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AAEE2019

1990 - 2019

30th Annual Conference for the Australasian Association for Engineering Education

Conference Handbook

8-11th December 2019

Brisbane Convention and Exhibition Centre
Brisbane, Queensland, Australia

Acknowledgment of Country

We wish to acknowledge the Turrbal people, the Traditional Owners and Custodians of the land and their Country on which we gather for this conference, and their Elders both past and present.

By these words, we would also like to show our respect to and honour the Giabal and Jarowair peoples of Toowoomba; the Jagera, Yuggera and Ugarapul peoples of Springfield and Ipswich; the Gadigal people of the Eora Nation, Sydney; and the Kambuwal peoples of Stanthorpe as the Traditional Owners of the lands and waterways where the University of Southern Queensland (USQ) is located.

Further, we acknowledge the cultural diversity of Aboriginal and Torres Strait Islander peoples and pay respect to Elders past, present and future. We celebrate the continuous living cultures of First Australians and acknowledge the important role played by Aboriginal and Torres Strait Islander peoples in Australian society.

The University respects and acknowledges our Aboriginal and Torres Strait Islander students, staff, Elders and visitors who come from many nations across Australia, and across the seas.

University of Southern Queensland

University of Southern Queensland (USQ) is a relatively young, medium-sized regional university originated in Toowoomba, Queensland with approx. 27,000 students, majority of which are part-time online students or studying via distance.

It has now established itself in a number of locations just within the Greater Brisbane catchment, with two university campuses located at Springfield and Ipswich. It also has a Queensland College of Wine Tourism at Stanthorpe. It offers courses in law, health, engineering, surveying, sciences, business, education, and the arts.

The institution was established in 1967 as the Darling Downs campus of the Queensland Institute of Technology. In 1970, the institution had provided studying programs for rural Queensland and international communities. In 1971, it became the Darling Downs Institute of Advanced Education, then the University College of Southern Queensland in 1990 and finally the University of Southern Queensland in 1992. USQ is ranked No.1 in Australia for Engineering Graduates in full-time work and graduate salary (Good Universities Guide, 2018/2019).

USQ has a long history of association and participation in AAEE, exemplified by hosting the 2004 annual conference, and having a number of USQ academic staff serving on the AAEE Executive Committee in recent years.

Sponsors and Exhibitors

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Welcome message
from the chair

On behalf of the organising committee, and University of Southern Queensland, it is with great pleasure that I welcome you to AAEE2019, the 30th Annual Conference of the Australasian Association for Engineering Education.

The practice of Engineering is changing rapidly and it requires change agents to lead the education and training of the next generations of engineering professionals. The theme of this year's conference is "Educators Becoming Agents of Change: Innovate, Integrate, Motivate".

Facing an impending tsunami of digital and technological disruptions in the next decade, engineers will need to lead, adapt and be agile in response. Thus, it is envisaged that the conference seek to answer how engineering researchers and educators will play a part in navigating these new frontiers in education.

Welcome to my town. This is my Brisbane! It is still vivid in my childhood memories arriving from country town Rockhampton to Brisbane living nearby at Highgate Hill. I would walked to the nearby West End State School, and later on, to Brisbane State High School. I would hear the buzzing sounds of construction at Southbank in preparation for the Word Expo 88, and later on, the transformation into what it is today, the BCEC and Southbank Parkland. I often dropped by and peeked through the safety fencing at the magnificent 'engineering' that turned a derelict piece of land into what it is today, a community oasis blessed with pools, playgrounds, food, entertainment, museum, performing arts, modern and classical arts, all within walking distance.

It would be remiss of me not to mention that it is an honour and privilege to host this year's conference, and absolutely delighted to be part of the 30th celebration of this annual event, the premier source of professional development for engineering educators from Australia, New Zealand and around the world. I trust that you will enjoy your time at the conference catching up with old friends and meeting new ones, sharing ideas and provoking actions that will have positive impacts for our future engineering graduates, and not forgetting to sample the food, sights and sounds of my home town, Brisbane.

Dr Steven Goh
AAEE2019 Conference Chair

Keynote speakers and panellists

Felicity Furey

Founder and past President of Power of Engineering and Executive Director of EduTec Start-up Machinam.com

Felicity is an award winning inspirational speaker, entrepreneur and engineer passionate about diversity. As a founder of two social enterprises, Felicity has shifted the perception of engineering with thousands of young people and companies. Felictiy was named as one of the Financial Review BOSS Magazine's Young Executive of the Year in 2016 and named as one of Australia's '100 Women of Influence' at just 26 years old. Felicity has been featured on ABC News, Sky News, the Australian Financial Review and the Australian.

Hon Trish White FIEAust FAICD

Engineers Australia's National President and Chair of the Board

Trish is National President and Chair of the Board of Engineers Australia. A professional company director, she serves on the boards of CHL group of companies, national rail regulator and chairs boards in the insurance, property, manufacturing and university sectors. As an executive director of professional services and business advisory firm, SlingsbyTaylor, she provides business advisory services to boards and executives of both commercial and not-for-profit organisations.

Formerly, Trish was Executive Strategic Advisor for WorleyParsons Ltd, working in the global resources and energy industries. That followed a career as a cabinet minister in the South Australian government, where she served in the infrastructure, development, transport, science and education portfolios.

Previously, her career had been in applied research with the Defence Science and Technology Organisation. Prior to that, she managed national infrastructure projects in Canberra. Trish is an experienced professional company director, having served on the boards of several large Australian companies. She is a Fellow of the College for Leadership and Management and the AICD.

Professor Maura Borrego

University of Texas

Maura is Director of the Centre for Engineering Education and Professor of Mechanical Engineering and STEM Education at the University of Texas at Austin. Maura is a Deputy Editor for Journal of Engineering Education. She previously served as a Program Director at the National Science Foundation, on the board of the American Society for Engineering Education, and as an associate Dean and Director of interdisciplinary graduate programs. Her research awards include U.S. Presidential Early Career Award for Scientists and Engineers (PECASE), a National Science Foundation CAREER award and two outstanding publication awards from the American Educational Research Association for her journal articles. Her M.S. and PhD are from Stanford University and her B.S is from the University of Wisconsin-Madison.

Robert Hoffman

Management Consultant

Robert isn't your typical civil engineer. By day, he is a Management Consultant in the Engineering and Asset Management Advisory team at KPMG. He is the Chairperson of the Young Engineers Australia Queensland Committee, Board Member of the UQ Young Alumni Advisory Board and Australian Institute of Project Management Future Project Leader. In his spare time, Rob enjoys cooking, is an avid runner and a long-serving member of the F45 family. In his additional spare time, he seems to fill the role of Wedding MC for all of his family and friends, which means he gets early access to the cake.

AAEE 2019 Conference Program

For more up to date program info, please visit the Conference website:
usq.edu.au/study/faculty-events/2019/12/aaee2019

Note: Workshop S2 will be held at P638, QUT, 2 George St, Brisbane CBD. Workshop M2, T2, W2 will be starting 11:15am due to change of room format from Theatre style to Cabaret style.

S = Sunday	1 = Room P1	A = 1:45 pm – 3:15 pm
M = Monday	2 = Rooms P2	B = 3:45 pm – 5:15 pm
T = Tuesday	3 = Room P3	
W = Wednesday	4 = Room P4	

Sunday 8th December 2019						
12:00 pm start for S1* 3:30-5:00pm (Workshops)	S1* Early Career Workshop (146) (80max) hosted in P1	S2 Sustainable Development Workshop (49) (30max) QUT Science and Eng Centre P638	S3 Learner's Mind Workshop (69) (20max) hosted in P2	S4 Eng Ed Research Workshop (80) (35max) hosted in P3	Setting up	Plaza P1-4
5:30 pm – 7:30 pm	Conference Registration & Info Desk (Jo Devine & David Thorpe)					Plaza P2 Foyer
6:30 pm – 8:30 pm	Welcome Reception (Canapes and Drinks for 2 hours)					Plaza P1-4 Foyer

Monday 9th December 2019						
Opens 8:15 am	Conference Registration and Info Desk (Shaun Chen, David Thorpe & Xiaoye Liu)					Plaza P2 Foyer
	Exhibition & Delegate Catering					Plaza P1-4 Foyer
9:00 am – 10:30 am	Conference Opening and Plenary Session					Plaza P1&2
Opening Ceremony	Dr Steven Goh, Chair AAEE2019					
	Welcome to Country					
	Professor Karen Nelson, DVC (Academic) of USQ					
	Dr Mark Symes, President of AAEE					
Keynote	Hon Trish White, President of Engineers Australia, Company Director, and former State Minister					
	Chair – Dr Steven Goh					
	Engineers Australia + Board of Professional Engineers Qld | 7 min presentations + Delegates' Photo					
10:30 am – 11:00 am	**Morning Tea**					Plaza P1-4 Foyer
11:00 am – 12:30 pm (Workshops)	M1 Curriculum Architecture Workshop (165) (90max) in P1	M2 Non-placement WIL Workshop (64) (50max) **starts 11:15am** in P2	M3 PBL Strategies Workshop (125) (30max) in P3	M4 Team Assessment Workshop (29) (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
12:30 pm – 1:45 pm	**Lunch and Exhibition Engagement**					Plaza P1-4 Foyer
12:45 pm – 1:45 pm	AJME Editorial Committee Meeting					P4

