

# Indigenous Engineering Summit

University of Melbourne, 18-19 June 2015

## Indigenous Student Support Working Paper: Issues and Recommendations

### Authors:

Tom Goldfinch, University of Wollongong  
Lilly Brown, The Aurora Project  
Beth Crowley, Graham (Polly) Farmer Foundation  
Jade Kennedy, University of Wollongong  
Bill Lawson, Reconciliation Australia  
Marj Horne, Australian Catholic University

### Summary of Recommendations:

- R1: Scholarship programs supporting Indigenous students in engineering studies broaden their focus to include not only high achieving students but also students demonstrating the potential to excel in engineering.
- R2: Align scholarship opportunities to other support mechanisms in the formal learning environment.
- R3: Ensure support programs are created in collaboration with Indigenous stakeholders.
- R4: Partnerships between educational stakeholders (students, educators, family, community, industry, government) are established with structural flexibility to enable responsive student support.
- R5: Tertiary engineering education providers revise current curricula in partnership with Indigenous Stakeholders to embed Indigenous perspectives.
- R6: Embed Indigenous support staff within engineering schools and departments to drive responsive and proactive support.

### 1. Introduction

In 2008, just 20 Aboriginal and Torres Strait Islander students graduated from professional engineering degree programs around Australia (Calma, 2009). This figure represents just a tiny fraction of engineering degree completions overall, and highlights the need for significant action to increase the number of indigenous students completing their studies. At present, however, engineering as a field of study faces significant challenges in increasing indigenous student numbers. DEEWR reports that the proportion of Indigenous students studying engineering and related technologies is much lower than that of non-indigenous students (DEEWR, 2008). The engineering profession is clearly under-performing in its appeal to indigenous students in comparison to health, education and the humanities (DEEWR, 2008, p. 118).

In contrast, there is strong demand from engineering industries for indigenous employees. Rio Tinto, for example, has set indigenous labour force targets in the order of 35-40% for a number of its major mining operations (Rio Tinto, 2013). Corporations such as BHP Billiton also offer substantial scholarships to indigenous student looking to study engineering at university (BHP Billiton, 2012). Engineers Australia, the peak body representing the engineering profession, is now pressing for greater participation in engineering education and professional practice (Engineers E. Australia, 2011a). This push for higher workforce participation is driven not only by employment targets, but also by the increasing acknowledgement that engineering needs to become a more socially engaged profession. Successive refinements in accreditation standards for the profession indicate an increasing need to value and include different perspectives and cultures in day-to-day activities to ensure the success of engineering projects (Engineers Australia, 2011b; Institution of Engineers Australia, 1996; Bradley, 2006).

The education sector, industry, government and Engineers Australia have responded to the need for greater participation among Aboriginal and Torres Strait Islander peoples through a variety of outreach activities and scholarship opportunities. There are numerous current initiatives that seek to increase interest in engineering amongst indigenous high school students through outreach programs. One of the most prominent of these is a summer school run by the organization Engineering Aid Australia ([www.engineeringaid.org](http://www.engineeringaid.org)). Engineering Aid Australia provides funding for indigenous students in years 10 and 11 from all over Australia to attend a week long program that includes site visits, talks from practicing engineers, and a range of hands on activities designed to spark students' interest in engineering. Other engineering focused programs take a travelling roadshow approach, visiting schools and running interactive engineering focused activities to engage Indigenous students in a face-to-face setting. Such programs include The University of Wollongong "Hands-on Engineering" program for years 7-12 and Engineers Australia's EngQuest (<http://www.engquest.org.au/>). There are also many examples of more general programs linking high school students with tertiary education such as the Australian Indigenous Mentoring Experience (AIME, see [aimentoring.com](http://www.aimentoring.com)), and other outreach and academic pathway programs including UOW's in2uni initiative (<http://www.uow.edu.au/in2uni/index.html>).

While initiatives to spark interest in engineering and in further study are well recognised and established, the slow trickle of Indigenous students into engineering education pathways continues. The National Indigenous Engineering Summit Student Support working group focused on issues surrounding Indigenous students' pursuit of and engagement with opportunities for a career in engineering. Through its deliberations, readings and experience, the working group has identified four situations in which Indigenous students may benefit from appropriate support towards engineering qualifications:

1. Support in the home
2. Support in formal learning environments
3. Support by external agencies
4. Support to study away from home

This paper details the background information used to develop draft recommendations for presentation and discussion at the National Indigenous Engineering Summit. Recommendations made in this paper are in draft, and have been developed for further refinement in partnership with Summit participants.

