

# Transforming multiple stakeholder insights into education action: Developing a pragmatic EIT professional advisory framework

Karyne Cheng Siew Ang<sup>a</sup>, Tim Aubrey<sup>b</sup>

*Faculty of Engineering and Information Technology, University of Technology, Sydney<sup>ab</sup>,  
Corresponding Author's Email: karyne.ang@uts.edu.au*

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## BACKGROUND

This paper discusses the formation of a stakeholder engagement framework for a Professional Advisory board (PAb). These collaborative undertakings were initially conducted to review post-graduate programs in the Faculty of Engineering and Information Technology (FEIT) at the University of Technology Sydney (UTS). This led to the realisation of a pragmatic and collaborative engagement process that benefits industry and the education sector whilst developing students that are able to deal with current and emergent challenges.

## PURPOSE OR GOAL

The PAb is a network of academics, students, alumni and industry members that undertakes to engage, advice and review discipline-specific faculty programs from multiple perspectives to ensure that programs remain relevant and valuable to industry. As the faculty moves towards reengineering their approach to teaching and learning as part of a university-wide initiative known as 'Learning 2014' (L2014), this provides the opportunity to shape a more engaged and collaborative teaching and learning culture within its programs.

## DESIGN/METHODS

The collaborative stakeholder process was built upon an intensive series of mixed methods and action research initiatives as engagement mechanisms. These pragmatic and emergent mechanisms involved quantitative surveys, focus groups, in-depth interviews, industry workshops and multiple rounds of academic consultations.

## RESULTS

The PAb framework was piloted in June 2014. Initial results from a feedback survey are also reported. The collaborative framework, whilst promising, engaging and conceptually robust, has not yet reached a stable state. The framework will be extended to other EIT disciplines in order to evaluate its outcomes across various disciplinary contexts and to optimise the framework's efficacy for future iterations. This paper suggests a pragmatic and robust framework to integrate industry and stakeholder expectations with faculty program deliverables in a way that is valuable, relevant and rewarding.

## CONCLUSIONS

In this initial framework, industry stakeholders and academics are given a voice to share their priorities and interests. More than that, the PAb provides a forum where areas that are less common, untapped or unknown to the rest of the group can be shared, further explored and tested. While the group is new and still evolving, different EIT aspects that have not yet been undertaken in education that may be potentially powerful could be explored in the future to ensure that we are able to support long term value in the various facets of EIT education. The PAb is proving to be a robust and balanced group of professionals and academics that provide technical and practical perspectives to ensure EIT education remains relevant and current.

## KEYWORDS

Industry engagement, stakeholders, advisory framework

## Background and introduction

At the University of Technology Sydney (UTS), the faculty structure combines both engineering and IT fields. Synergies and overlaps are identified. Both have common ALTC Threshold Learning Outcomes (TLOs) (Wright, Hadgraft & Cameron, 2010). There is an overlap of disciplinary knowledge and likelihoods of cross-disciplinary study or knowledge, and both professions face dynamic changes in their corresponding fields (Ang & Aubrey, 2013). In response to the changing demands, industry requirements and the underpinning AQF specifications (AQF, 2013), the Faculty of Engineering and Information Technology (FEIT) embarked on a stakeholder consultation project that involved industry representatives, alumni members, students and academics in a collaborative effort in the desire produce graduates that meet the requirements of a dynamic industry.

This paper discusses the key stakeholder and industry engagement undertakings and emergent research that contribute to the formation of a framework for a professional advisory board (PAb). The overall purpose was to develop an innovative post-graduate learning framework outlining mechanisms that build stronger linkages and shared learning experiences that benefit industry and the education sector whilst developing students that are able to deal with current and emergent challenges. Furthermore the framework would provide a means for educational practitioners to reflect on practice and performance in order to anticipate, adapt and respond to the changing environment and consequently design and implement programs or courses that are able to develop graduates that are industry-ready (Daniele & Mistilis, 1999; King, 2008).