1:45 pm – 3:15 pm	Paper M1A Student Motivation and Engagement *8, 70, 84, 85, 97, 98, 99, 107* ***Chair: Alex Kist***	Paper M2A Assessment, Curriculum and Program Design *13, 24, 31, 36, 46, 58, 83* ***Chair: Jo Devine***	Paper M3A Learning Experiences and Student Success *33, 38, 47, 61, 68, 82, 92* ***Chair: David Thorpe***	M4A Hub for Immersive and Virtual Experiences Workshop (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
3:15 pm – 3:45 pm	**Afternoon Tea**					Plaza P1-4 Foyer
3:45 pm – 5:15 pm	Paper M1B Student Motivation and Engagement *135, 137, 139, 159, 172, 174, 177, 183* ***Chair: Alex Kist***	Paper M2B Assessment, Curriculum and Program Design *90, 96, 117, 147, 169, 193* ***Chair: Jo Devine***	Paper M3B Learning Experiences and Student Success *108, 110, 127, 134, 164, 184, 185, 189* ***Chair: David Thorpe***	M4B Professional Engineering Registration Workshop (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
5:30 pm – 7:00 pm	Swim at Streets Beach at Southbank or Self-Guided CityCat Ferry and CBD Cycling-Walking Tour (Optional)					

Tuesday 10th December 2019						
Opens 8:15 am	Conference Registration and Info Desk (Shaun Chen, David Thorpe & Xiaoye Liu)					Plaza P2 Foyer
9:00 am – 10:30 am	Plenary Session					Plaza P1&2
Keynote	Prof Maura Borrego, Director of the Center for Engineering Education and Professor of Mechanical Engineering and STEM Education at the University of Texas at Austin					
	Chair – Dr Steven Goh					
Panel Session	Panel: Maura Borrego, Felicity Furey, Robert Hoffmann (Theme to be advised)					
	Facilitator - AProf Alex Kist					
	Elsevier + Mathworks | 7 min presentations					
10:30 am – 11:00 am	**Morning Tea**					Plaza P1-4 Foyer
11:00 am – 12:30 am (Workshops)	T1 AJEE Journal Workshop T1 (131) (90max) in P1	T2 Mathworks Exhibitor Workshop (30max) **starts 11:15am** in P2	T3 Implementing WIL Workshop (94) (20max) in P3	T4 Self and Peer Assessment Workshop (18) (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
12:30 pm – 1:45 pm	**Lunch and Exhibition Engagement**					Plaza P1-4 Foyer
1:00 pm – 1:45 pm	AAEE AGM					P1
1:45 pm – 3:15 pm	Paper T1A Visualisation and Automation in Teaching *5, 53, 59, 100, 115, 162* ***Chair: Alex Kist***	Paper T2A Innovation in Teaching Practices *9, 20, 44, 65, 77, 81, 86* ***Chair: Jo Devine***	Paper T3A Authentic and Work Integrated Learning *11, 43, 51, 52, 76* ***Chair: David Thorpe***	T4A Scenario-based Assessment Workshop (123) (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
3:15 pm – 3:45 pm	**Afternoon Tea**					Plaza P1-4 Foyer
3:45 pm – 5:15 pm	Paper T1B Visualisation and Automation in Teaching *129, 167, 173, 179, 180, 181* ***Chair: Alex Kist***	Paper T2B Innovation in Teaching Practices *67, 182, 152, 163, 168, 192* ***Chair: Jo Devine***	Paper T3B Authentic and Work Integrated Learning *112, 121, 149, 186, 187* ***Chair: David Thorpe***	Paper T4B Understanding the Student and Teams *41, 48 ,71, 72, 93, 160, 166* ***Chair: Melanie Fleming***	Networking in the Plaza Foyer	Plaza P1-4
6:30 pm – 11:00 pm	Conference Dinner and Annual Awards (3 Course + 4hr Drinks) + UniSuper Presentation + CASR + USQ Music Performance					Boulevard Room

Wednesday 11th December 2019						
Opens 9:00 am	Conference Registration and Info Desk (Shaun Chen, Jo Devine & Xiaoye Liu)					Plaza P2 Foyer
9:15 am – 10:30 am	Plenary Session					Plaza P1&2
Keynote	Felicity Furey, Founder and past President of Power of Engineering Inc. and Executive Director of EduTec Start-up Machinam.com					
	Chair – Dr Steven Goh					
	Edutechnics + Keysight Technologies + Liquid Instrument | 7min presentations					
10:30 am – 11:00 am	**Morning Tea**					Plaza P1-4 Foyer
11:00 am – 12:30 pm (Workshops)	W1 AAEE Conference Workshop (161) (90max) in P1	W2 Engaging Prof Practice Workshop (190) (50max) **starts 11:15am** in P2	W3 Peer Review Workshop (140) (30max) in P3	W4 Wearable Tech Workshop (111) (25max) in P4	Networking in the Plaza Foyer	Plaza P1-4
12:30 pm – 1:30 pm	**Lunch and Exhibition Engagement**					Plaza P1-4 Foyer
1:30 ppm – 3:00 pm	Paper W1 (DT) Industry and Engineers of the Future *22, 23, 34, 91, 114, 156, 170* ***Chair: David Thorpe***	Paper W2 Problem-Based Learning and Capstone Projects *2, 6, 17, 25, 26, 28, 79, 153* ***Chair: Jo Devine***	Paper W3 Teaching the Teacher to Teach *35, 60, 63, 144, 178, 188* ***Chair: Alex Kist***	W4A Research in Automotive Safety Workshop (30max) in P4	Networking in the Plaza Foyer	Plaza P1-4
3:00 pm – 3:30 pm	**Afternoon Tea**					Plaza P1-4 Foyer
3:30 pm – 4:00 pm	Conference Closing (Presentation of Best Paper and Best Reviewer Awards) and Farewell					Plaza P1&2

Parallel Workshops

Sunday Workshops

S1 Early Career Workshop (146) 12:00 pm – 5:30 pm

Grow Your Career at AAEE 2019

'Great oaks from little acorns grow'

ABOUT THE WORKSHOP

Grow your Career is an intensive half-day professional development workshop for AAEE members, offered as part of the AAEE 2019 Conference.

In recent years the university sector has changed radically, due to a transformation that is a most likely a long way from settling down. Therefore, there are new and emerging challenges around work-performance expectations, career development opportunities and overall job-satisfaction. You may be very new to academia; you may believe that you've hit your glass ceiling; or perhaps lie somewhere in between (but a little too stressed or unsatisfied). Either way, you will benefit from this workshop. Therefore if this sounds like you, and you do want to be happier at work by realising your full potential, come along. You'll learn to identify the genuine issues around your particular context, how you are the one empowered to affect change and how to develop personalised realistic goals for real satisfaction.

WHERE, WHEN, HOW & WHO?

The workshop is planned to commence on Sunday 8th December at noon, and will finish in time for the AAEE Conference Welcome Reception. Further details shall be provided regarding the venue, once numbers are confirmed and it is free to AAEE members who attend the 2019 Conference.

The lead facilitator is Professor Colin Kestell, Deputy Dean (L&T) for the School of Engineering at RMIT. Following a leadership role within the high-tech aerospace and defence sector, Colin's move to academia ignited a passion to teach and to understand teaching. He subsequently developed expertise in program design, delivery, the professional development of his peers and has won a number of national teaching awards. In his senior executive role of Deputy Dean, in the international faculty sized School of Engineering, he leads significant change through close collaboration, reflective counselling and one-on-one coaching for significant numbers of staff. His School's teaching performance indicators are now at an all-time high.

S2 Sustainable Development Workshop (49) 3:30-5:00pm (QUT P638)

Taking the next steps: Competency Standards and Education for Sustainable Development

(Hosted at P638, QUT, 2 George Street, Brisbane CBD)

OVERVIEW OF WORKSHOP

This workshop is grounded in the ongoing dialogue regarding education for sustainable development, and in response to the calls to action regarding the 17 United Nations Sustainable Development Goals (UN SDGs) and their 169 indicators. On the 10th anniversary of the textbook co-authored by the first author (Higher Education and Sustainable Development), this workshop will engage participants in discussing "what's accomplished – and what's next" for competency standards and curriculum renewal. The paper builds on and complements ongoing discussions with colleagues in WFEO and Engineers Australia (pers comms., Doug Hargreaves, Elizabeth Taylor) regarding opportunities for taking the next steps in ensuring graduates who have knowledge and skills that are '21st Century-ready'. It follows an industry-facing paper co-authored by the first author, accepted for presentation at the World Engineering Convention (WEC) in Melbourne (November 2019 – Theme 4) "Deepening sustainability competencies in engineering graduates: next steps for global standards".