### **1.1 Stories from Indigenous Engineers...**

The Student Support Working Group discussed Indigenous engineers' stories as a backgrounding activity to understand some of the challenges overcome by individuals. Some of these Engineers will be in attendance at the summit to share their stories. With permission, these personal stories will be added to the working paper for completeness and to provide a personal context to many of the issues raised below.

### **1.2 What do we mean by support?**

In considering strategies for supporting Indigenous students appropriately, there is a need to avoid a deficit perspective. An over-emphasis on issues originating from Indigenous students (and their familial, cultural and community contexts) is increasingly being identified as *part* of the problem of ineffective support, rather than a remedy to it (Altman, 2009; Forde, Bamblett, Lovett, Gorringer, & Fogarty, 2013; Pholi, Black, & Richards, 2009; Vass, 2012). Considering ways to support students' path to engineering requires an acknowledgement of what Indigenous communities and Indigenous students can bring to engineering.

Strategies for supporting learners also needs to acknowledge that in many instances, reasons for withdrawal from formal studies by both Indigenous and Non-Indigenous learners are not related to academic performance (Baillie & Fitzgerald, 2000; Behrendt, Larkin, Griew, & Kelly, 2012; Foley, 1996). In arguing this point, Foley (1996) describes from an Indigenous university student perspective, three areas where support may be beneficial to students outside the focus on academic support:

- Housekeeping skills – organising timetabling, time management, and study routines.
- Life skills – Coping with new environments, low self-esteem, and family pressures, often in the absence of normal support structures for students studying away from home.
- Financial skills – managing study costs within available income, dealing with family pressures around money.

Foley argues that effective support cannot be delivered effectively by institutions where formal support units are not staffed by individuals who are 'stable, punctual, dedicated... with broad Community knowledge... and have an in-depth knowledge of the university' (p.55). Employing the wrong support staff imposes in institutional barrier to the provision effective student support within the learning context.

In summary, ***support is defined here as the removal of barriers to participation in formal studies leading to career pathways in Engineering.*** In particular:

- Financial barriers
- Cultural barriers
- Social barriers
- Academic barriers
- Deficit perspectives

### **2.1 Support in the home**

Within wider Australian population, students are twelve times more likely to attend university if their parents expect them to and four times more likely to attend university if their friends do (Gemici, Bednarz, Kermel, & Lim, 2014). This speaks to the importance of creating a cohort and engaging with parents from a strengths based position. In doing so it is also important to recognise that the difficulty in disrupting the negative historical relationship between Indigenous people and the Australian education system. Formal educational institutions were instrumental in dispossession and are often still recognised as such [REF], creating barriers to buy-in from parents.

Several current programs have demonstrated successful approaches to engaging with family and community in providing academic support for Indigenous learners. The Aspiration Initiative (<http://theaspirationinitiative.com.au/>) acknowledges the importance of parental/carer support from this perspective by valuing parents as knowledge holders who have extreme potential influence over their children and engaging them within initiatives such as the Academic Enrichment Program.

Similarly, The Graham (Polly) Farmer Foundation's (pff.com.au) Partnerships for Success initiative is a voluntary out-of-school education program targeted at aspirational and high-achieving Indigenous students in Years 7-12 operating in 28 sites across Australia. The program aims to support Indigenous students to excel academically, complete secondary school and achieve entrance to university. Although university entrance is the primary goal, the program also supports students to achieve other tertiary placements, such as vocational education and training (VET), an apprenticeship or traineeship, or the employment of their choice. Evaluation of the WA programs indicated that they extensively addressed the issue of engagement with Family and Community

(Partington et al., 2009). Supported by professional development opportunities provided by the WA Department of Education and Training, school teachers and administrators were asked to:

- *consult with the local Aboriginal Community to identify community needs*
- *facilitate local ownership of the program*
- *build a community support team to sustain program operation*
- *engender local school community support of the program*
- *develop positive relations with program partners (Partington et al., 2009, p.100).*

Through the experience of initiating and sustaining community partnerships, a framework was developed for guiding the interaction between Family and Community, and Schools involving 7 dimensions: *communicating; connecting learning at home and at school; building community and identity; recognising the role of the family; consultative decision-making; collaborating beyond the school; and participating (Partington et al., 2009, p101)*. Key to this framework is the valuing of Community and Family contributions within the partnership and the flexibility to work beyond the immediate goals of the program. This is an important component of addressing social, practical and cultural barriers for students as they become apparent, rather than attempting to define them from the outset (see Recommendation 4).