Moreover, as the faculty moves towards reengineering their approach to teaching and learning as part of a university-wide initiative known as 'Learning 2014' (L2014), this provides the opportunity to shape a more engaged and collaborative teaching and learning culture in its programs. The winner of Nobel Prize in Physics 1929, Murray Gell-Mann comments, "*We need to move from the sage on the stage to the guide on the side.*" This means that integral elements like team and industry projects, flipped learning methods, studio teaching, open-ended problem solving, peer collaborative learning, experiential learning, engagement in research need to be incorporated in modern engineering education. The philosophy of the L2014 approach to EIT education captures essential features of a modern EIT education – cultivating a professional mindset from the very start, fostering excitement about what professional engineers do, participative learning of the fundamentals to ensure deep and relevant learning and developing the technical skills and knowledge of how engineers contribute to society in a multi-disciplinary manner. It is designed in a way that attempts to capture our students' passion whilst being engaged with the professional world. The PAb is well positioned in contributing to the alignment of the faculty initiatives with university strategies, industry requirements and student learning needs.

## Literature Review: Stakeholder engagement in engineering education

Universities are constantly aiming to provide education pathways and awards that meet student's goals, industry and regulatory demands. The Higher Education Quality and Regulatory Framework emphasises the need for assuring "*minimum discipline knowledge, discipline-specific skills and professional capabilities including attitudes and professional values that are expected of a graduate from a specified level of program in a specified discipline area*" (ALTC 2010, p3). Response to these requirements means having a shift in EIT education paradigms - from being solely content driven to being industry relevant and practice-driven.

To enhance employment opportunities for graduates, educators therefore need to take a holistic approach that integrates the development of knowledge, work experience, and technical and interactive skills, whilst reflecting on how these may address the current and

emerging demands of employers in a dynamic environment (Ang & Aubrey, 2013). The expectation of EIT practitioners is no longer limited to technical competence. Practitioners are increasingly expected to understand complex and changing industrial, social, global, legal, regulatory and economic contexts (Daniele & Mistilis, 1999; King, 2008; Mills & Treagust, 2003). We suggest that multiple perspectives need to be considered in order to holistically inform curricula strategies and structure. From the literature, a multi-directional model developed by the Cambridge-MIT Institute (CMI) for the UK describes a collaborative knowledge-sharing approach that harnesses research conducted in elite institutions for commercial purposes (Acworth, 2008). The collaborative entities comprised academic researchers and educators, industry participants and government policy makers who jointly identify and pursue shared solutions to common problems. From Male and King's guidelines for best practice for engineering faculties in industry engagement (2013), they recommend that faculties need to establish people, processes and resources to ensure strong relationships with industry. They recommend engagement processes that are structured and transparent. The following section demonstrates how the faculty developed its industry engagement framework. This includes a brief explanation of the philosophical underpinnings of the research design and emergent processes leading to the formation of the framework.

## **Research approach and analysis**

This study is distinct from many others in the EIT education literature reviewed, in that it entails a pragmatic and emergent action-oriented research process (Greenwood, Whyte, & Harkavy, 1993). The multiple inquiry methods include a mix of quantitative and qualitative strategies, and participatory action-research (AR) processes. The insights inform the present collaborative framework. The pragmatic philosophy underpinning the study is well-suited since the research is rooted in practice-based problems and solutions. It is about 'what works' and embraces a multitude of methods to inform the research methodology (Tashakkori & Teddlie, 1998). Mixed-methods provide a triangulation process that improves accuracy, complements and balances the strengths and weaknesses of different research methods (quantitative and qualitative) and builds a more complete picture (Creswell, 1998; Denscombe, 2003; Lincoln & Guba, 1985). One of the key aims of AR is to produce knowledge and action that is directly useful to a group of people (Reason, 2001). Contemporary forms of AR emphasize collaboration between all those involved in the inquiry project (Reason, 2001). Furthermore, traits of participatory AR include the co-generation of problem solutions and knowledge (Whyte, 1991). While most forms of academic research detach the researcher from what is being researched where the research is conducted from a distance (for example, through surveys and questionnaires), AR is rooted in each participant's in-depth, critical and practical experience of the situation to be explored and acted in (Reason, 2001). In using Greenwood et al's (1993) features of collaboration, incorporation of local knowledge, process emergence, eclecticism and diversity, and linking scientific understanding to social action, this paper describes the PAb framework and its emergent developmental process as a case for discussion.