ACTIVITIES

In this 90 minute workshop, participants will engage in a highly interactive series of brainstorming and discussion, intended to elicit ideas and insights regarding what could be possible in taking next steps. Proposed activities will follow the 'Collective Social Learning' methodology by Professor Val Brown, comprising (no non-standard room and equipment requirements):

- 0-5 minutes: Introduction and logistics – Workshop outline
- 5-20 minutes: Provocation with regard to current context (Cheryl Desha), including live-feed contribution from American colleague Debra Rowe (co-author WEC Paper); and Elizabeth Taylor (Deputy Chair Washington Accord. Chair Accreditation Board Engineers Australia)
- 20 – 45 minutes: Activity 1 – "What should be" – brainstorming session collecting key engineering competencies associated with the 17 UN SDGs
- 45 – 60 minutes: Activity 2 – "What is" – brainstorming session regarding current statements within the competency standards and what this translates to in practice
- 60 – 80 minutes: Activity 3 – "What could be" – group facilitated discussion regarding Activity 1 and 2 outcomes in potential competency standard considerations going forward
- 80 – 90 minutes: Closing discussion – "What can be" – reflection on next steps.

TARGET AUDIENCE

The target audience for this workshop is engineering educators and leaders who are engaged in curriculum renewal and program management. Prior knowledge of sustainable development as a topic is desirable, although observers are welcome if there are conference delegates who are interested in finding out more about progress and opportunities in this area.

OUTCOMES

The workshop aims to produce an example list of modifications that could be made to the competency standards to connect engineering graduate attributes to the UN SDGs. The target audience will gain knowledge regarding the UN SDGs and ideas to integrate such knowledge and skills within curricula.

PRESENTERS' BACKGROUNDS

Cheryl Desha, Doug Hargreaves and Les Dawes have been working for the past 20 years to build capacity for resilient and liveable cities. Together their collective goal is to empower graduates with knowledge and skills that enable sustainable development - in the right form, at the right time, and in the right place.

S3 Learner's Mind Workshop (69) 3:30 pm – 5:00 pm

Instructor's Working Model of the Learner's Mind

OVERVIEW OF WORKSHOP

Through the development of a conceptual working model of the learner's mind, the proposed workshop aims to help participants choose teaching strategies and implementations that are well-aligned with the psychological and biological processes occurring within their students' minds during learning, Zull (2002).

Adapted from Mayer (2009), the working model has four essential components: Input/Output of sight and sound, Conceptual Processing Pathways for verbally and visually encoded knowledge, Memory for working and long term storage, and Thinking Systems for reasoning (slow) and intuitive (fast) processing, Kahneman (2011). The focus will be on identifying the essential operating characteristics of each component at the psychological/neurological levels. Links will be noted for teaching strategies aligned with particular operating characteristics, Lang (2016).

ACTIVITIES

Following the provided workbook, participants will develop their working model through a series of concept map sketching activities. For each of the relevant components in their working model, participants will complete a small group reflective observation of everyday life experiences to identify the essential operating characteristics of the component. There will be a short mini-lesson on the essential neurological processes involved in memory encoding and recall. The teaching strategies used throughout the workshop will closely mimic those used by the facilitator in teaching engineering fluid mechanics. There will be a closing reflective activity to identify teaching strategies worthy of consideration in participants' courses. The workbook will include an extended bibliography for further study.

This 90-minute workshop has no special audio-visual requirements beyond a data projector.

TARGET AUDIENCE

Suitable for STEM instructors with all levels of experience.

OUTCOMES

Participants will be able to use their conceptual working model to explain why best practice teaching strategies promote student mastery. Their working model will be a useful tool for diagnosing and correcting potential teaching strategy implementation issues. This introductory workshop will provide a foundation for further study in applied cognition in education.

REFERENCES

- Kahneman, D. (2011). Thinking Fast and Slow. Toronto ON Canada: Anchor Canada.
- Lang, J.M. (2016). Small Teaching: Everyday Lessons from the Science of Learning. San Francisco, CA, US: Jossey-Bass.
- Mayer, R. E. (2009). Multimedia learning (2nd ed.). New York, NY, US: Cambridge University Press.
- Zull, J.E (2002). The Art of Changing the Brain. Sterling, VA, US: Stylus Publishing.

KEYWORDS

Thinking processes, Memory encoding and recall.

PRESENTER'S BACKGROUND

Gordon Stubley is a nationally recognized Canadian engineering educator with teaching experience in engineering fluid mechanics. A former Associate Dean of Teaching, he has facilitated numerous workshops for STEM faculty at the University of Waterloo and other Canadian institutions. He has also facilitated workshops at the Canadian Engineering Education Association (CEEA-ACEG) 2017 and 2018 conferences. He will have presented workshops similar to the proposed workshop at CEEA-ACEG 2019 and at the Universities of Otago and Waterloo.

S4 Engineering Education Research Workshop (80) 3:30pm – 5:00 pm

What would an impact study look like for engineering education research

OVERVIEW OF WORKSHOP

Australian universities are increasingly being asked to demonstrate research impact given changes in government policy and associated funding structures. As part of this, the Australian Research Council recently completed its first national assessment of university engagement with industry, government and the wider community, including how research outcomes are being translated into practice (Australian Research Council, 2019). Here institutions were asked to prepare narrative studies to highlight their research impact in terms of economic and social benefits. For engineering as field of research, no universities submitted studies aligned to the area of engineering education research (Australian Research Council, 2019). This raises the broad question of how the impact of engineering education research can be best-evidenced and objectively evaluated against technical engineering research outcomes. Thus the purpose of this workshop is to brainstorm what an impact study for engineering education research would entail.

ACTIVITIES

A "world café" activity is proposed for facilitating group dialogue unpacking what an ideal engineering education research impact study would look like. This involves individuals forming small groups to discuss a given topic or question, with ideas recorded on butcher's paper. After some time, individuals switch between tables to discuss a new topic, with this process repeated as many times as necessary.

The world café table topics proposed for this workshop will be drawn primarily from the requirements set out for developing submissions for the 2018 Engagement and Impact Assessment including:

- Why and how the impact of engineering educational and technical research are different?
- Who or what benefits from the results of the research? (eg. who are the stakeholders)
- What is the nature of the impact? (eg. social, economic, cultural, and environmental factors)
- How can we measure the extent of the impact? (eg. cost-benefit analysis, quantity affected)

Ideally the room would be set up with tables spread out. The only non-standard equipment required would be butcher's paper.

TARGET AUDIENCE

This workshop is targeted at engineering education researchers at all career stages. No prior knowledge is needed to participate in the activities.

OUTCOMES

The intended outcome of the workshop is a consolidated set of ideas around how impact can be demonstrated for engineering education research.

REFERENCES

Australian Research Council. (2019). Engagement and Impact Assessment 2018-19 National Report. Retrieved from https://dataportal.arc.gov.au/EI/NationalReport/2018/

KEYWORDS

Research impact, engineering education research

PRESENTERS' BACKGROUNDS

The presenters of this workshop are a cross-institutional team collaborating on a project investigating the experiences of individuals transitioning into engineering education research. A theme of this research has been understanding how the "capital" of the field (such as Excellence in Research for Australia (ERA) rankings and availability of grant funding) influences the transition.

Kim Blackmore, Australian National University; Sarah Dart, Queensland University of Technology; Smitha Jose, Swinburne University; Raj Sharma, Central Queensland University

Monday Workshops

M1 Curriculum Architecture Workshop (165) 11:00 am – 12:30 pm

Curriculum Architecture: Change the People and the Curriculum Will Follow

OVERVIEW

This workshop proposes to engage participants in a curriculum design methodology that starts with people and not the curriculum. We do this through a seminar discussion and set of activities that encourage participants to shift their thinking away from a teacher-centred, disciplinary knowledge and skill set-oriented curriculum and make a pivot toward a more student-centred learning experience, focused on people and not content. In order to adopt this line of thinking, we take participants through the steps and questions we ask our academic colleagues to reflect on and answer when designing a new program of study.

ACTIVITIES

Participants will practise using some of the methodological tools we have developed and regularly deploy to prompt shifts in people's thinking, including asking questions, storytelling and the use of metaphor.