In terms of academic support within the home, the challenge faced by families supporting relatives towards studies in engineering lies with the low rates of Indigenous participation in engineering fields. In particular, developing partnerships as described above for engineering pathways is problematic when Indigenous communities have so little close connection with engineering from an 'insider's' perspective, and subsequently a limited understanding of what engineering is. In the example of mathematics (essential in working towards engineering pathways), Goos (2004, p. 20) asserts that to engage any parent in supporting their children in math involves demystifying mathematics and introducing parents to current ideas about numeracy concepts and learning approaches. A NSW-based pilot program focusing on teaching mathematics in Indigenous contexts (Howard, Perry, Lowe, Ziems, & Mcknight, 2003) provides a useful example of a program where not only the existing knowledge of learners was built on, but parents/carers and families were involved in the planning and implementation of curriculum for k-6 mathematics. This pilot program was successful, but one of the main inhibitors was teacher professional development in parallel to the implementation of the program.

In the prior work described here, it is apparent that ensuring students are supported outside the formal learning environment involves active, purposeful and ongoing efforts to engage Family and Community in students' education (See Recommendation 3).

## **2.2 Support in formal learning environments**

Formal Learning Environments are defined here as K-12 schools, Tertiary institutions (TAFE, Universities, etc.), and organised structured tutoring outside the classroom. In the Higher Education sector, Australian Universities have also responded to the need to support indigenous students through the establishment of dedicated indigenous support units responsible for developing and operating support programs and outreach programs. These units are generally responsible for administration of Institutional Scholarships, tuition support, and alternative admissions pathways. Many also take a leadership role across Institutions to promote awareness, build on-campus communities and drive initiatives at the school, faculty and Institution level. Many of the Indigenous student support programs run by such central units exist largely in parallel to standard academic programs and support structures (Nakata, Nakata, & Chin, 2008), and support may be more effectively delivered when embedded within schools and faculties (Behrendt et al., 2012), see Recommendation 6.

In terms of Engineering Education, Appanna (2011) argues that there are unique challenges faced by indigenous students in engaging with STEM curricula. Western cultures which have shaped engineering education in Australia emphasise facts and concepts in a decontextualised manner. In contrast, the indigenous worldview emphasizes value, spirituality and holistic understandings (NTDEET, 2006, in Appanna, 2011). Western Scientific approaches can also be at odds with traditional Indigenous belief systems (Linkson, 1999). Such a clash of cultures can create significant challenges in education when these differing values and worldviews are not recognized and accommodated (Prpic & Kanjanapanyakom, 2004). The low rates of indigenous participation in the engineering profession also means there is limited role modelling within indigenous communities which may otherwise help overcome these content-related challenges (Behrendt et al., 2012, p.174). These key issues mean that engineering education faces significant challenges in effectively supporting indigenous students through existing programs operating from outside the standard curriculum.

There have been a number of previous efforts to revise engineering curricula to accommodate and/or value different cultural perspectives within the university context. Much of the prior work in revising engineering curricula to embed other worldviews and cultural perspectives has focused on globalization and the international nature of the engineering profession (Becker, 2006; Lohmann, Rollins, & Hoey, 2006; Rhamdhani, Salehi, Wong, Kapoor, & Vakhguelt, 2009). Other work has emphasized the need to focus on differing perspectives closer to home (Abuodha, Layton, & Goldfinch, 2011; Duff, Brodie, Furber-Gillick, Quinn, & Smith, 2011; Goldfinch, Layton, & McCarthy, 2010; Goldfinch, Leigh, Gardner, Dawes, & McCarthy, 2012). These curriculum revisions and strategies range from content focused activities to short term immersive or simulated intercultural experiences, to deeper, embedded approaches to exploring engineering in terms of different cultural perspectives (Leigh et al., 2014).

