

# Do as I say, not as I do: professional development of academics lacks contextualisation and sensitivity to discipline

Tracey Papinczak<sup>a</sup>, Lydia Kavanagh<sup>a</sup>, Liza O'Moore<sup>b</sup>, Carl Reidsema<sup>a</sup> and Caroline Crosthwaite<sup>a</sup>

<sup>a</sup> Faculty of Engineering, Architecture and Information Technology (EAIT), The University of Queensland (UQ)

<sup>b</sup> School of Civil Engineering, The University of Queensland

Corresponding Author Email: [tracey.papinczak@uq.edu.au](mailto:tracey.papinczak@uq.edu.au)

---

## Structured abstract

### BACKGROUND

Professional development (PD) of educators is an area of considerable focus within the Australian Higher Education sector. For academics, PD in teaching and learning (T&L) is generally delivered centrally by T&L units within universities. Contextualisation and considerations of discipline and diversity, in such a system, are often sacrificed in order to reach a maximum audience with the most efficient use of time and resources. This contrasts with current literature on professional development in tertiary institutions, which emphasises the importance of context- and discipline-sensitive approaches and strategies (Gibbs, 2013).

### AIM

In order to highlight the value of contextualised PD, this paper outlines and evaluates the current state of play of PD in T&L for engineering academics. The paper reviews three approaches:

1. T&L PD delivered in a number of national universities by T&L units;
2. the T&L Development Program (TLDP) which offers contextualised PD for academics in the Faculty of Engineering, Architecture and Information Technology (EAIT) at The University of Queensland; and
3. 'best practice' PD as outlined in literature.

### APPROACH

The workshops, consultation services, courses and programs of T&L PD at a number of national universities were reviewed for their: approaches to teaching and instruction; degree of contextualisation and discipline-sensitivity for academics across schools and/or faculties, and face to face contact with academics. These were compared to best-practice approaches to PD in T&L in recent and seminal literature and to the equivalent experiences offered by the TLDP

### RESULTS

Polarised practice was identified, with PD offerings from centralised T&L units generally occupying a space quite removed from best practice. The TLDP occupied a space closer to the best-practice guidelines, meeting the needs for contextualisation and discipline-specificity. While the TLDP strives to meet best practice guidelines for T&L, several constraining factors emerged, including lack of resources, poor recognition and reward for staff participation in PD programs and the many demands made of time-poor academics.

### CONCLUSIONS/ RECOMMENDATIONS

Centralised T&L units offer non-contextualised training for academics as part of their remit which also includes activities such as developing institution-wide T&L strategies and evaluating current practices. In the current climate, funding is limited which reduces the ability of centralised T&L units to provide best practice, contextualised T&L PD. The TLDP offers contextualised workshops, mentoring for new staff, and individual support. There is also a level of ownership and hence control over direction (e.g., workshop topics and speakers) within this program as it is 'owned' and operated within the faculty. It is therefore likely to be better able to improve teaching practices of engineering educators.

### KEYWORDS

Teaching and learning, professional development, diversity

## Background

Professional development (PD) of educators is an area of considerable focus within the Australian Higher Education sector (Shurville, Browne & Whitaker, 2009). Literature indicates that teacher training, especially for new academics, is important for several reasons, including steadily increasing student numbers, more diverse student cohorts, an aging lecturer population, and greater university accountability to funding bodies and students (ESF, 2012; Hicks, Smigiel, Wilson, & Luzecky, 2010; Wood et al., 2011). Engineering educators, in particular, face additional challenges such as accelerating growth in the capabilities and complexities of technology, changes in engineering practices in developed nations, and changes in industry expectations (Adams & Felder, 2008; Felder, Brent & Prince, 2011; Jamieson & Lohmann, 2009). This means that PD for teaching academics should not be viewed as remedial, but instead as a characteristic of a mature and reflective profession (Jamieson & Lohmann, 2009) and a response to changing requirements.

However, despite evidence that there is a need for PD in teaching and learning (T&L), Dearn (2002) reported that few Australian academics study for formal certificates of higher education. In addition, Goody (2007) found that up to 25% of Australian universities conduct no initial teaching preparation for their staff.

