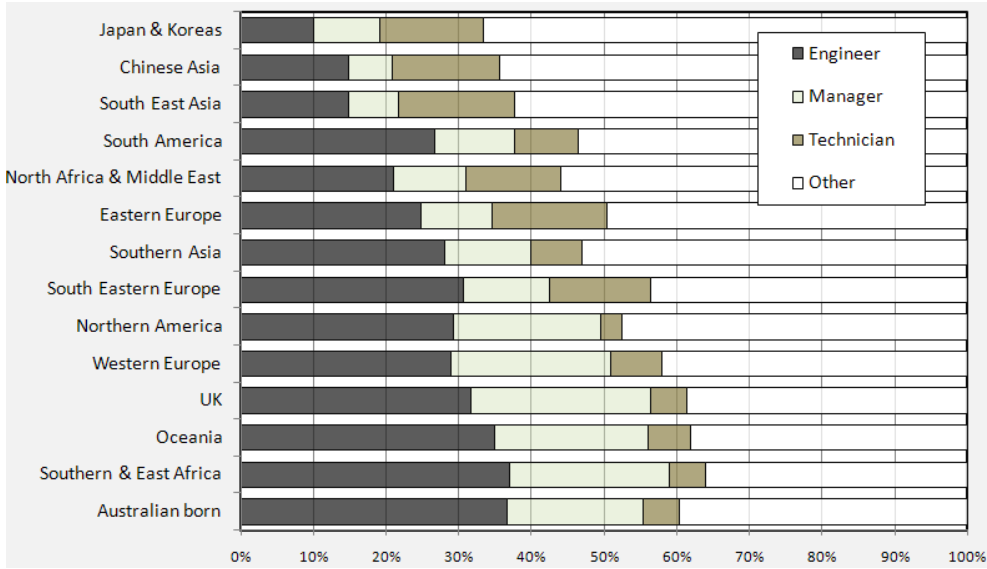
Looking at engineers in particular, Birrell and Healy (2008) noted that almost 50% of those likely to have gained their qualifications outside Australia managed to find work in professional or managerial positions, compared to *only 28%* of those likely to have gained their qualification in Australia (p8).

## Results from 2006 census data

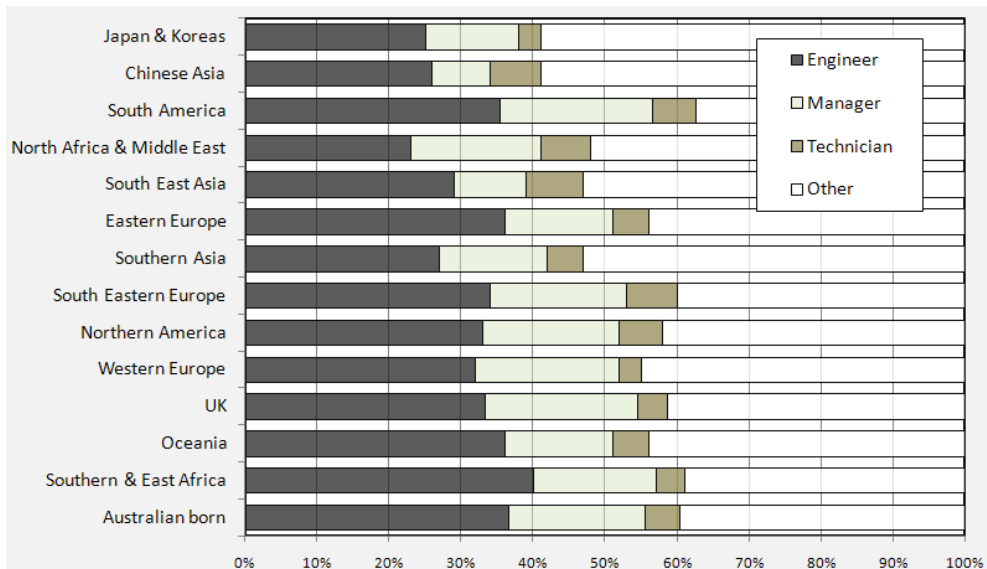
The 2006 census revealed 140,000 people in Australia whose highest qualification was an engineering degree – this does not include those who subsequently studied in other fields, e.g. MBA degrees. Only about 2% were unemployed and a slightly higher percentage were not in the labour force. Slightly more than 50% were born outside Australia. By carefully classifying occupational categories assigned by the ABS we concluded that, for Australian born engineers, 37% were working in engineering jobs, 19% in management occupations that could be associated with engineering (though this category included finance and other non-engineering management jobs, for example) (James P. Trevelyan & Tilli, 2010). 5% were working in technical occupations and 40% were employed in unrelated occupations. For migrants, only 25% were working in engineering jobs, 13% in management, 8% technical, and 54% in unrelated occupations.