Within the context of math education research, math is consistently identified as an area of crisis in education for Indigenous students (Ford, 2012). Pedagogy and classroom practices (Matthews, Howard, & Perry, 2003; Nichol & Robinson, 2000), assessment (Klenowski, 2009) and content (Harris, 1991) are increasingly being criticized as exclusionary and irrelevant to many Aboriginal and Torres Strait Islander learners. This is an important issue in terms of potential support, encouraging student involvement and keeping them interested. Matthews, Watego, Cooper and Baturu (2003) for example assert that despite the many interventions developed and implemented with the aim of enhancing the mathematical learning outcomes of Indigenous students, 'Indigenous students find little relevance within mathematics, and educators have little faith in Indigenous students' mathematics abilities'. This is also a systemic issue within schools. There is a growing body of research and literature that emphasises the significant negative impacts of low expectations and racism (in curriculum content, pedagogy etc.) on the self-concept and academic achievement of Indigenous students (Bodkin-Andrews, O'Rourke, & Craven, 2010; Craven & Marsh, 2004). This parallels a tendency within policy and practice to frame academic underachievement as a cultural incompatibility, or as the problem of the student, their family or community. Furthermore, political considerations of Indigenous educational disadvantage often fail to contend with certain significant aspects of Aboriginal and Torres Strait Islander lived realities. Within context of minority populations, high expectations and aspirations are identified as imperative for student success (Cooper, Baturu, Warren, & Grant, 2006; Vand den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).

In the Graham (Polly) Farmer Foundation's Partnerships for Success initiative, the high expectations of program staff are explicitly communicated to students. Local coordinators and tutors encourage their students to work hard and challenge them to be successful. This sometimes involves pushing students into challenging environments, building their confidence and encouraging them to enrol in

demanding subjects. The program seeks to provide students with compelling real-life incentives to study hard by conveying the message that success at school can lead to further education and training or a job of their choice.

Also focusing on pre-tertiary engineering education, the newly established CSIRO Indigenous STEM Education program provides supported pathways that aim to increase Aboriginal and Torres Strait Islander representation in STEM-related professions. Recognising the fundamental importance of Aboriginal and Torres Strait Islander culture and identity in student achievement, a strong cultural, as well as a rigorous academic focus, is guiding the development, implementation and evaluation of the program.

The current research suggests that there are significant cultural barriers to Indigenous students' engagement with traditional teaching in engineering related studies. Regardless of the education sector concerned, there is a need to re-evaluate the underlying assumptions for the way curricula are designed, particularly in the tertiary education sector. To maximise effectiveness, this may be paired with efforts to engage with Family and Community in other student support initiatives (see Recommendation 5). However, gaining support to undertake such revisions is likely to be problematic in situations where few Indigenous Students, if any, are currently enrolled. Educational staff buy-in is essential to high quality, sustainable curricula that appropriately accommodate Indigenous learners, or indeed other student cohorts who bring differing perspectives and approaches to learning to the classroom. A current project, funded by the Australian Government Office for Learning and Teaching (OLT), is aiming to work around this by establishing the foundations of engineering curricula that can value and accommodate alternative world-views to the benefit of non-indigenous students (Goldfinch & Kennedy, 2013; Leigh et al., 2014), see <https://indigenousengineering.wordpress.com/>.

### **2.3 Support by external agencies**

External agencies are defined here as institutions or organisations that don't have direct control over formal learning environments, such as not for profit organisations, industry groups and employers, government bodies, or other scholarship providers. External agencies play a key role in providing inspiration to potential students and financial support through numerous scholarships for Indigenous students seeking to enter tertiary studies. The Aspiration Initiative lists over 300 scholarship programs for undergraduate indigenous university students and over 100 for advanced postgraduate studies in various fields (see <http://theaspirationinitiative.com.au/indigenous-scholarships>). There are also many scholarships available for studies in Engineering such as the Australian Indigenous Education Foundation-BHP Billiton scholarships, Rio Tinto Indigenous Scholarships and Engineering Aid Australia Scholarships, plus others stemming from Reconciliation Action Plan commitments. These employer-linked opportunities also offer direct connection with practicing engineers and engineering technologists and employment opportunities following successful completion of studies. Despite the advantages of industry linked scholarships, many of these opportunities go unfilled each year. These programs are well promoted through education providers, websites and other agencies, raising questions as to why these scholarships are not always filled. One possibility is that many focus on a traditional model of inviting only high achieving students to apply, without clearly defining 'high achieving'. Indigenous students who are successfully progressing through their studies may benefit academically from financial support but be discouraged from applying due to their average performance to date. Reconsidering the focus on academic high achievers to students who demonstrate the potential to succeed may result in funds benefitting a wider group of Indigenous students (see Recommendation 1). Where scholarship funding is redistributed across a broader Indigenous student cohort, student success is also more likely where appropriate additional support is available by the funding organisation AND within the formal learning environment (see Recommendation 2)