Issues to be addressed include:

- What will students be able to do upon completion of their degree (or sub discipline)?
- Who will they be, what will they do?
- Tell us about your subject from the perspective of your students
- What would they say about the assessment journey?
- What are the kinds of connections they make between your subject and other subjects in your sub discipline?
- Describe your students' learning approaches?
- How do they prepare for their assessments?

AUDIENCE

Academics responsible for subject coordination and/or curriculum leadership will benefit from this workshop. The intention is to 'begin with the end in mind', to open up a conversation to challenge some of the deeply-held beliefs about what academics think (and assume to be true) about how their students learn. This means taking the academic from the centre of the learning and asking them to pivot or shift towards student-centred thinking.

OUTCOMES

At the conclusion of this workshop, participants will be able to implement a set of curriculum development tools such as storytelling and powerful questions to lead academic colleagues in curriculum renewal.

PRESENTERS

Justine Lawson, Ian Zucker and Roger Hadgraft

M2 Non-placement WIL Workshop (64) 11:15 am – 12:30 pm

Developing and Implementing Non-placement Work Integrated Learning into Curricula

OVERVIEW OF WORKSHOP

Work integrated learning (WIL) involves students engaging interactively with practice, workplaces, and practitioners to develop employability. Engineering–related employment has traditionally been the main form of WIL in engineering programs. The Engineers Australia accreditation criterion for engagement with professional practice states that an equivalent of 12 weeks in a workplace environment can be achieved through various appropriate methods, not limited to placements.

The Virtual Work Integrated Learning for Engineering Students (Male, Hargreaves, & Pointing, 2017) four-year project has developed, implemented, and tested eight VWIL modules to support non-placement WIL. In the modules, students engage electronically with engineers, and interact in simulated workplaces.

Based on the research, a guide for academics, on implementing and embedding non-placement WIL in engineering curricula, was developed. Topics include identifying opportunities for incorporating engagement with practice, embedding aligned VWIL activities, reflection, and assessment, and recruiting a large number of professional engineers.

Workshop participants will learn about the guidelines and recommendations, and discuss and plan possibilities for developing and implementing non-placement engagement with practice at their universities.

ACTIVITIES

- The workshop facilitators will introduce the guidelines and focus on specific recommendations.. (30 minutes)
- In groups, participants will discuss possibilities to develop and implement non-placement engagement with practice at their universities. (30 minutes)
- Groups will report and share plans. (30 minutes)

TARGET AUDIENCE

Unit coordinators, program leaders, and academics who are interested in engaging students with engineering practice should attend this workshop. No prior knowledge is assumed.

OUTCOMES

Participants will leave with an understanding of strategies for developing and integrating non-placement WIL into their programs and specific recommendations, which will improve efficacy in the adoption.

PRESENTERS' BACKGROUNDS

The facilitators are researchers on the VWIL Project, led by Sally Male, Chair in Engineering Education at The University of Western Australia. The team has extensive experience in: engineering education research; and teaching in civil, electrical, mechanical and software engineering.

M3 PBL Strategies Workshop (125) 11:00 am – 12:30 pm

Strategies for meeting and exceeding Stage 1 Competencies through community-centred project-based learning

OVERVIEW OF WORKSHOP

Engineers without Borders Australia (EWBA) is developing a curriculum framework to map personal and professional breadth skills and competencies that fulfil and surpass Engineers Australia Stage 1 Competencies. Many project-based learning experiences, especially those facilitated in partnership with community organisations, meet and exceed the minimal competencies required of engineering graduates, yet the idiosyncratic complexity of different projects often make it difficult to map to standardised curriculum.

In this workshop we will present our draft framework for feedback, and discuss how it has been applied to the EWB Challenge. We will also share the development of our EWB Challenge Toolkit, and brainstorm and explore innovative approaches for addressing some of the more complex topics in this framework. Many individual academics in our community have independently pioneered successful strategies to teach these complex topics, and our hope is to bring together and share this collective wisdom.

Participants in this workshop will have the opportunity to engage in discussion around competency development through project-based learning, and take away novel approaches for integrating these competencies in their teaching.

ACTIVITIES

We will introduce our framework, and how it's been applied to the EWB Challenge, and give opportunities for small group discussion to sense check and give feedback about its relevance to engineering educators. We will then consolidate this feedback through whole group discussion, and then prioritise areas of the curriculum that are most challenging to address (e.g. developing empathy in engineering students, socio-cultural awareness, dealing with ambiguity in the design process, etc.). These complex topics will form the basis of another round of small group discussion to share ideas from our draft EWB Challenge Toolkit, and collaboratively brainstorm teaching strategies to address these challenging areas, which will then be shared back with the whole group.

TARGET AUDIENCE

Educators currently engaged with project-based learning, humanitarian engineering, and/or building the skills required of future sustainable development practitioners

OUTCOMES

Participants will learn about curriculum mapping for project-based learning, and take away new activities, discussion topics, and contacts for teaching key but complex professional engineering skills

KEYWORDS

Project-based learning; curriculum mapping; professional skills

PRESENTERS' BACKGROUNDS

Scott Daniel is a Director of Engineers without Borders Australia. He has also been involved in engineering education curriculum development, and humanitarian engineering. Alison Stoakley is Engineering Education Lead at Engineers without Borders Australia, and in her role manages the EWB Challenge. Sam Perkins is Head of Education & Research at Engineers without Borders Australia. Eva Cheng is Senior Lecturer and Deputy Director of Women in Engineering and IT at UTS. She has taught the EWB Challenge for 6 years, and is involved in various humanitarian engineering activities and creating pathways for students.

M4 Team Assessment Workshop (29) 11:00 am – 12:30 pm

Learn to Use Evidence-Based Team Development Assessments at ITPmetrics.com for Free

OVERVIEW OF WORKSHOP

The disciplinary accreditation bodies and the industries that recruit our graduates expect engineering courses to produce high calibre graduate engineers who are industry-ready. Specifically, graduates are expected to possess strong teamwork, communication and interpersonal skills in addition to their capabilities in the technical domain; and yet these skills are often reported as poorly developed among the graduates. Given such demands, are we addressing the development of complex interpersonal skills and competencies, within our engineering curriculum? Moreover, how are engineering programs actually tackling this challenge? Through team development and group dynamics exercises as well as conflict resolution examples – the workshop is an opportunity to examine the meaningful practice of embedding interpersonal skills in engineering and design curricula by exploring the opportunities provided thorough the ITP Metrics platform (www.ITPmetrics.com). O'Neill developed ITPmetrics.com and currently over 150,000 assessments have been taken to support the student development of teamwork skills. The assessments are 100% free and evidence based.

ACTIVITIES

Attendees will be engaged in an interactive session involving a break out activity from which they will gain a better understanding of the assessments offered on ITPmetrics.com, specifically the conflict management styles. There will be a debrief of the conflict management styles report after they have completed it on ITPmetrics.com. In this debrief attendees will have the opportunity to discuss various uses of each style along with other activities. The goal is for attendees to leave the workshop with the confidence and knowledge to utilize assessments offered on ITPmetrics.com in their own classrooms to enhance teamwork experiences of students.

TARGET AUDIENCE

This workshop is relevant for anyone who deals, or would like to deal (more intensively) with teamwork in engineering and design education in an active way.

OUTCOMES

Attendees will develop a deeper understanding of conflict within student teams and ways this can be handled most effectively. An overview of the assessments on ITPmetrics.com assessments will be provided in order to equip attendees with the knowledge and skills to administer the assessments in their own classes. By experiencing an assessment and debrief themselves, attendees can learn the way both are carried out and implement this into their own classes to improve student's learning of teamwork competencies.

KEYWORDS

Teamwork skills, conflict management

PRESENTERS' BACKGROUNDS

Nicoleta Maynard is an Associate Professor in Engineering at Monash University, Australia. In her role, Nicoleta is working with the engineering staff on enhancing industry engagement in the engineering curriculum, scholarship of teaching and learning and research in STEM education. Nicoleta Maynard's work and contributions in educational leadership and teaching innovation have been recognised by a number of national and international awards. She is the recipient of the 2016 Caltex Award for Excellence in Teaching, 2013 Australian's Government's Office for Learning and Teaching Citation for Outstanding Contributions to Student Learning and 2009 Australasian Association for Engineering Education Awards and Engineers Australia Citation Award. Nicoleta's work and research in engineering education has been

recognised nationally and internationally with peer review publications, presentations and invitations for participation in technical panels.