These figures suggest that skills shortages were, at least in part, due to the failure of engineering employers to be able to attract the large number of potential applicants already in Australia and working in other occupations. Alternatively, these people did not have the skills that employers were looking for. Anecdotal evidence suggests that both factors were significant.

Figure 1 reveals a breakdown for male migrants by region, selecting those who arrived aged 26 or more, most likely with foreign qualifications. Female migrants display similar employment outcomes to males, but because there are fewer, there are more obvious statistical anomalies in the data. Note that around 25% of migrant engineers come from 'anglo-european' source countries such as New Zealand, South Africa, Britain, Western Europe, Canada and USA.



**Figure 1:** Employment occupation outcomes for *male* migrant engineering graduates who arrived aged 26 years or more from different regions: 2006 Census data, this and other data from (James P. Trevelyan & Tilli, 2010).

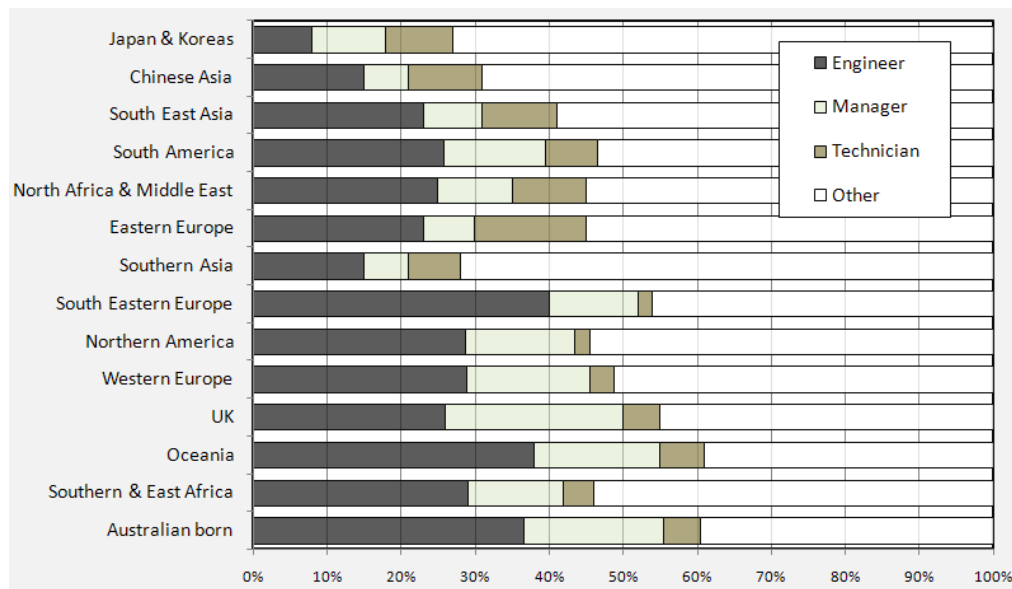


**Figure 2:** Employment occupation outcomes for migrant engineering graduates who arrived aged 0 – 18 years from different regions.

Figure 2 shows similar data for male migrants who arrived aged 18 or less, and therefore completing at least part of their schooling in Australia. The outcomes for most regions are similar to those for the Australian born, though there is a slight trend evident reflecting figure 1. Figure 3 shows the data for

the remaining group, those who arrived aged 19-25 years and who therefore, most likely, received their engineering education in Australia. What is surprising is that the employment outcomes for many regions are worse than for those arriving with foreign engineering qualifications. China and South Asia, in particular, show a much worse employment outcome, at least in terms of engineering and managerial employment.

This data strongly suggests that, for migrants arriving aged 19-25, an Australian engineering qualification *can be a disadvantage* when compared to their compatriots with foreign qualifications.



**Figure 3:** Employment occupation outcomes for migrant engineering graduates who arrived aged 19-25 years from different regions.

Statistical data alone cannot establish a causal link to explain these results. Some possible explanations have emerged from another research project examining engineering practice through qualitative research methods (James P. Trevelyan, 2010).