In 2013, 308 student and graduate respondents were surveyed and 13 participated in interviews and focus group discussions (Ang & Aubrey, 2013). The data provided insights on student and recent graduate perceptions of their learning and professional experiences. A further 32 industry, alumni and academic representatives participated in interviews and workshop discussions, whilst 54 industry respondents took part in an industry survey. Industry consultations provided insights on the importance and relevance of various levels of education, emerging trends and challenges, industry priorities, roles and expectations in ensuring relevance.

The data provided multiple perspectives and practical insights to inform the development of the emergent framework and ultimately the formation of the Professional Advisory Board (PAb). The PAb is a network of academic industry members that undertakes to engage, advice and review faculty programs/courses from an industry's perspective in order to inform

program and course leaders to design and deliver relevant teaching and learning objectives and outcomes. Underlying the mission is the opportunity to attract quality members in academia and industry to network, partner, inspire and engage in discussions around current and emergent industry demands to ensure that faculty programs remain relevant and valuable to industry.

A pilot PAb session was conducted within a specific discipline in June 2014 to test and fine-tune the implementation of the collaborative process of the framework. Specific objectives and session outcomes were set for the session in consultation with internal academic members in terms of what they needed to know in order to inform the planning of their own course program structures. In total, 15 industry, alumni and academic representatives attended the facilitated pilot session. Survey feedback was also collected from 11 out of 15 participants immediately after the session. The feedback data is not statistical due to its low numbers. Nevertheless this provides some indicative directions for incremental refinements in implementing future PAb. Subsequent PAb feedback surveys will help boost the sample sizes for statistical analysis. The following section presents the outcomes from piloting the PAb framework.

## Results

The PAb is designed to acquire multiple perspectives to inform teaching and learning directions at the faculty. Directions include identifying areas of knowledge, new and emerging skills required in EIT encompassing technical and other professional capabilities. This means drawing on different specialist skills by different stakeholders - the experiences of industry representatives, alumni (graduates of the university), current students and academics to act as a 'think-tank' to co-develop common issues and review how the university might establish long term collaborative relationships to deliver teaching and learning that could be more relevant to industry and stakeholder needs.

Participants are motivated to be part of a PAb group because it is an opportunity for them to '*give back to university*'. They would also have the opportunity to shape the direction of future courses, make an impact in terms of developing and enhancing the way engineering is taught at the university for the benefit of the city or nation, help improve the job gap ratios, shape the engineering skillsets in Australia, shape the types of learnings students need when they graduate so that they are able to readily contribute to industry's progress and development.