Thomas A. O'Neill is an Associate Professor of Industrial and Organizational Psychology at the University of Calgary with expertise in the areas of team effectiveness, virtual teams, conflict management, personality, and assessment. He developed ITPmetrics.com, which is a free online platform with evidence-based software tools for assessing team dynamics, teamwork competencies, and behavioral styles. Tom has published in mainstream management journals such as Journal of Management, Organizational Behavior and Human Decision Processes, Human Resource Management Review, Organizational Research Methods, and Academy of Management Learning and Education. He has received research funding from major Canadian granting agencies (CFI, NSERC, SSHRC). Tom received the Canadian Psychological Association's Emerging Research Scholar Award (2015), Undergraduate Research Supervision Award (2015) and the GREAT Supervisor Award for Graduate Research (2016), and he is a Teaching Scholar within the Taylor Institute for Teaching and Learning (2016) and Killam Emerging Research Scholar (2018).

Robert Brennan holds a PhD in Mechanical Engineering from the University of Calgary. He is currently professor of Mechanical and Manufacturing Engineering at the University of Calgary, and holds the NSERC Chair in Design Engineering. His research interests range from engineering education to intelligent automation and control systems.

Simon Li is currently an assistant professor in the Department of Mechanical and Manufacturing Engineering at the University of Calgary. He holds a PhD in Mechanical and Industrial Engineering from the University of Toronto. Simon's research interests include three areas: operations research, engineering design, and sustainability. Simon also holds the NSERC Chair in Design Engineering with Robert Brennan.

M4A Hub for Immersive and Virtual Experiences Workshop 1:45 pm – 3:15 pm

The USQ HIVE | Hub for Immersive and Virtual Experiences Explore, Engage, Experiment with Engineering Education

OVERVIEW OF WORKSHOP

This workshop will present our approach to implementing innovative teaching and learning approaches using immersive and virtual experiences. We will discuss the affordances and early findings from some of the approaches we have been exploring, including:

- The USQ Lightboard
- 360 Degree Tours
- 360 Degree Video
- 3D Learning Objects
- AR/VR/XR approaches in Engineering Education

This workshop will also generate discussion on some of the challenges unique to engineering education and brainstorming possible approaches and solutions using immersive and virtual experiences. Opportunity to network and possibly collaborate on future projects will be facilitated. Bring your business cards and ideas!

PRESENTERS

Mr. Bill Wade, Dr. Andrew Maxwell, Mr. Gary Elks; USQ HIVE Educators in Residence Program

M4B BoPEQld Professional Engineering Registration Workshop 3:45 pm – 5:00 pm

What do engineering educators need to know about Professional Engineering Registration?

Hosted by Dr Maureen Hassall BEng, BSc(Psych), MBA, PhD, CEng, MAusIMM, MIChemE, RPEQ

Maureen Hassall joined the Board in 2019 as the Academic representative. She is a chartered and registered Chemical Engineer and has a PhD in Cognitive Systems Engineering. Maureen is an Associate Professor of Chemical Engineering and the director of UQ R!SK at the University of Queensland. Her research, teaching and consulting work focuses on using leading-edge systems thinking, technology, engineering and human factors approaches to deliver evidence-based innovations in risk management and process and systems safety. Maureen's academic endeavours are informed by 30 years of working for and with resources, chemical, energy, manufacturing and major contracting companies in Australia, New Zealand and North America.

Tuesday Workshops

T1 AJEE Journal Workshop T1 (131) 11:00 am – 12:30 pm

Publishing in and reviewing for the Australasian Journal of Engineering Education

The Australasian Journal of Engineering Education (AJEE) is the peak engineering education research journal in Australasia. The Journal's Aims and Scope have been revised in 2019 to include learning throughout the life of an engineer.

OVERVIEW OF WORKSHOP

In this workshop participants will learn about the new Aims and Scope of AJEE and how to prepare a paper or review for AJEE.

ACTIVITIES

The Editorial Team will introduce the new Aim and Scope, the submission and review process, and review criteria. Participants will identify important features of papers, using selected AJEE papers as examples; discuss possible expansion of conference papers; and have the opportunity for Q&A with the Editorial Team.

TARGET AUDIENCE

Engineering education researchers considering publishing in, or reviewing for, AJEE should attend this workshop.

OUTCOMES

Participants will have a better understanding of the AJEE and be better equipped to write useful reviews, and to submit successful manuscripts.

KEYWORDS

journals, publishing, peer review

PRESENTERS' BACKGROUNDS

Sally Male and Anne Gardner are the Editor-in-Chief and Deputy Editor of the AJEE and will lead the workshop. The Associate Editors, Kacey Beddoes, Scott Daniel, Ray Eaton, Julia Lamborn and Sasha Nikolic each with specific research expertise, will facilitate group discussions for participants with aligned research interests.

T2 Mathworks Exhibitor Workshop 11:15 am – 12:30 pm

Transforming Classroom Engagement – How is MATLAB in the game?

OVERVIEW OF WORKSHOP

Flipped classrooms, project-based learning, collaborative learning spaces, computational thinking – are all examples of the evolution of modern engineering education. There is simply an expectation that the teaching and learning experience in 2019 should be very much different to that of 1999. Fostering curiosity, empowering students to apply and discover, are all critical in successfully engaging with today's engineering student. In parallel to the modernization of engineering education, MATLAB too has evolved over the last 20 years. A blinking command prompt and a blank white page with Courier New font, seems as dated today as the "chalk and talk" lecture deliveries of 1999.

So, have you embraced modern MATLAB, which is built for today's learning environment?

In the first half of this session we'll demonstrate the latest MATLAB features and resources, that support classroom modernization. Specifically:

- How is Computational Thinking enabled by the new MATLAB desktop environment?
- How does MATLAB ONLINE support content shareing within the classroom?
- How does MATLAB GRADER automate classroom assessments and what analytics are produced?

In the second half of this session we'll demonstrate MATLAB's current capabilities in Machine Learning and Deep Learning for engineering applications. And we'll explain how the MATLAB user experience differs to alternate platforms for teaching AI.

The difference can be encapsulated in the question: "Do you want your students working on challenges at the cutting edge of Computer Science … or, do you want your students working on challenges at the cutting edge of Engineering?

Optional (but recommended) Prerequisites for attending this session:

- Bring your Laptop, Mac, or tablet
- During this session attendees will have the opportunity to experience first-hand the WEB based version of MATLAB (aka MATLAB ONLINE), as well as the Web based auto-grading tool MATLAB GRADER.
- No software needs to be installed, but you will need to login to the sessions using your MathWorks account. If you don't have an account, please create one before attending this session: https://au.mathworks.com/mwaccount/register

PRESENTERS

Ken Dunstan & Bradley Horton

T3 Implementing WIL Workshop (94) 11:00 am – 12:30 pm

Where there is a WIL, there is a way

OVERVIEW OF WORKSHOP

Industrial Training (IT) is requirement of many Australian engineering degree programs. Despite its many benefits, IT also presents an insurmountable challenge to Engineering Schools and Faculty due to multi-faceted administrative, quality assurance and compliancy requirements. Growth in student numbers and diversity, and the changes within the engineering profession further necessitate a rethink of what constitute a quality IT placement, as well as how to assess or evaluate student learning and performance, at scale.

ACTIVITIES

- Managing Industrial Training • In this activity, participant will discuss what constitute quality IT placement and review the tools that can be used to administer and meet the compliancy requirements for IT.
- Supporting Student • In this activity, participant will review and share best practice for supporting students in their search for IT placements, including the use of student as partners to create a system that develop the students' job search and employability skills.
- Assessing Industrial Training • In this activity, participant will review and share best practice for capturing, assessing and evaluating student professional development during their IT placement.

TARGET AUDIENCE

Academics and professional staff involved in Work Integrated Learning and employability, specifically Industrial Training for engineering students, Industry Representative, Students

OUTCOMES

1. Participate in discussion on what constitute IT and quality indicators for IT.
2. Develop an understanding of quality assurance and compliancy requirements for IT.
3. Share examples of tools and best practice for IT.
4. Contribute to the development of a shared framework or resources for IT.

KEYWORDS

Industrial Training, Work Integrated Learning

PRESENTERS' BACKGROUNDS

Dr May Lim was an IT Coordinator at the UNSW School of Chemical Engineering and a fellow of the UNSW Scientia Education Academy. She has worked closely with her Faculty, student societies, student career and employment units, industry and professional bodies to improve the IT process and contributed to the development of tools and guidelines for capturing, assessing and evaluating student professional development in IT.

Dr Sarah Grundy is currently the IT Coordinator at the UNSW School of Chemical Engineering.

A. Prof Jayashri Ravishankar is an Associate Professor at UNSW School of Electrical Engineering and Telecommunications. She is interested in technology-enabled teaching and implements various strategies to improve students' active learning. In 2016 and 2018, she received the Teaching Excellence Award in Engineering and Vice Chancellor Award for Teaching at UNSW.

T4 Self and Peer Assessment Workshop (18) 11:00 am – 12:30 pm

Raising the quality of self-and peer evaluations using tools of the CATME system

OVERVIEW OF WORKSHOP

The goal of this 90 minute workshop is to introduce participants toscientifically proven team formation and peer feedback tools to help them effectively manage teams and help students learn/improve teamwork skills. Attendees will interact with the CATME system in real-time.