Internationally, there is growing recognition that any T&L PD should be discipline-specific (Webster, Merdova & Becker 2005). In Australia, PD in T&L is generally delivered centrally by institutional T&L units, whose strategic focus, leadership and structure are in a constant state of flux (Hicks, 2006; Holt, Palmer & Challis, 2011). Contextualisation and considerations of discipline and diversity, in such a system, are generally sacrificed in order to reach a maximum audience with the most efficient use of time and resources (both human and material). At The University of Queensland (UQ), the Teaching and Educational Development Institute (TEDI) works to an anecdotal mandate of “scalable, sustainable and strategic” which all but precludes working at a discipline-specific level. In addition, funding for contextualised PD at any level in higher education institutions is difficult to obtain, and is likely to remain so in the current fiscal environment. Thus, a one-size-fits-all approach has been the common T&L PD experience. This contrasts with current literature on PD in tertiary institutions, which emphasises:

- a focus on context- and discipline-sensitive approaches and strategies (Hicks, 2006), and teaching leadership as an important part of academic development and change management (Gibbs, 2013);
- the importance of subject-matter context (Webster-Wright, 2009) – not only in terms of teaching spaces and subject material, but in “the social interactions within communities of practice” (p 723);
- that development of teaching expertise needs to be embedded within disciplines and departments for two key reasons (Healey, 2000): the primary allegiance for most academics is to their subject or profession while allegiance to their institution is weaker, and there is evidence that important differences are apparent among disciplines in “what academics do and how those activities are described and valued” (Healey, 2000, p.173);
- that contextualised PD is a robust strategy in the development of strong communication networks and enhanced professionalisation of T&L (Healey, 2000; Webster et al, 2005); and
- that innovation and reflective practice is best facilitated by a diverse team of staff developers, which supports embedding professional development within faculties or schools (Ellis & Phelps, 2000).

A best evidence medical education (BEME) review of 2777 published papers (Steinert et al., 2006) outlines key features for PD for academics; bullet points 1, 2, and 4 directly address the need for contextualisation of T&L PD:

1. experiential learning (practicing what has been learnt and gathering feedback);

2. the importance of peers (peers as mentors and the role of collegial dialogue and support);
3. multiple instructional methods;
4. the role of context; and
5. the value of extended programs.

National and international evidence of the need to professionalise academic teaching is driving a change agenda as per a recent article in the Financial Review, reflecting on a report by the Grattan Institute, which called for university teaching to be professionalised (Dodd, 2013). The report emphasises that, while university funding incentives reward institutions for recruiting academics on the basis of research performance (rather than skills in teaching), the prevailing culture will remain focussed on research at the expense of quality instruction for its students. It offers the recommendation that teaching should be conducted by academics with appropriate training, and that all teaching academics need to be eligible for promotion based on their teaching. Furthermore, professionalisation of academic teaching would allow universities to avoid detailed regulation by the Tertiary Education Quality and Standards Agency (TEQSA) in this specific area and resulting compliance costs.

## Aim

In order to emphasise the value of contextualised PD, this paper outlines and evaluates the current state of play of PD in T&L for engineering academics through three different approaches:

1. T&L PD delivered by centralised institution-based T&L units;
2. the T&L Development Program (TLDP) which offers contextualised PD for academics in the Faculty of Engineering, Architecture and Information Technology (EAIT) at UQ (Kavanagh, O'Moore, Reidsema, Crosthwaite & Papinczak, 2012); and
3. 'best practice' PD as outlined in literature.

The research questions were:

- How is 'best practice' PD described in current and seminal literature?
- Do centralised T&L units offer current 'best practice' PD for academic staff?
- Does the TLDP offer PD which is closer to 'best practice' than centralised T&L units?

## Approach

The workshops, consultation services, courses and programs of T&L PD at a number of national universities were examined and evaluated with respect to:

- their approaches to teaching and instruction,
- the degree of contextualisation and discipline-sensitivity for academics across schools and/or faculties, and
- face to face contact with academics.

These were compared to the equivalent experiences offered by the TLDP, and to best-practice approaches to PD in T&L in recent and seminal literature.

## Results

### Australian university T&L PD

Table 1 outlines current T&L PD practices at seven de-identified GO8 universities and at UQ; GO8 institutions were selected as they are well-resourced and large. Information was gathered as at March to May 2013 from university websites and related online sources; relevant published literature from academics in these units was also examined. In some instances, information was difficult to source readily. Analysis was conducted at a superficial level only, and for the purposes of this research that was all that was required. It is useful to detail what happens at UQ in order to describe table headings more fully. UQ's centralised T&L unit, TEDI, offers:

- a suite of PD workshops in face-to-face mode which any academic, regardless of discipline, can attend ('Generic face-to-face PD workshops'),
- two qualifications in university teaching for staff: the Graduate Certificate in Higher Education (GCHE), a formal postgraduate qualification offered through the School of Education, and the Certificate in University Teaching Practice (CUTP) offered via TEDI ('Certificates and programs');
- opportunities for staff to contact TEDI for direct help ('Consultation services'); but
- with the exception of an option for studies in clinical education in the GCHE, no contextualisation is embedded within workshop topics or courses, and academics from faculties are not involved in preparation or delivery of material.