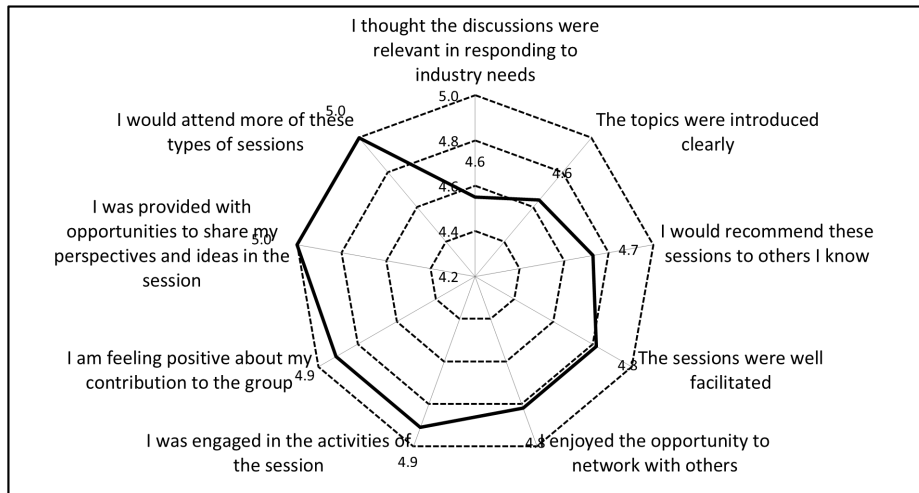
The pilot session was primarily focussed on eliciting ideas to inform the redesigning of one of the under-graduate Engineering programs. The session commenced with a dialogue about emerging industry trends leading to discussions around the shape of jobs to come in the future. This led to an exploration of the current and future needs in the sector, prioritizing key skills and attributes a graduate would require to 'hit the ground running' and the fundamentals that graduates would need to know. This led on to discussions around what employers looked for in a prospective Engineering candidate in their area of discipline.

Sessional reports were emailed to participants for their review, comments and validation. Participants were then requested to draw on their expert perspectives about two additional questions that were raised in the session. The actual content and outcomes of these discussions are very interesting in themselves but that is not the scope of this paper. The next section presents information based on the feedback of the participants about their experiences in the session.

### Perceptions of participants about the pilot session

From the feedback gathered, participants are generally positive about their PAb experience. The areas to improve on as described in Figure 1 include ensuring that the topics are introduced more clearly and that topics are relevant in responding to industry needs.

Unanimously, participants would attend more of these sessions. They felt that they were provided with opportunities to share their perspectives and ideas in the session.

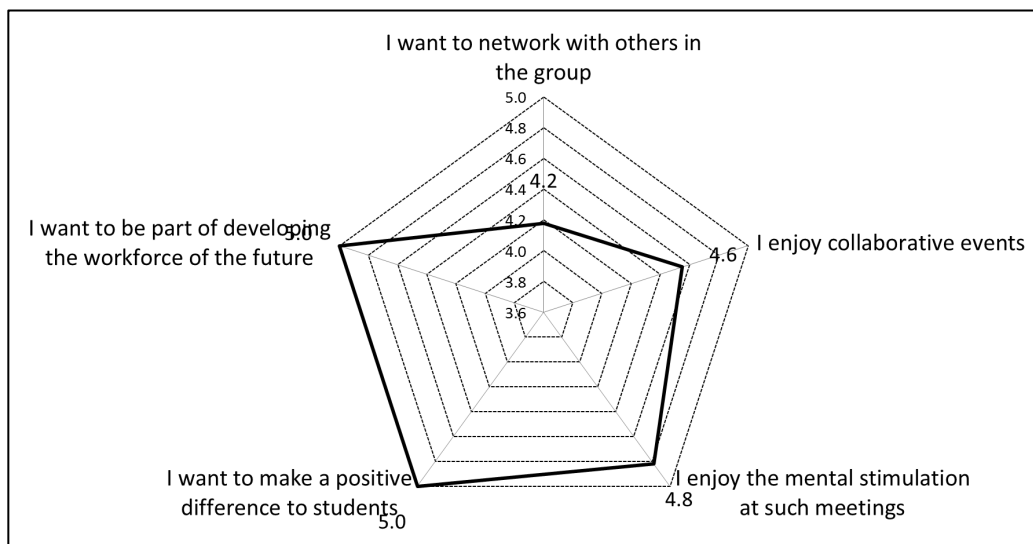


**Figure 1: Perceptions of the PAb experience**

Participants felt positive and engaged in the discussions and conversations in the session, particularly the collaborative workshop sessions. The session provided multiple perspectives through a good mix of academia and industry members. Alumni members (graduates) benefited from learning about engineering attributes expected by employers in their discipline areas.