External agencies also offer support through experiences and programs aimed at supporting aspirations towards a career in Engineering. In addition to those described in 2.1 and 2.2 (The Aspiration Initiative, AIME, The Graham Polly Farmer Foundation and Engineering Aid Australia) the Aboriginal Summer School for Excellence in Technology and Science (ASSETS) provides a residential summer school that is followed by a leadership program for Year 10 Aboriginal and Torres Strait Islander students who are interested in their cultural background as well as science, technology, engineering and mathematics (<http://www.csiro.au/en/Education/Programs/Indigenous-STEM/ASSETS/About-ASSETS>). ASSETS is just one part of the Indigenous STEM Education program managed by CSIRO and funded by the BHP Billiton Foundation, and exists among a range of aspiration building initiatives which can be complimented by other support strategies. Ensuring strong collaborative networks between Community, External Agencies and Formal Learning Environments has been demonstrated by the Polly farmer foundation and others as a critical factor for successful student transitions from K-12 education to tertiary studies (see also Recommendation 4).

#### **2.4 Support to study away from home**

Many of the issues experienced by Indigenous students discussed above are faced by these students when studying significant distances from family and Community. In many respects, support to study away from home has been the primary focus of funding for student support, and the financial barriers encountered by students studying away from home are well recognised. Much of the focus has been on financial support for Indigenous students living away from home. However, significant cultural and social barriers may be faced by students who are physically disconnected from family and Community support (Foley, 1996). This scenario also creates challenges for Education providers and External agencies seeking to develop support strategies in partnership with Community. Across the board for engineering students in Australia and overseas, failure to develop networks and identify with the discipline are key factors in students discontinuing their studies (Baillie & Fitzgerald, 2000; Marra, Rodgers, Shen, & Bogue, 2012). In this sense, support should focus on building social support networks and a strong professional identity among students. Many Indigenous units within educational units currently facilitate social connections through residential colleges and student groups. However, to partner this with engineering discipline specific student-student, student-staff and student-engineer connections requires closer collaboration with engineering schools and departments, potentially facilitated through faculty or school embedded support staff (see Recommendations 5 and 6).

### **3. Discussion and Conclusion**

Recommendations arising from this paper can be grouped under three general strategies for progress in this area:

- R1 & R2: Improve access to financial support, and impact of financial support
- R3 & R4: Build two-way partnerships with stakeholders and beneficiaries. Mutual learning is essential.
- R5 & R6: Build support into the core-business of engineering education providers (as it is currently for middle-class white male school leavers...)

This paper has captured only a snapshot of the complex issue of student support. In addressing recommendations made by the Student Support Working Group, there is a need to explore how gains have been made in other disciplines such as Health, Law and Education. Critically, there is a need to build stronger relationships between engineering education providers and Indigenous Communities to provide greater clarity on the present barriers to fuller Indigenous participation in

engineering studies. To conclude, there is a need to change the way engagement with Indigenous stakeholders is viewed and approached within the engineering education sector. Achieving progress against these recommendations requires engagement that has parallels with current practices in Industry engagement – a recognition and acceptance of the importance of ongoing cooperation, committed to by most staff, with a view to facilitating mutual learning and mutual benefit. Closer engagement between engineering education providers, Indigenous stakeholders and other associated bodies may facilitate a greater understanding of the wider benefits of greater participation in engineering by Indigenous Australians.