**Table 1: T&L PD at GO8 Australian universities in 2013**

University	Centralised T&L Unit	Generic face-to-face PD workshops	Discipline-specific face-to-face PD workshops	Consultation services	Certificates & programs
A	✓	✓	X	X	✓
B	✓	✓	✓ (one faculty)	X	✓
C	✓	✓	X	✓	X
D	✓	X	X	X	✓
E	✓	✓	X	X	✓
F	✓	✓	✓ (several faculties)	✓ (via faculties)	✓
G	✓	✓	X	X	✓
UQ (TEDI)	✓	✓	X	✓	✓

All the institutions have centralised T&L units which predominantly deliver face-to-face workshops, certificates and programs, and blended learning offerings (which include a face-to-face component). Only one university does not offer scheduled workshops in face-to-face mode choosing instead to offer the content via online modules. Two universities provide discipline-specific PD via faculty-based T&L units. University B offers these only through their Business and Economics faculty while University F has many small faculty-based T&L units, some of which offer discipline-based workshops and consultations for staff. In the discipline of engineering, this was limited only to PD for sessional staff.

### **'Best practice' PD in engineering education**

Highly successful programs aim to understand and best meet the needs of participants (ESF, 2012). Here, the use of the word 'program' needs to be acknowledged; well-designed programs of professional development are more effective than short, one-off workshops (ESF, 2012; Steinert et al., 2006). Through a well-designed suite of PD activities, a culture of continual learning and innovation can be constructed (Felder et al., 2011).

PD offerings in a program need to acknowledge the different nature and stages of academic careers and participants' prior education and experiences (Jamieson & Lohmann, 2009). Within engineering education, systems thinking, dialogue and reflective practice are key features of effective PD; the right balance between practical teaching strategies and tips, theories of learning and cognition, and reflection on practice are most important (Adams & Felder, 2008; Felder et al., 2011).

Contextualisation not only affects participant engagement but also their willingness to attend PD activities, thus highlighting the imperative to ensure all aspects of the program relate to participants' work (Hardy & Smith, 2006) which is supported by the finding that discipline thinking is a primary influence on many T&L tasks (Saroyan et al., 2004). Thus, it is not surprising that generic university workshops only infrequently lead to faculty members

integrating what has been learnt with their own T&L practices (Boud & Garrick, 1999), and that T&L PD processes that “succeed in Law flop in Engineering” (Gibbs, 2013).

It is not just the contextualisation of PD activities that adds to the effectiveness of a T&L development program. Academics need to be able to access expert advice and support, to engage with student evaluations, and to consider both their strengths and weaknesses as teachers as part of a cycle of reflection (Finelli et al., 2008). Mentoring provides one mechanism through which these types of supportive interactions may be facilitated (ESF, 2012; Felder et al., 2011). Peer learning within disciplines is an additional strategy to enhance the construction of shared understandings regarding student learning (ESF, 2012). Through the sharing of effective instructional methods and materials as well as intellectually stimulating discussions with colleagues about best practice, valuable learning communities can be developed (Adams & Felder, 2008).

Instructional consultants are another valuable resource to support enhanced T&L practices (ESF, 2012). Also referred to as educational consultants or educationalists, instructional consultants should be available to facilitate reflection on teaching and to interpret results “through the prism of a consultant’s expertise” (p403). Their expert input can guide both interpretation and planning for change (Finelli et al., 2008; Shurville et al., 2009).

As a final word on best practice PD in engineering education, programs should be regularly evaluated by multiple stakeholders and modified in accordance with evidence (ESF, 2012). Despite the fact that many PD programs are evaluated against a set of outcomes such as participant satisfaction and intention to change, what is most required is a measure of behaviour modification (Webster-Wright, 2009). That is, has the PD program brought about measurable changes in teaching behaviours?