There are three sets of possible reasons that could explain why migrants from China and South Asia (for example) who gained their qualifications in their home countries are almost twice as successful as those with Australian qualifications in gaining engineering or related managerial employment:

- i) these migrants are less likely to seek engineering work in Australia, or
- ii) they seek work and are less likely to secure engineering-related employment, or
- iii) they gain engineering-related employment but are less likely to stay in that employment sector.

The first possible set of reasons is that graduates from Australian universities choose to pursue engineering or related employment in their home countries, not Australia. In other words, those remaining in Australia are not interested in engineering-related occupations. There is little evidence to support this as a possible explanation, but at the same time there is a lack of reliable evidence to finally refute this possibility. We know that most migrants with Australian degrees prefer to remain in Australia on graduation and a large proportion seek permanent resident status. It takes a few months to complete this process, however, and it would be necessary for education institutions to trace graduating international students to find out their ultimate employment destinations.

Census data, however, reveals a large number of migrants with engineering degrees remaining in Australia in other fields of employment other than engineering.

The second possible set of reasons relate to factors (such as discrimination) that decrease the likelihood that migrants from certain regions with Australian engineering degrees can gain engineering-related employment. Here there are several possibilities. Data from the longitudinal study reported earlier revealed that most graduates start their careers with larger companies that can provide the additional on-the-job training that engineering graduates need to become proficient in their profession. Interview data from has revealed some smaller companies have a preference to employ engineers with previous experience since they find it harder to train complete novices. Larger companies often use psychometric testing to narrow the choice of graduates, and tend to select for behavioural competencies such as 'initiative', 'customer focus' and 'interpersonal relations' rather than specific technical attributes. It is possible that psychometric tests might be biased against graduating international students. It is also possible that there are other mechanisms that discriminate against international students applying for engineering employment.

However, the relatively greater success of migrants with home-based qualifications from the same countries in finding engineering-related employment makes it difficult to sustain arguments based on discrimination. Australian government authorities charged with resolving cases of discrimination do not retain occupation data in their statistics so it is not possible to test this. Informal enquiries revealed no evidence that officers working for these authorities were aware of issues in engineering-related sectors of the economy.

It is possible that employers prefer migrants who arrive with qualifications from their home countries (who have to have engineering work experience to qualify for migration) because they have more appropriate skills than migrants who have Australian engineering degrees but no understanding of engineering practice.

Qualitative research on engineering practice has revealed a wide gap between student and faculty perceptions on the one hand, and the realities of practice on the other. According to students and faculty, engineering practice predominantly comprises solitary technical problem-solving and design work. In reality, engineers spend most of their time on direct interactions with others, and solitary technical work is a relatively much smaller proportion of their working time (Tilli & Trevelyan, 2008; J. P. Trevelyan, 2007; James P. Trevelyan & Tilli, 2010). Engineers seldom engage in hands-on work, instead they rely on the work of tradespeople, contractors and artisans. This coordination role "usually involves the one-on-one relationships between superiors, clients, peers, subordinates and outsiders." Detailed surveys of working time perceptions of our own graduates revealed that they reported spending 60% of their time explicitly interacting with other people (Tilli & Trevelyan, 2008), of which about 32% was verbal (face to face and telephone calls) and the remaining 28% was in writing. These results agree reasonably well with several earlier research reports (e.g. Kilduff, Funk, & Mehra, 1997; Tenopir & King, 2004; Youngman, Oxtoby, Monk, & Heywood, 1978, p7-9). Trevelyan (2007) suggested that the importance of coordination in engineering work is not reflected in engineering education: students have only informal opportunities to develop appropriate skills (p191).

This explanation fails to explain the greater success of migrants who arrived aged less than 19 years. However, these migrants could have access to more effective job-seeking networks, as explained below.