### Reasons for participating in such a group

Figure 2 suggests that members in a PAb are motivated to participate because they want to make a positive difference to students and contribute to developing the workforce of the future. Networking appears less of a key purpose for such a group. These results triangulate well with the participants' spontaneous discussions about their motivations to participate in the PAb.

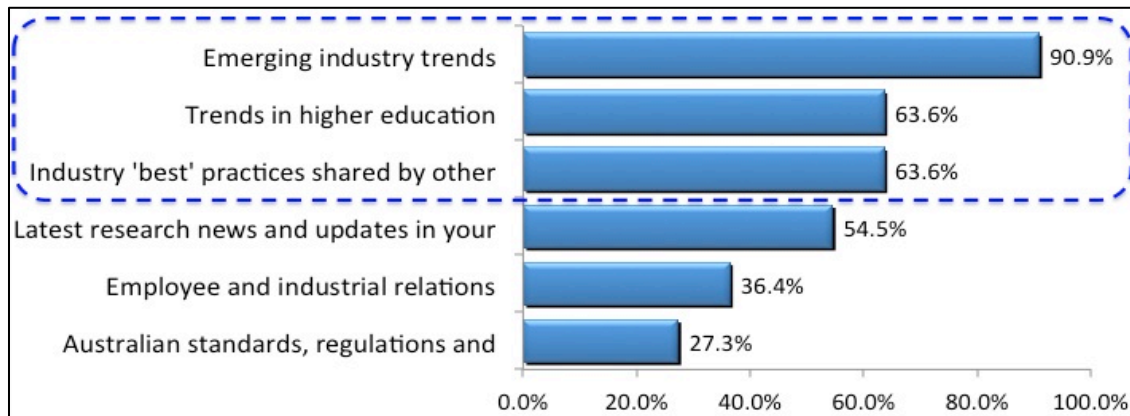


**Figure 2: Reasons for participating in a PAb**

### Topical discussions of value to PAb members

Topical areas that participants are likely to value are discussions about emerging industry trends, trends in higher education and industry best practices (Figure 3). They are less likely

to be interested in employee and industry relations nor Australian standards, regulations and policies.



**Figure 3: Topics of value in a PAb discussion**

The collaborative framework, whilst promising and conceptually robust, has still not yet reached a stable state. Subsequently, we intend to review and extend the PAb framework to other disciplines and programs in late 2014 in order to present further data on the PAb lifecycle and evaluate its outcomes across various disciplinary contexts and to optimise the framework's efficacy for future iterations. Whilst models of industry engagement and advisory networks are not a new concept, this paper documents the process and lessons learnt in practice from an Australian EIT education and industry context. What makes this approach novel is the co-creation of knowledge and potential aspects of program design by involving and valuing key stakeholders in the process. The next section provides suggestions for developing a pragmatic and robust framework for educators desiring to further integrate industry and stakeholder expectations with faculty program deliverables in a way that is valuable, relevant and rewarding.

## Discussion

### The PAb Framework

Underpinning the framework philosophies is the inter-connectedness of employers, students, educators and policy-makers supported by the literature (Helfat, 2007). The relational strategies suggested by Ang and Aubrey (2013) embrace a dynamic, adaptive and collaborative approach to accomplish relevance and currency in EIT education. As the faculty moves towards a more engaged and collaborative teaching and learning culture, and embeds Learning 2014 and the UTS Model of Learning into its programs, the PAb is well positioned in contributing to the alignment of the faculty initiatives with the strategies of the university, industry requirements and student learning needs. Additionally, guidelines from Male and King (2013) are also used as a reference in the formation of PAb and its initiatives. The PAb operates at the programs level, and targets different themes and disciplines as an advisory and review team.

The strategic actions of PAb include leveraging on industry practitioner insights, experience and networks to ensure alignment and relevance with current and emerging industry needs that students and graduates face in the faculty. It also serves to provide a space that encourages collaboration, engagement and commitment between academia (educators, researchers, students) and industry (practitioners and alumni). The key aspects of the framework are presented in Table 1. This includes a description of the mission, vision, values and strategic activities in a recommended PAb framework. It also outlines the types of members, mechanics and key contributions expected of its members.