## References

- Abuodha, P., Layton, C., & Goldfinch, T. (2011). *Evidence of intercultural competency from engineers without borders challenge projects*. Paper presented at the Australasian Association for Engineering Education Annual Conference, Fremantle, WA.
- Altman, J. C. (2009). Beyond closing the gap: Valuing diversity in Indigenous Australia: Centre for Aboriginal Economic Policy Research, ANU.
- Appanna, S. D. (2011). Embedding Indigenous Perspectives in Teaching School Science. *Indigenous Education, 40*, 18-22.
- Australia, E. (2011a). Engineers Australia Reconciliation Action Plan 2011-2015. Canberra, ACT.
- Australia, E. (2011b). Stage 1 Competency Standard for Professional Engineer. Melbourne, VIC.
- Australia, I. o. E. (1996). *Changing the Culture: Engineering Education into the Future*. Barton, ACT: Institution of Engineers Australia.
- Baillie, C., & Fitzgerald, G. (2000). Motivation and attrition in engineering students. *European Journal of Engineering Education, 25*(2), 145-155.
- Becker, F. S. (2006). Globalization, curricula reform and the consequences for engineers working in an international company. *European Journal of Engineering Education, 31*(3).
- Behrendt, L., Larkin, S., Griew, R., & Kelly, P. (2012). Review of Higher Education Access and Outcomes for Aboriginal and Torres Strait Islander People: Final Report. Canberra, ACT.
- Billiton, B. (2012). AIEF-BHP Billiton Iron Ore Tertiary Scholarships Retrieved 21st January, 2013, from <http://www.aief.com.au/scholarships/aief-bhpbio-tertiary-scholarships.aspx>
- Bodkin-Andrews, G., O'Rourke, V., & Craven, R. G. (2010). The utility of general self-esteem and domain-specific self-concepts: Their influence on Indigenous and non-Indigenous students' educational outcomes. *Australian Journal of Education (ACER Press), 54*(3), 277-306.
- Bradley, A. (2006). Australian Engineering Competency Standards - Stage 1 Competency Standards for Professional Engineers. Melbourne.
- Calma, T. (2009). Enriching tertiary education with indigenous voices. Retrieved 15th February, 2013, from [http://humanrights.gov.au/about/media/speeches/social\\_justice/2009/20091211\\_don\\_aitkin.html#fn9](http://humanrights.gov.au/about/media/speeches/social_justice/2009/20091211_don_aitkin.html#fn9)
- Cooper, T. J., Baturo, A. R., Warren, E., & Grant, E. J. (2006). "Aim High-Beat Yourself": Effective mathematics teaching in a remote Indigenous community.
- Craven, R. G., & Marsh, H. W. (2004). The challenge for counsellors: Understanding and addressing Indigenous secondary students' aspirations, self-concepts and barriers to achieving their aspirations. *Australian Journal of Guidance and Counselling, 14*(1), 16-33.
- DEEWR. (2008). National Report to Parliament on Indigenous Education and Training, 2008. Canberra, ACT.
- Duff, A., Brodie, T., Furber-Gillick, D., Quinn, D., & Smith, E. (2011). *Do with and not to. Building cultural understanding, enabling communication and promoting the spirit of reconciliation in first year engineering*. Paper presented at the Australasian Association for Engineering Education Annual Conference, Fremantle, WA.