Apart from discrimination or skills preferences, another possibility is that migrants with Australian engineering degrees lack certain skills needed to find engineering-related employment. Qualitative interviews with engineers of South Asian origin seeking employment after completing Australian qualifications revealed some potential contributing factors. Though the sample size is small in this category (n=3), they provide a useful insight. All spoke English very fluently and had no difficulty communicating. These engineers displayed little understanding of the employment market and had relied entirely on newspaper and internet advertisements. In one case over 500 applications had been

sent with no positive result. In practice, up to 80% of jobs are not advertised and employers rely on networking and chance encounters to fill vacancies (this is for all occupations: the proportion for engineering jobs does not seem to have been determined). None of the three had received job seeking advice from their education institution. None understood the practice of writing a covering letter explaining how their skills were relevant for the selection criteria in the job advertisement. Instead they had simply responded to advertisements with their CV and a simple covering letter. None had attended Engineers Australia technical meetings to meet with and network with other engineers. After the interviews, each was provided with advice on the informal job market and instructions on joining Engineers Australia as graduate engineers, and the importance of meeting engineers and building a personal network of contacts.

Working against this possible explanation is the evidence that migrants who arrived earlier than 19 years were much more successful in finding engineering-related employment. One could expect that many of these migrants, if not the majority, also have their parents living in Australia. It is much less likely that international students who came to Australia only for their tertiary studies would have their parents living in Australia. Parents and family can be a source of valuable contacts and networks when it comes to seeking employment, even the awareness that such networks are valuable. None of the three graduates we interviewed had their parents in Australia, and none were aware of the need to develop and make use of such networks. Our research on engineers in South Asia (Domal, 2010; Domal & Trevelyan, 2008) revealed that family networks are often essential in order for many South Asian engineers to obtain their first job.

The third possibility is that once employed, a higher proportion of these migrants than, say, Australian born graduates, either dislike engineering work or fail to meet employer expectations and look for jobs in other sectors of the economy. In other words, once they get engineering jobs they are less likely to remain in an engineering-related occupation.

In light of this important aspect of engineering in Australia, the work of Domal and Trevelyan (2008) is enlightening. They commented that although the content of engineering education in South Asia is very similar to Australia, engineering practice was quite different. Their recent field work to examine engineering practices in South Asia “provide(s) strong evidence that hierarchal organization structures limit the autonomy and coordination abilities of typical engineers in South Asia. Engineers are given minimal individual responsibility and, as a result, avoid taking the risks associated with questioning the *status-quo*, avoid any acting on their own initiative, and, avoid any experimentation with innovations.” (p13)

Migrants accustomed to a culture characterized by strict hierarchy, rigid division of labour and formalized lines of interaction, may not be well prepared for the demands of informal technical coordination in the way it is practiced in Australia. Are these traits recognized by Domal and Trevelyan (2008), that may be incompatible with effective technical coordination, peculiar to engineering practices in South Asia? Shibata (2008) examined the transplanting of Japanese work practices into Thailand. He determined them to be unsuccessful and one of the reasons why was the “job consciousness of rigid division of labour” (p341) of Thai employees. Blunt (1988) examined work practices in an educational institution in Brunei, with Brunese, Malaysian and expatriate workers. Although his work did not focus on engineers, his observation of work practices showed that “close supervision is positively evaluated by operators and managers alike, employees are afraid to disagree with their supervisors, there is a low level of trust...” (p236) and “A marked unwillingness to make any decision without reference to the most senior executive in the organization” (p236). Putti (1989) studied organizational development in large firms in Singapore and commented that “A major barrier to the practice of OD (organization development) in many Asian countries seems to be the lack of a climate for open discussion” (p268). Craig and Lemon (2005) studied the human interface in Polish and Chinese factories. They commented on “the use of indirect communication” in Chinese culture and “in ex-communist countries such as...Poland there remains ...meticulous job demarcation in which the boundary between jobs becomes rigid and there is a tendency to retreat from this position rather than step over the boundary to complete a task or solve a problem” (p129). It is possible that

growing up in a culture where authority exercised through an inflexible hierarchy, and a lack of trust outside family relationships, may make it difficult for a migrant to accommodate to a culture in which it is normal to exercise informal influence outside explicit organizational authority.

The difficulty is that this culture factor should also influence migrants who arrived aged 26 or more who have more exposure to the culture in their home countries. There are no apparent factors that could explain why a much higher proportion of Australian-educated migrants would move to other forms of employment but not those who arrived in Australia before they turned 19 or those who arrived aged 26 or more.

Although no definite causation conclusions can be drawn, these results are sufficiently significant for engineering schools to pay close attention to the needs of international students who have arrived from South, South East and East Asia.