**Table 1: Key aspects of the PAb framework**

Mission	The PAb is a network of academic industry members that undertakes to engage, advice and review faculty programs/courses from an industry's perspective in order to inform program and course leaders to design and deliver relevant teaching and learning objectives and outcomes.
Vision	The PAb will attract quality members in academia and industry to network, partner, inspire and engage in discussions around current and emergent industry demands to ensure that our faculty programs/courses remain relevant and valuable to industry.
Values	Critical Thinking, insightful, open, adaptive and agile, Commitment, relevant, forward thinking, technical knowledge
Strategic actions	Leverage on industry practitioner insights, experience and networks to ensure alignment and relevance with current and emerging industry needs that students and graduates face in the faculty. Provide a space that encourages collaboration, engagement and commitment between academia (educators, researchers, students) and industry (practitioners and alumni).
Members	Represented by a team of discipline-specific members from external industry representatives, alumni members, students and internal university staff
Mechanics	Utilises mixed-methodologies and participatory AR processes in collecting data to inform decisions made. Facilitated face-to-face PAb sessions with members occur 2-3 times yearly. Iterative academic participative action-research sessions in between PAb sessions (collaborative workshops) Continued engagement and communication occur through email updates, requests for e-reviews and feedback through surveys, reports and relevant social networking websites and newsletter channels.
Key contributions	Advise, review, validate or raise concerns with existing or proposed program/course design and outcomes; provide a broader picture of what is trending in industry, co-construct industry-relevant case studies and projects.

### **Frequency of face-to-face meetings**

We envisage that facilitated face-to-face review meetings will occur two to three times a year.

The benefit of this meeting structure is that it enables the PAb to discuss, advise and review the relevant programs and provide feedback, whilst allowing for time in between sessions for academic action, implementation and further internal discussions and academic workshops before the next session. We believe that this structure will provide the robustness and traction needed to respond more effectively to emerging industry requirements and to lead in the process of program refinement and change.

### **Management and communication of PAb outcomes**

At the start, invitations, PAb information kits and Frequently Asked Questions (FAQs) containing detailed information about the framework are circulated to interested parties. Continued and open communication channels in between PAb sessions include reports, updates, request for reviews, shared ideas and surveys. These are conducted by email and through the relevant social networking websites and newsletter channels. This helps to keep the members continuously engaged and informed. Members appreciate that their contributions are valued, considered and acted upon by the faculty where relevant and feasible. Members are not expected to provide hands-on designing of programs/courses and subjects. The faculty will ultimately be responsible for the final decisions upon consideration of other factors including AQF requirements, policy statements, available curriculum resources and impact on the overall teaching and learning systems. Changes to any aspects of policies, program and curriculum design and structure need to be vetted by the Courses Committee for approvals. The progress of these outcomes will be communicated back to the

PAb. Subsequent PAb sessions may differ in focus although the overarching mission, vision, values and strategic actions are suggested to remain the same. Further sessions could be structured to follow up on outcomes or specific program themes that may require members' advice in order to shape the direction of the courses.

## **Conclusion: Research-based framework as a stakeholder engagement and collaborative tool**

Keeping in line with the principle that professional relevancy comprises of a progressive collaborative partnership with students, industry and universities (Ang & Aubrey, 2013), the authenticity and relevance of EIT students' education can be further strengthened through a close partnership of industry practitioners and educators (King, 2008; Wohlin & Regnell, 1999). Universities need to adopt a strategic approach that supports the individual and educator's capability to keep abreast with and adapt to industry and technological trends (Ang & Aubrey, 2013). In practice, it is often easier to collate knowledge and reflect on that knowledge than to actually act and make the changes. With the recognition of this challenge from the onset, the project team determined that knowledge gained needed to be turned into consideration and action. Upon the completion of each stage of research with the various stakeholder groups, academic workshops were organised to review how these insights could be incorporated in a feasible and sustainable manner for the longer term. The participatory action research initiatives with academics through workshops provide added momentum for a series of smaller incremental changes in different EIT courses and programs. The PAb framework is iteratively built on the industry engagement and course review and emergent research mechanisms drawn from processes conducted in 2013.