### **Teaching and Learning Development Program (TLDP) at UQ**

The TLDP is an EAIT Faculty-funded initiative with three main T&L PD foci: 1) professionalisation of T&L, 2) development of teaching academics, and 3) development and maintenance of communication networks in T&L (Kavanagh et al., 2012). Key initiatives have been implemented over the previous 22 months, including:

1. contextualised, active workshops to provide PD to T&L academics;
2. creation and support of mentoring partnerships to better support inexperienced teaching academics (N=21);
3. contextualised Tutors@UQ program for engineering tutors (N>200);
4. the Graduate Teaching Assistant (GTA) Program (N=17) (Kavanagh, O’Moore, Papinczak & Delaney, 2013); and
5. one-on-one T&L advice to staff receiving poor student feedback.

#### *1. Contextualised workshops*

Eight workshops have been delivered since the TLDP began in November 2011 (Table 2), with particularly good attendance at the workshops run over the course of a day. Overall ratings for the workshops were good. Topic selection for the workshops has largely evolved from the input of teaching academics in the schools of engineering. Workshops were strongly discipline-based and offered participants the perspectives and skills of engineering educators in face-to-face mode. Delivered in an active format, they model the pedagogy that should be used with students. Didactic presentations were kept to short ‘bursts’ of 10-15 minutes, and interspersed with activities such as “Think, Pair, Share’ and small group work. Context and the unique T&L challenges and rewards of educating engineering students are strongly emphasised. Participants are encouraged to share their stories ‘from the field’ and to engage in reflection on practice; feedback indicates that this inclusive community practice is highly valued.

**Table 2: Contextualised T&L workshops delivered by the TLDP (2011-2013)**

Workshop	Date	No. attendees	Mean rating of	Std Dev
----------	------	---------------	----------------	---------

			<b>overall workshop (/5)</b>	
Felder and Brent (3 d)	November 2011	>100	4.3	
New Staff (4 h)	March, July 2012, February 2013	10, 11, 10	4.00, 4.3, 4.3	0.5, 0.5, 0.4
Assessment in Engineering (4 h)	June 2012	15	4.2	0.5
T&L Forum (1 d)	November 2012	56	3.3 – 4.4	0.5
Active Learning (4 h)	April 2013	32	3.9	0.8
GTA Basics of University Teaching (4 h)	July, 2013	15	4.8	0.4

Note: 1= poor; 2 = fair; 3 = average; 4 = good; 5 = excellent

## 2. Mentoring

Since the TLDP began, all new T&L academics have been paired with an experienced lecturer as mentor. Quality mentoring, in which the mentor is highly experienced and invested in T&L, and provides robust advice, has worked towards improvements in the course evaluations for the new staff (see Table 3).

**Table 3: Results of high-quality mentoring on evaluations of mentee's courses**

Mentee	Mentor	Course Evaluations (/5)	
		Pre-mentoring	Post-mentoring
T&L academic (< 3 y)	School T&L Committee Chair	4.1	4.5
T&L academic (new)	Highly experienced engineering educator	3.5	4.1
		3.2	4.2
T&L academic (requested mentoring)	Highly experienced architecture educator	2.2	3.3
		3.3	3.5
		4.2	4.0
T&L academic (new)	Highly experienced engineering educator	4.0	4.1
T&L academic (new)	Highly experienced engineering educator	3.5	4.0
		3.8	3.9
T&L academic (new)	Experienced academic and content expert	3.6	4.3
T&L academic (new)	School T&L Committee Chair	3.2	4.2
T&L academic (less than 3 years experience)	School T&L Committee Chair	3.9	4.1
		3.9	3.9
		4.1	4.0

Note: 1= poor; 3 = satisfactory; 5 = outstanding

## 3. Contextualised tutor training

As previously stated, excellence in T&L arises from a sustained program but it also arises from addressing T&L development needs across the levels of academia. Therefore, under the auspices of the TLDP, the generic UQ tutor training workshops were adapted to provide better learning and engagement for tutors in EAIT faculty. This involved replacing generic information with context-specific information, and the inclusion of faculty T&L academics in the three workshops that make up the Tutors@UQ program. The response from both tutors and academics has been very positive and it the recommendation is that EAIT faculty continue to offer contextualised tutor training.