Students need to understand the critical importance of developing professional networks including not just their peers but also older and more experienced engineers. All students need to understand the importance of the informal job market and effective strategies to find employment in the informal sector where a large number of engineering jobs lie waiting for those enterprising enough to find them. They need to develop the skills to understand what skills a given employer is looking for and how to demonstrate that they either have the skills or can learn them in a short time. Students also need to understand another important result from our longitudinal study of engineering graduates. They are not expected to know much from their studies that is directly relevant to any particular job. However, they are expected to have skills that will enable them to learn rapidly from their work colleagues. They need to be able to ask for help and guidance, and to overcome the shyness associated with the fear of seeming to be incompetent by asking simple questions. The ability to continue learning is the key to career success. Lee (1994) found that one of the best predictors of success for young engineers was the ability to form helpful relationships with more senior and experienced engineers. Finally, providing more assistance to smaller companies to set up effective graduate development programs for young engineers could help to overcome future skills shortages.

## References

- Birrell, B., Dobson, I. R., Rapson, V., & Smith, T. F. (2001). *Skilled labour: Gains & Losses - Australian Immigration Research: Centre for Population and Urban Research, Monash University.*
- Birrell, B., & Healy, E. (2008). How are skilled migrants doing? *People and Place, 16*(1), 1-20.
- Blunt, P. (1988). Cultural Consequences For Organizational Change In a Southeast Asian State: Brunei. *The Academy of Management Executive, 2*(3), 235-240.
- Craig, J., & Lemon, M. (2005, 16-17 November). *Perceptions and reality in the implementation of formal management systems: a study of the human interface in Chinese and Polish factories.* Paper presented at the The IEE and MOD HFI DTC Symposium on People and Systems.
- Department of Immigration and Citizenship. (2008a). Is your occupation in demand? Retrieved 14 October, 2008, from <http://www.immi.gov.au/skilled/general-skilled-migration/skilled-occupations/occupations-in-demand.htm>
- Department of Immigration and Citizenship. (2008b). Temporary Business (Long Stay) - Standard Business Sponsorship (Subclass 457) Retrieved 23 October 2008, from <http://www.immi.gov.au/skilled/skilled-workers/sbs/index.htm>
- Domal, V. (2010). *Comparing Engineering Practice in South Asia and Australia.* PhD PhD, The University of Western Australia, Perth.
- Domal, V., & Trevelyan, J. P. (2008, June 20-22). *Comparing Engineering Practice in South Asia with Australia.* Paper presented at the American Association for Engineering Education (ASEE) Annual Conference, Pittsburgh.

- Engineers Australia. (2008). *The Engineering Profession: A Statistical Handbook*, fifth edition. Hawthorne, L. (1994). *Labour Market Barriers For Immigrant Engineers In Australia*: Bureau of Immigration and Population Research, Australian Government Publishing Service.
- Kilduff, M., Funk, J. L., & Mehra, A. (1997). Engineering Identity in a Japanese Factory. *Organization Science*, 8(6), 579-592.
- Lee, D. M. S. (1994). Social ties, task-related communication and first job performance of young engineers. *Journal of Engineering and Technology Management*, 11, 203-228. doi: 0923-4748(94)00012-3
- Little, I. (2010, July). Taxi drivers, chickens and eggs. *Engineers Australia*, 82, 40-41.
- Putti, J. (1989). Organization Development Scene in Asia: The Case of Singapore. *Group & Organization Studies*, 14(3), 262-270.
- Shibata, H. (2008). The transfer of Japanese work practices to plants in Thailand. *The International Journal of Human Resource Management*, 19(2), 30-45.
- Tenopir, C., & King, D. W. (2004). *Communication Patterns of Engineers*. Hoboken: IEEE Press - Wiley & Sons Inc.
- Tilli, S., & Trevelyan, J. P. (2008, June 20-22). *Longitudinal Study of Australian Engineering Graduates: Preliminary Results*. Paper presented at the American Society for Engineering Education Annual Conference, Pittsburgh.
- Trevelyan, J. P. (2007). Technical Coordination in Engineering Practice. *Journal of Engineering Education*, 96(3), 191-204.
- Trevelyan, J. P. (2010). Reconstructing Engineering from Practice. *Engineering Studies*, (in press).
- Trevelyan, J. P., & Tilli, S. (2010). Labour Force Outcomes for Engineering Graduates in Australia. *Australasian Journal of Engineering Education*, (in press).
- Youngman, M., Oxtoby, R., Monk, J. D., & Heywood, J. (1978). *Analysing Jobs*. Farnborough, Hampshire, UK: Gower Press.

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