ACTIVITIES

- INTRODUCTION [10 min] Introduce presenters and participants. Establish wireless connections. Introduce CATME SMARTER Teamwork System. Briefly discuss forming teams with CATME tools. Handouts.
- PEER EVALUATION [15 min]: Sharing problems encountered in peer rating evaluations. Discuss how the system addresses issues raised by participants.
- DEMONSTRATE.CREATING A PEER RATING SURVEY [20 Min] Participants login as students and complete the survey. Demonstrate using CATME survey results for formative and summative assessment. Preview the student view of the results.
- RATER TRAINING [35 min]: What does it mean to be a good rater? How do you become one? Discuss how the system addresses issues raised by participants. Importance of the instructor's role. Demonstrate the instructor's CATME tools for training students. Participants login as students and complete one iteration of the rater training. Preview the student view of results. How can we use this information to improve student teaming performance? Presentation focuses on issues in rating and rater training.
- ASSESSMENT [10 min] Summary of how these tools fit in an overall strategy of managing student teams

TARGET AUDIENCE

All instructors using or planning to use student teams in their courses will benefit. OUTCOMES Participants will gain insight on how to form more productive teams and how to use peer ratings to improve teamwork performance and learning in their courses.

REFERENCES

[1] Ohland, M.W., Loughry, M.L., Woehr, D.J., Finelli, C.J., Bullard, L.G., Felder, R.M., Layton, R.A., Pomeranz, H.R., & Schmucker, D.G. (2012). The Comprehensive Assessment of Team Member Effectiveness: Development of a Behaviorally Anchored Rating Scale for Self and Peer Evaluation. Academy of Management Learning & Education, 11 (4), 609-630. Winner of the 2013 Maryellen Weimer Scholarly Work on Teaching and Learning Award.

[2}Loignon, A. C., Woehr, D. J., Thomas, J. S., Loughry, M. L., Ohland, M. W., & Ferguson, D. M. (2017). Facilitating Peer Evaluation in Team Contexts: The Impact of Frame-of-Reference Rater Training. Academy of Management Learning & Education, 16(4), 562-578 Winner of Best Paper in Innovative Teaching/Management Education, 2016, Southern Management Association KEYWORDS Teamwork, Peer Ratings, Rater Training.

PRESENTERS' BACKGROUNDS

Ferguson and Ohland have decades of experience teaching teamwork and Ferguson two decades experience managing professional consulting teams. Both have a decade working with the CATME system and are engaged in NSF funded research on teaching teamwork to engineers. See https://info.catme.org/research/publications-and-presentations/

T4A Scenario-based Assessment Workshop (123) 1:45 pm – 3:15 pm

Developing scenario-based assessments

Contextualised skills and behaviours are often assessed using self-report scales. While easily administered to large numbers of respondents, self-report scales have questionable validity in predicting actual behaviour. Conversely, simulation-based assessments or in-situ observations offer much more authentic evaluations of actual behaviour but are substantially more time-consuming to conduct. Scenario-based assessment techniques can be a good compromise between these extremes. They can be administered to a much larger number of participants than simulation-based assessments, with greater predictive validity than self-reports. Although they have been used in a variety of ways, all scenario-based assessments have three common elements: a description of a realistic, open-ended situation, with some issue or problem to be resolved (i.e. the scenario), some questions pertaining to that scenario, and a rubric, or scoring guide, for evaluating the responses.

OVERVIEW OF WORKSHOP

The goal of this workshop is to introduce participants to the processes in developing and utilising scenario-based assessment. To do so, participants will be introduced to the Energy Conversion Playground (ECP), a scenario-based assessment developed to assess socio-technical thinking and co-design expertise in the context of humanitarian engineering. Participants will have the opportunity to work with the assessment and discuss how to develop their own scenario-based assessments for other constructs.

ACTIVITIES

Participants will be introduced to the ECP and use the given rubric on socio-technical thinking and co-design expertise to assess real-life responses to the ECP. In small groups, they will discuss their ratings to reach consensus. With the presenters, they will discuss how scenario-based assessments can be used in teaching and research. Finally, the process involved in developing a scenario-based assessment and rubric will be discussed, with participants having the opportunity to plan the creation of their own scenario-based assessments.

TARGET AUDIENCE

Educators looking for alternative assessment approaches with their students, researchers considering developing their own scenario-based assessments (or using established scenario-based assessments) as a research tool, or teachers of design and/or humanitarian engineering.

OUTCOMES

Participants will be more familiar with the steps involved in developing scenario-based assessments, and how they can be used in research and teaching.

KEYWORDS

Scenario-based assessment, co-design, socio-technical thinking

PRESENTERS' BACKGROUNDS

The authors are scholars in engineering education. Together, they have published several conference and journal papers on the development of rubrics for scenario-based assessments in humanitarian engineering contexts. Presenter are Scott Daniel and Andrea Mazzurco.

Wednesday Workshops

W1 AAEE Conference Workshop (161) 11:00 am – 12:30 pm

Stop lecturing about active learning: integrating good teaching practices into AAEE conference sessions

Although the research favouring active learning strategies over traditional instruction is compelling, many conference presentations nevertheless take a very didactic approach. Indeed, much of the research presented at AAEE Conferences describes different modifications we have made to students' traditional learning experiences to make them more engaging and effective.

Inspired by the session of the same name held at this year's American Society for Engineering Education (ASEE) Conference, in this workshop we will explore different strategies for implementing active learning approaches in our conference presentations. Additionally, we will workshop suggestions for alternative presentation formats for future AAEE conferences.

OVERVIEW OF WORKSHOP

In this workshop, we will brainstorm, share, and discuss different techniques for making our AAEE presentations more engaging and audience-focused. These will then be compiled and subsequently shared with the AAEE community.

ACTIVITIES

In both plenary and small-group discussions, participants will have opportunities to brainstorm, share, and build on different ideas for making conference presentations more interactive and engaging. Discussion will also focus on how different contextual issues can inform which strategies are most effective in different situations.

TARGET AUDIENCE

Any researcher considering presenting at AAEE or other conferences in the future.

OUTCOMES

Participants will be more familiar with a greater repertoire of skills and strategies for making their conference presentations more engaging. Conversely, AAEE will develop a clearer understanding of delegates' preferences regarding presentation formats.

KEYWORDS

Active learning, presentations, conferences, lecturing

PRESENTERS' BACKGROUNDS

All presenters are experienced engineering educators and researchers, and are currently serving on the AAEE Executive Committee.

W2 Engaging Prof Practice Workshop (190) 11:15 am – 12:30 pm

Agents of Change for Equitable Engagement with Professional Practice

OVERVIEW OF WORKSHOP

This workshop draws from a National Centre for Student Equity in Higher Education (NCSEHE) funded project and the final report "Access, quality and wellbeing in Engineering Work Integrated Learning placements: Implications for equity and diversity". The project employed a mixed methods approach including interviews with students about their experiences, supplemented by interviews with university staff. Findings were made about Engineering Work Integrated Learning placement practices and their impacts, challenges in accessing and providing quality placements, and how equity students face additional barriers to access and wellbeing. Good practices were identified and recommendations made for students, industry partners, EA and Higher Education (HE).

Participants will engage in discussion with opportunities for reflection on their role as change agents for equity in WIL in their institution or workplace. In light of recommendations and best practice findings, participants will develop personalised action plans for changes for more equitable engagement with professional practice providing quality experiences supportive of student wellbeing.

ACTIVITIES

Brainstorming the issues of access, quality and wellbeing in engineering workplace and work integrated learning, for example how to ensure equitable access for all students including those of diversity and equity status, how to engage industry provision of quality work integrated learning or placement and internship-like experiences within curriculum, how to prepare students and workplaces for successful experiences that do not diminish student wellbeing. Check-list 'audit' discussion of practices, programs, policies, support mechanisms and curriculum design against the findings for good practice and recommendations.

Action plan development for change to enhance engagement with professional practice through work integrated learning and associated WIL-like experiences.

TARGET AUDIENCE

Higher education staff and students, and industry partners of higher education are the target audience. No prior knowledge needed to participate in the activities though some suggested pre reading will be provided to assist participants with awareness of the context of WIL and engagement with professional practice and industry engagement best-practice recommendations.

OUTCOMES

The outcomes from the workshop will be an action plan to implement in their context as appropriate to participants' role.

KEYWORDS

Work integrated learning, engagement, industry, professional practice, diversity, equity, wellbeing

PRESENTERS' BACKGROUNDS

Natalie Lloyd has led a range of education and equity research including leading the NCSEHE project. Sally A Male co-wrote the Best Practice Guidelines for Effective Industry Engagement in Australian Engineering Degrees and has led major projects on engineering work integrated learning. Megan Paull was the chief investigator on the OLT project Volunteering to Learn. Teena Clerke has participated in a range of educational, equity and health research projects.