## 4. GTA program

The inaugural GTA program was based on the best-practice guidelines of Amundsen and Wilson (2012), Takayama (2009), and Park (2004) and deals, in part, with successional planning and development of T&L academics. Offered in blended learning mode,

participants were required to attend three workshops, complete five online modules, observe and reflect on three teaching sessions, and receive mentorship. Reflective practice and engineering-specific context were embedded in the program. The program was a new initiative for 2013 and is not reported here in depth; however, response from the first cohort is excellent in terms of their learning, satisfaction, and engagement (Kavanagh et al., 2013).

#### 5. One-on-one consultations

An EAIT-funded instructional consultant is available to provide advice and support to academics who seek to improve their T&L practices and/ or are referred due to poorer than expected course evaluations. An action research approach is utilised to enable academics to ‘tweak their practice’, evaluate the results, reflect on this evidence and plan for further change as necessary. Both general and discipline-specific advice is provided, with academics often given a choice of several options regarding potential T&L modifications to their course. Table 4 shows that the strategy of offering one-on-one discipline specific advice has resulted in a significant improvement in evaluations for every course.

**Table 4: The effect of an instructional consultant**

Course	Course Evaluations (/5)	
	Pre-consultation	Post-consultation
ARCHxxxx	3.0	3.7
CHEExxxx	3.2	4.0
CIVLxxx1	3.4	4.1
CIVLxxx2	3.0	3.8
ENGGxxx1	3.0	4.0
ENGGxxx2	3.2	3.6
MECHxxxx	3.1	4.1

Note: 1= poor; 3 = satisfactory; 5 = outstanding

### Discussion, conclusions and recommendations

This paper has identified a spectrum of PD practice, with the offerings from centralised T&L units generally occupying a space closer to one end of the spectrum and ‘best practice’ approaches at the other end. ‘Best practice’ PD for teaching academics is consistently described as discipline-specific, responsive and engaging, supportive of reflection, offered in a sustained fashion and regularly evaluated and reviewed to ensure quality and relevance. This type of PD for T&L is unlikely to be able to be effectively delivered centrally due to the nature of their institutional-wide remit required of centralised units and their lack of discipline-specific experts to provide context and relevance. No centralised PD units were found to offer ‘best practice’ PD according to the characteristics outlined in this paper.

The TLDP offers contextualised workshops, mentoring, one-on-one guidance, and T&L development across academic levels. There is a level of ownership and hence control over direction (e.g., workshop topics and speakers) within the program as it is ‘owned’ and operated within the faculty. It therefore occupies a space close to the best-practice guidelines as it meets the needs for contextualisation and discipline-specificity and is better positioned to be able to improve, develop, and support the teaching practices of engineering educators.

The success of the TLDP, as evidenced by the outcomes discussed above, offers clear evidence that a more localised approach to T&L development is important. This is not surprising as the literature strongly supports this approach.

What has not been discussed here are the constraining factors for the program: a lack of resources, poor recognition and reward for staff participation in PD programs or for demonstrated enhancement of T&L practices, reduced availability and/or willingness of

suitable skilled academic staff to act as facilitators and mentors, and the many demands made of time-poor academics. These were outlined in Kavanagh et al. (2012) and unfortunately are still pertinent a year later.