- Foley, D. (1996). Perspectives on Effective Student Support for Indigenous Students in a Tertiary Institution. *The Australian Journal of Indigenous Education*, 24(2), 53-55.
- Ford, M. (2012). Achievement gaps in Australia: what NAPLAN reveals about education inequality in Australia. *Race Ethnicity and Education*, 1-23.
- Forde, C., Bamblett, L., Lovett, R., Gorringer, S., & Fogarty, B. (2013). Discourse, deficit and identity: Aboriginality, the race paradigm and the language of representation in contemporary Australia. *Media International Australia, Incorporating Culture & Policy*, 149.
- Gemici, S., Bednarz, A., Kermel, T., & Lim, P. (2014). The factors affecting the educational and occupational aspirations of young Australians: National Centre for Vocational Education Research.
- Goldfinch, T., & Kennedy, J. (2013). *Understanding Indigenous consultation and engagement in engineering education*. Paper presented at the Australasian Association for Engineering Education Annual Conference, Gold Coast, QLD.
- Goldfinch, T., Layton, C., & McCarthy, T. (2010). *Encouraging Cultural Awareness in Engineering Students*. Paper presented at the 20th Annual Conference for the Australasian Association for Engineering Education, Sydney, Australia.
- Goldfinch, T., Leigh, E., Gardner, A., Dawes, L., & McCarthy, T. (2012). *Engineering Across Cultures: New learning resources for intercultural competency in engineering*. Paper presented at the Australasian Association for Engineering Education Annual Conference, Melbourne, VIC.
- Harris, P. (1991). *Mathematics in a cultural context: Aboriginal perspectives on space, time and money*: Deakin University Press.
- Howard, O., Perry, B., Lowe, K., Ziems, S., & Mcknight, A. (2003). *Mathematics in Indigenous contexts: A case study*. Paper presented at the 26th annual conference of the Mathematics Education Research Group of Australasia.
- Klenowski, V. (2009). Australian Indigenous students: Addressing equity issues in assessment. *Teaching Education*, 20(1), 77-93.
- Leigh, E., Goldfinch, T., Prpic, J. K., Dawes, L., Kennedy, J., & McCarthy, T. (2014). *Shared Values: Diverse perspectives – engaging engineering educators in integrating Indigenous engineering knowledge into current curricula*. Paper presented at the Australasian Association for Engineering Education Annual Conference, Wellington, New Zealand.
- Linkson, M. (1999). Some issues in providing culturally appropriate science curriculum support for Indigenous students. *Australian Science Teachers' Journal*, 45(1).
- Lohmann, J. R., Rollins, H. A., & Hoey, J. J. (2006). Defining, developing and assessing global competence in engineers. *European Journal of Engineering Education*, 31(1).
- Marra, R. M., Rodgers, K. A., Shen, D., & Bogue, B. (2012). Leaving Engineering: A Multi-Year Single Institution Study. *Journal of Engineering Education*, 101(1), 6-27.
- Matthews, S., Howard, P., & Perry, B. (2003). *Working together to enhance Australian Aboriginal students' mathematics learning*. Paper presented at the Mathematics Education Research: Innovation, Networking Opportunity.
- Nakata, M., Nakata, V., & Chin, M. (2008). Approaches to the Academic Preparation and Support of Australian Indigenous Students for Tertiary Studies. *Australian Journal of Indigenous Education*, 37, 137-145.
- Nichol, R., & Robinson, J. (2000). Pedagogical challenges in making mathematics relevant for indigenous Australians *International Journal of Mathematical Education in Science and Technology*, 31(4), 495-504.
- Partington, G., Galloway, A., Sibbel, J., Gray, J., Grote, E., Gower, G., & Goh, K. (2009). Longitudinal Study of Student Retention and Success in High School (Follow the Dream): Edith Cowan University.
- Pholi, K., Black, D., & Richards, C. (2009). Is "Close the Gap" a useful approach to improving the health and wellbeing of Indigenous Australians? *Australian Review of Public Affairs*, 9(2), 1-13.

- Prpic, J. K., & Kanjanapanyakom, R. (2004). *The impact of cultural values and norms on higher education in Thailand*. Paper presented at the 27th HERDSA Annual Conference, Miri, Sarawak.
- Rhamdhani, M. A., Salehi, K., Wong, Y. C., Kapoor, A., & Vakhguelt, A. (2009). *How are engineering graduates prepared to work in a culturally changing world?* Paper presented at the 20th annual conference of the Australasian Association for Engineering Education, Adelaide, SA.
- Tinto, R. (2013). Creating Aboriginal Jobs. Retrieved 16th January, 2013, from [http://www.riotinto.com/ourapproach/17194\\_features\\_3629.asp](http://www.riotinto.com/ourapproach/17194_features_3629.asp)
- Vand den Bergh, L., Denessen, E., Hornstra, L., Voeten, M., & Holland, R. W. (2010). The implicit prejudiced attitudes of teachers relations to teacher expectations and the ethnic achievement gap. *American Educational Research Journal*, 47(2), 497-527.
- Vass, G. (2012). "So, What is Wrong with Indigenous Education?" Perspective, Position and Power Beyond a Deficit Discourse. *The Australian Journal of Indigenous Education*, 41(2), 85-96.

DRAFT