W3 Peer Review Workshop (140) 11:00 am – 12:30 pm

Agents of Change for Equitable Engagement with Professional Practice

OVERVIEW OF WORKSHOP

The limitations of standardised student surveys, when used as instruments to assess the quality of teaching, are well documented (e.g. Boring et al, 2016). We are very comfortable to assess the quality of research by peer review processes. Why are we far less likely to assess the quality of teaching by peer review? It is 10 years since the ALTC released a report about peer review of teaching (Crisp et al, 2009). Since then, there has been very little discussion about what makes a good teacher into a good engineering teacher and how these qualities can be determined. What criteria should we be using to review teaching, beyond the generic? Further, peer review is an important aspect of professional practice, and is therefore an important learning outcome for students. We should be modelling such behaviours as teachers.

ACTIVITIES

What inferences can be made by observing a colleague's teaching? Participants will brainstorm aspects that peer reviewers may consider when evaluating the quality of teaching in an engineering classroom. This will be followed by an activity in which participants actually peer review a recorded segment from a teaching session and share their ratings and justifications. This activity will be supported by an online polling system that will enable participants to calibrate their (de-identified) ratings against the ratings of the group.

TARGET AUDIENCE

All teaching academics and especially those who wish to help improve the overall quality of teaching in their institutions.

OUTCOMES

Participants will be more confident providing feedback on a colleague's classroom teaching, by identifying suitable criteria to use. Participants will gain insight into the variety of ways in which teaching practices are viewed by others and have an opportunity to calibrate their views against the views of others. The workshop organisers will also benefit. We are conducting work at UNSW to improve peer review of teaching processes and will benefit from the views expressed by participants. .

REFERENCES

Boring, A., et al. (2016). " Student evaluations of teaching (mostly) do not measure teaching effectiveness." ScienceOpen Research 2016 (doi: 10.14293/S2199-1006.1.SOR-EDU.AETBZC.v1)
Crisp, G., et al. (2009). Peer Review of Teaching for Promotion Purposes: a project to develop and implement a pilot program of external peer review of teaching in four Australian universities. Australian Learning and Teaching Council.

KEYWORDS

Peer review teaching; teaching evaluation

PRESENTERS' BACKGROUNDS

Iain Skinner has been teaching engineering students at UNSW since 1992 where he is now Director of Governance in the Faculty of Engineering. He has been an active proponent of the systematic peer review of teaching for many years and is a Senior Fellow of Higher Education Academy. Chinthaka Balasooriya is the Director of Medical Education Development at the School of Public Health & Community Medicine at UNSW. He has been deeply involved in medical education research and teaching for the last 20 years.

W4 Wearable Tech Workshop (111) 11:00 am – 12:30 pm

Enhancing the 21st century educational landscape with wearables

OVERVIEW OF WORKSHOP

The new era of learning has progressively extended from e-learning to Mobile learning (m-learning) allowing for a vibrant online learning experience. Wearable computing is the latest trend in the sea of technological marvel out there today.

Wearable technologies typically incorporate a variety of sensors, e.g.: mechanical information for measuring position, acceleration, displacement or biological information for measuring heart rate, temperature, respiration rate etc. Other special features such as voice activated interfaces or visual interfaces also aid for additional assistive services. These features lend themselves as an ideal candidate for research & development into means for a more dynamic and rich education experience.

Example: Virtual reality, such as Oculus Rift, has noticeable impacts in education. It allows learners to experience learning differently and without the risk involved. It provides live scenarios for students and takes them to places that are either difficult, or sometimes impossible, to access in real-life, e.g. space studies, archeology courses, medical education, chemical/mining engineering and aviation training. The utilization of virtual reality wearables in education enables hands-on, engaged and interactive participation of students in their learning process compared to the passive way of reading/ watching lessons in a traditional classroom.

Exploring and creating a design idea for an ideal wearable concept can provide a means to solving some of the challenges in a creative fashion by the people who are at the forefront of the application, the teachers, the instructors, the lecturers.

ACTIVITIES

Brainstorm the various wearable technologies out there in the current market and its potential application in the education context. Create a concept design of a wearable for future of education. Introduction: Brief 5-10 mins overview of some wearable technologies available in the market and possible use in the education sector. Include examples of current use or tested scenarios in the education space. Show examples from my own practice and research. Explain the need and use for wearable technology in education sector.

Breakout: Group audience in teams of 5 (from a diverse background if possible).

- Provide overview of the activity. Set objectives and goals. List tangible outcomes.
- Present a slide with various pictures of current wearable technology
- Provide overview of the activity. (Use design thinking to approach and solve)
- Framing of the problem. (10 mins)
- Discuss some limitations (technological and pedagogical) and target outcomes.
- Discuss barrier to learning opportunities (e.g.: accessibility issues)
- Brainstorm (25 mins) – What is, what if, what wows, what works
- Participants to split the butcher paper in 4 quadrant with the above headings
- Present vs Future. (10 mins)
- What is? – the present
- What if? – envision the future
- Innovate (10 mins)
- What wows? – focus on a solution
- What works? – test hypothesis
- Sketching the design concept (20 mins) – mind map, sketching on paper
- Wrap up (15 mins) – share with the audience the different design solutions

Set objectives and goals.

- At least one concept design from each group with reasonable detail
- A list of generated ideas and a summary of the session
- A doc of draft product principles with list of any limitations/negative

Resources required for presenter:

- Projector
- Laptop/computer with USB access
- Handheld wireless mic (if the venue is large)
- Laser pointer

Resources required per table:

- 3 pieces of butcher paper/flipchart pad
- Pack of 6 coloured markers

TARGET AUDIENCE

This session welcomes staffs from school, TAFE College or higher education who works with digital technologies as part of their delivery either standalone, blended or complementary approach. It will also suit anyone who is working with diverse cohort of students onshore, offshore, on the job or students with special needs.

OUTCOMES

- Innovation in education technologies using creative problem solving and design thinking Pedagogy driven digital education
- Inclusive education – reducing barriers to learning opportunities

REFERENCES

Bower, M., & Sturman, D. (2015). What are the educational affordances of wearable technologies? Computer & Education.

Cook, C., & Sonnenberg, C. (2014). Technology And Online Education: Models For Change. Contemporary Issues In Education Research.

KEYWORDS

Education, wearables, engineering

PRESENTERS' BACKGROUNDS

Indu is an Electrical and Electronics Engineer with over 15 years of experience in engineering, education and leadership. She is currently the Deputy Dean at Engineering Institute of Technology and is also a Phd student at USQ conducting research in the space of wearables as an assistive technology in education. Throughout her career, Indu has been dedicated in designing and developing effective education and training programs through comprehensive curriculum development and e-learning. She was awarded the North Metropolitan Trainer of the year in 2017 for her innovative teaching strategies in engineering education.

Wednesday Workshop 1:30 pm – 3:00 pm

W4A Research in Automotive Safety Workshop 1:30 pm – 3:00 pm

SCOPE AND AIMS

Safe System for Universities (SS4U) is a project funded by the Victorian Traffic Accident Commission and being developed through the University of Adelaide and the Safe System Road Infrastructure Program, Regional Roads Victoria. SS4U is a curriculum aimed at developing Safe System knowledge, recognised as best-practice in road safety throughout Australia and New Zealand, within engineering education. This is being achieved through the development of "plug and play", self-learning-oriented education material, with emphasis on the principles, ethics, practice and pragmatics of both general engineering safety and the specialist field of road safety.

A workshop is being held for a number of conference participants to inform and engage them with the Safe System for Universities project. The objectives of the workshop are:

- To inform workshop participants about, and the need for, the Safe System for Universities project
- To engage workshop participants in a fun and insightful activity that will demonstrate the education style of SS4U and highlight the learning benefits of the project
- To seek feedback from workshop participants regarding current levels of engineering safety education in Australian and New Zealand universities, gaps within current education, whether SS4U represents a viable education conduit and improvements that can be made to the project.

ACTIVITIES

The workshop will be split into three components:

- Introductory presentation and demonstration of the Safe System for Universities learning material (approx. 30 mins)
- A short group activity requiring workshop participants to apply information from the demonstration and their engineering knowledge to a safety task, then report back to other participants (approx. 30 mins)
- Group discussion (feedback) and optional short written survey (Approx. 30 mins).

FORMAT

The workshop is developed for approximately 30 attendees, for a duration of 90 minutes. Tables and chairs for 30 people are required, set up as to allow 5-6 people at each table. The group activity is undertaken in groups of 5-6 people. AV equipment (for MS PowerPoint presentations) is required for the introduction/demonstration.