## References

- Adams, R. & Felder, R. (2008). Reframing professional development: A systems approach to preparing engineering educators to educate tomorrow's engineers. *Journal of Engineering Education*, 97(3), 239-240.
- Amundsen, C. & Wilson, M. (2012). Are we asking the right questions? A conceptual review of educational development in higher education. *Review of Educational Research*, 82(1), 90-126.
- Boud, D. & Garrick, J. (1999). *Understanding learning at work*. London: Routledge.
- Dearn, J., Fraser, K., & Ryan, Y. (2002). *Investigation into the provision of professional development in university teaching in Australia: A discussion paper*. Canberra (ACT): Department of Education, Skills and Training.
- Dodd, T. (2013). Uni teachers told to improve grades. *Financial Review* 22/7/13.
- Ellis, A. & Phelps, R. (2000). Staff development for online delivery: A collaborative team-based action learning model. *Australian Journal of Educational Technology*, 16, 26-44.
- European Science Foundation (ESF). (2012). *The professionalisation of academics as teachers in higher education*. Available at: [http://www.esf.org/fileadmin/Public\\_documents/Publications/professionalisation\\_academics.pdf](http://www.esf.org/fileadmin/Public_documents/Publications/professionalisation_academics.pdf).
- Felder, R., Brent, R. & Prince, M. (2011). Engineering instructional development: programs, best practices and recommendations. *Journal of Engineering Education*, 100(1), 89-122.
- Finelli, C., Ott, M., Gottfried, A., Hershock, C. O'Neal, C., & Kaplan, M. (2008). Utilising instructional consultations to enhance the teaching performance of engineering faculty. *Journal of Engineering Education*, 97(4), 397-411.
- Gibbs, G. (2013). Reflections on the changing nature of educational development. *International Journal for Academic Development*, 18 (1), 4-14.
- Goody, A. (2007). *Report on the survey of foundations of university teaching programs. Unpublished: Preparing Academics to Teach in Higher education (PATHE)*. Project funded by the Carrick Institute for Learning and Teaching in Higher Education.
- Hardy, I. & Smith, E. (2006). Contesting tertiary teaching qualifications: an Australian perspective. *Teaching in Higher Education*, 11(3), 337 – 350.
- Healey, M. (2000). Developing the scholarship of teaching in higher education: A discipline-based approach. *Higher Education Research & Development*, 19(2), 169-189.
- Hicks, O. (2006). Integration of central and departmental development - reflections from Australian universities. *International Journal for Academic Development*, 4(1), 43-51.
- Hicks, M., Smigiel, H., Wilson, G., Luzeckyj, A. (2010). *Preparing academics to teach in higher education*. Sydney (NSW): Australian Teaching and Learning Council.
- Holt, D., Palmer, S. & Challis, D. (2011). Changing perspectives: Teaching and learning centres' strategic contributions to academic development in Australian higher education. *International Journal for Academic Development*, 16 (1), 5-17.
- Jamieson, L. & Lohmann, J. (2009). *Creating a culture for scholarly and systematic innovation in engineering education*. Washington, DC: American Society for Engineering Education.
- Kavanagh, L., O'Moore, L., Papinczak, T. & Delaney, M. (2013). *Graduate Teaching Assistant Program: A pilot study in EAIT Faculty*. Paper presented at the AAEE Conference, Gold Coast, Qld.
- Kavanagh, L., O'Moore, L., Reidsema, C., Crosthwaite, C. & Papinczak, T. (2012). *The teaching and learning development program: An opportunity to excel?* Paper presented at the AAEE Conference, Melbourne, Vic.

- Park, C. (2004). The graduate teaching assistant: Lessons from a North American experience. *Teaching in Higher Education*, 9(3), 349-361. Available at: [http://eprints.lancs.ac.uk/120/1/GTA\\_paper\\_3.PDF](http://eprints.lancs.ac.uk/120/1/GTA_paper_3.PDF)
- Saroyan, A., Amundsen, C, McAlpine, L., Weston, C., Winer, L., & Gandell, T. (2004). Assumptions underlying workshop activities. In A. Saroyan & C. Amundsen (EDS.), *Rethinking teaching in higher education: from a course design workshop to a faculty development framework* (pp15-29). Sterling, VA: Stylus Publishing.
- Shurville, S., Browne, T. & Whitaker, M. (2009). Accommodating the newfound strategic importance of educational technologists within higher education. *Campus-Wide Information Systems*, 26(3), 201-231.
- Steinert, Y., Mann, K., Centeno, A., Dolmans, D., Spencer, J., Gelula, M. and Prideaux, D. (2006). *A Systematic Review of Faculty Development Initiatives Designed to Improve Teaching Effectiveness in Medical Education: BEME Guide*. Available at <http://www2.warwick.ac.uk/fac/med/beme/reviews/published/>
- Takayama, K. (2009). Best practice guidelines for undergraduate TA programs. Available at: [http://brown.edu/sheridan\\_center](http://brown.edu/sheridan_center).
- Webster, L., Merdova, P., Becker, J. (2005). Providing a discipline-based higher education qualification. *Journal of University Teaching and Learning Practice*, 2 (2), 75-83.
- Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. *Review of Educational Research*, 79(2), 702 – 739.
- Wood, L., Vu, T., Bower, M., Brown, N., Skalicky, J., Donovan, D., Loch, B., Joshi, N. & Bloom, W. (2011). Professional development for teaching in higher education. *International Journal of Mathematical Education in Science and Technology*, 42(7), 997 – 1009.

## **Copyright statement**

Copyright © 2013 Papinczak, Kavanagh, O'Moore, Reidsema and Crosthwaite: The authors assign to AAEE and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to AAEE to publish this document in full on the World Wide Web (prime sites and mirrors), on Memory Sticks, and in printed form within the AAEE 2013 conference proceedings. Any other usage is prohibited without the express permission of the authors.