From this initial PAb framework, students, graduates, the alumni and participating industry professionals are given a voice to share their priorities and interests at the program and discipline-specific levels. What is known is that research that is designed well can be a win-win strategy that can be viewed as both a stakeholder engagement tool, knowledge sharing process and foster networking, collaboration and critical thinking amongst its participants. The knowledge outcomes of such collaborations will be continuously improved as it is still in its early phases of inception. Furthermore, as the group evolves, it is envisaged that discussions leading to long-term areas of value including the exploration of less familiar or less common areas within the group will be embarked on. The PAb framework allows for aspects that are unknown and not necessarily accepted by mainstream academia or industry to be reviewed and debated in an open-dialogue and positive spirit of agility and critical thinking. In doing so, this provides opportunities, for a faculty to perhaps challenge the orthodoxy in a crowded EIT education market by taking risks in embarking on emerging EIT areas that could potentially have powerful outcomes. Change to ensure relevance has been adopted as a continuous process incorporating a framework that embraces adaptive thinking and collaborative learning for all parties in a dynamic environment. The PAb started through small, incremental changes in a collaborative partnership in an attempt to create a more balanced view of EIT education. The PAb, while still in its early stages of conception, is proving to be a robust and balanced group of professionals and academics that is able to offer technical and practical perspectives that ensure EIT education remains relevant and current.

## **References**

- Acworth, E. B. (2008). University–industry engagement: The formation of the Knowledge Integration Community (KIC) model at the Cambridge-MIT Institute. *Research policy*, 37(8), 1241-1254.
- Ang, K. C. S., & Aubrey, T. (2013). *Shelf-life of post-graduate engineering education – relevance and currency in an age of dynamic industry expectations*. Paper presented at the Australasian Association of Engineering Education (AAEE) Conference 2013, Sunshine Coast.



- AQF. (2013). *Australian Qualifications Framework*. South Australia: Australian Qualifications Framework Council Retrieved from <http://www.aqf.edu.au>.
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks: Sage Publications.
- Daniele, R., & Mistilis, N. (1999). Information technology and tourism education in Australia: an industry view of skills and qualities required in graduates *Information and Communication Technologies in Tourism 1999* (pp. 140-150): Springer.
- Denscombe, M. (2003). *The good research guide: for small-scale social research projects* (2nd ed.). Maidenhead: Open University Press.
- Greenwood, D. J., Whyte, W. F., & Harkavy, I. (1993). Participatory action research as a process and as a goal. *Human Relations*, 46(2), 175-192.
- Helfat, C. E. (2007). *Dynamic capabilities : understanding strategic change in organizations*. Malden, MA: Blackwell Pub.
- King, R. (2008). Engineers for the future: addressing the supply and quality of Australian engineering graduates for the 21st century. Sydney: Australian Council of Engineering Deans.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- Male, S., & King, R. (2013). Best Practice Guidelines for Effective Industry Engagement in Australian Engineering Degrees. *Australian Council of Engineering Deans (ACED)*, V5.
- Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer? *Australasian Journal of Engineering Education*, 3, 2-16.
- Reason, P. (2001). 14 Learning and Change through Action Research. *Creative management*, 182.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46): Sage.
- Whyte, W. F. E. (1991). *Participatory action research*: Sage Publications, Inc.
- Wohlin, C., & Regnell, B. (1999, 22-24 Mar 1999). *Achieving industrial relevance in software engineering education*. Paper presented at the Software Engineering Education and Training, 1999 Proceedings, New Orleans, LA.

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