CONTACT

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Parallel Papers

Presentation format | A 7 min pitch for each presenter followed by panel Q&A after the presentations. Each paper session are broken up into 3-4 presentations and follow by Q&A. If you have a session of 6 papers, then starts off with 3 papers approximately for 21 min follow by 20 min Q&A, and then 3 remaining papers approximately 21 min follow by 20 min Q&A. If you have 8 papers in a session, then it will be divided into 2 slots of 4 papers but with only 15 min Q&A.

Monday Papers 1:45 pm – 3:15 pm

Paper M1A Student Motivation and Engagement ***Chair: Alex Kist***

8	Stuart Palmer and Wayne Hall	Using qualitative student evaluation data to illuminate quantitative scale item ratings: seeing beyond the numbers
70	Yusuf Khan	Outcome of WITT model for EE2E programme for Secondary School to Engineering pathways
84	Kim Blackmore, Chris Browne and Jeremy Smith	Project-Based Application Streams to Support Student Motivations and External Engagement
85	David Lowe and Anthony Kadi	Diversity in student initial reactions to a Professional Engagement Program

97	David Thorpe and Ian Craig	Challenging Students in Teaching Sustainable Engineering – Innovations in the Technology, Sustainability and Society Course at USQ
98	Sarah Lyden and Alan Henderson	Increasing student satisfaction with teamwork in project-based engineering units
99	Sarla Kumari, Mohammad Al-Rawi, Jai Khanna and Maryam Moridnejad	Motivation and Engagement: Māori and Pasifika learners
107	Sam Cheah, Mona Bahri, Elena Sitnikova, Kate Wilson and Kate Wilson	Why do students choose engineering: Intrinsic or Extrinsic Motivation?

Paper M2A Assessment, Curriculum and Program Design *Chair: Jo Devine*

13	Stuart Palmer and Siva Krishnan	Using text analytics in benchmarking an engineering management major in a master of engineering course
24	Nathan Dunbar and Avinda Weerakoon	Integrating Experiential Engineering and English Tasks in a Second Language Medium Programme
31	Timothy Anderson and Smitesh Bakrania	Identifying common problems in the determination of the thermodynamic properties of pure substances by Mechanical Engineering undergraduate students
36	Pavel Livotov, Mas'udah, Arun Prasad Chandra Sekaran, Richard Law and David Reay	Education in systematic eco-innovation in environmental and process engineering

46	Andreas Helwig, Shane Simmons and Steven Goh	Engineering Students e-Portfolio: Review, Reflect, Note, Act and Test
58	Mohammad Al-Rawi, Annette Lazonby, Jai Khanna, Sarla Kumari and Maryam Moridnejad	Assessing Group Project for Fluids Power and Advanced Fluid Mechanics Paper
83	Jeremy Smith, Ellen Lynch, Robert Care, Neil Greet and Rob Mitchell	Building an Australian Humanitarian Engineering Community of Practice

Paper M3A Learning Experiences and Student Success *Chair: David Thorpe*

33	Adrian McCallum and Helen Fairweather	Empowering self-reflection to stimulate optimum outcomes in first year engineering
38	Sarah Dart	Developing Predictive Models of Student Success in Undergraduate Engineering Mathematics Courses
47	Maree Lake, Kylie Rice and Neal Lake	Factors Influencing Student Success in Engineering Mathematics
61	Robert Ross	Gamification of Engineering Exam Revision using Escape Rooms

68	Iouri Belski, Anne Skiadopoulos and Chi Tin Stephen Yang	TRIZ Heuristics Improve Creative Problem Solving Self-efficacy of Engineering Students
82	Lokesh Padhye	Educational videos, based on the student response system (SRS), as a feedback tool to enhance the learning of core concepts
92	Sooraj Sekhar, Petr Matous, David Lowe and Tim Wilkinson	How do students handle atypical subject choices?

Monday Papers 3:45 pm – 5:15 pm

Paper M1B Student Motivation and Engagement *Chair: Alex Kist*

135	Charlotte Watts and Charles Hoke	Supporting Student Engagement in Foundational Engineering Courses Via the Development of a Laboratory Program
137	Kamel Hooman	Online evaluation of an engineering course with built-in focus group
139	Felicity Coffey	Can MicroMasters MOOCs accomplish their intended marketing role? Review of the first year and a half of the UQx Sustainable Energy MicroMasters series through edX
159	Kathryn Youngblood, Nicola Sochacka, Joachim Walther and Shari Miller	How mental models mental impact students' engagement with empathic communication exercises

172	Nicholas Emerson, Zia Javanbakht and Geoff Tansley	Blended learning in Engineering Design: Using YouTube analytics to track student engagement with online content
174	Antonette Mendoza, Shanton Chang, Kristine Elliott and Anne Venables	The Writing Circle: A peer-based collaborative approach to improving engineering students scholarly writing skills
177	Carlo Gabriel	Motivation, Self-Efficacy and Anxiety in Learning Engineering Fundamentals among Year 1 Students at Southern Institute of Technology
183	Benjamin Taylor, Claire-Marie McLean and Billy Weston	Appointing Peer STEM Ambassadors in Regional High Schools

Paper M2B Assessment, Curriculum and Program Design *Chair: Jo Devine*

90	Roger Hadgraft, Beata Francis, Terry Brown, Robert Fitch and Ben Halkon	Renewing Mechanical and Mechatronics programs using Studios
96	David V. Thiel and Hugo G. Espinosa	Engineering Ethics Courses Reimagined
117	Hugh Wilson and Malcolm Hay	Use of microcredentials to provide an alternative learning pathway for an engineering diploma program.

147	Raj Sharma	Impact of Assessment Criteria on Students participation on Online Quizzes
169	Andrew Valentine	Intellectual Property Education in Australian engineering degree programs: how do we rate?
193	Xiaoye Liu, Zhenyu Zhang and Marita Basson	Teaching Terrestrial Laser Scanning for Spatial Data Collection and Applications - Experiential Learning as a Tool to Enhance the Development of Higher Level Graduate Capabilities

Paper M3B Learning Experiences and Student Success *Chair: David Thorpe*

108	Tim Wilkinson and Peter Cafe	Student at risk perceptions of academic weakness
110	Nigel Robertson and Lynne Parmenter	Learning Engineering: experiences and opinions of learning to become an engineer
127	Sanam Aghdamy, Jeung-Hwan Doh, Hong Guan and David Thambiratnam	Impact of Lecture Recording in Undergraduate Engineering Classes: Students' Perception and Academic Attainment
134	Nicholas Tse, Serene Lin-Stephens and Shaokoon Cheng	Agile Learning in Product Development

164	Kacey Beddoes	First Year Practicing Civil Engineers' Challenges
184	Samuel Cunningham-Nelson, Wageeh Boles, Luke Trouton and Emily Margerison	A Review of Chatbots in Education: Practical Steps Forward
185	Ramadas Narayanan, Prasad Gudimetla, Sherre Roy and Aruna Jayasuriya	Enhancing student learning experience in Engineering Dynamics course with the use of a simulation tool
189	Jolanta Szymakowski	Like-ability peer interactions and grouping in an engineering classroom

Tuesday Papers 1:45 pm – 3:15 pm

Paper T1A Visualisation and Automation in Teaching *Chair: Alex Kist*

5	Irina Boiarkina and Bradley Horton	Automation of Practice Problem Generation for Reactor Engineering
53	Jonathon Skotny, Andrew Valentine, Ghulam Mubashar Hassan and Sally Male	Conceptual Learning and Immersive Properties in Head-Mounted-Display Virtual Reality Simulations
59	Joshua Burridge, David Lowe, Keith Willey and Judy Kay	Defeating Hawthorne in tech-enabled education: Passive observation of student behaviour with a remote laboratory

100	Ayodele Olofinjana, Theresa Ashford, Damon Kent and Helen Fairweather	Immersive Visualisation – seeing the engineering problem in surround vision.
115	Jayashri Ravishankar, Danny Tan and William Armour	Innovative 3D Virtual Electrical Safety Case Studies for Immersive Engagement
162	Jiajun Huang, Shuo Yang and Chang Xu	A Visual Content-Based Approach for Automatic Evaluation of Student Assignment Reports

Paper T2A Innovation in Teaching Practices *Chair: Jo Devine*

9	Nirmal Mandal, Mohammad Rasul and Kalam Azad	Team teaching approaches: how to manage student learning in multi-campus settings
20	Jay Somasundaram and Mohammad Rasul	Re-engineering Education: Deconstructing the barriers to disruptive innovation
44	Elliot Varoy, Gerard Rowe and Nasser Giacaman	Improving Understanding of Electrical Concepts Using Visualisation, Collaboration and Experiential Learning
65	Edoghogho Ogbeifun and Jan-Harm Pretorius	Including hands-on experience in the teaching of research methods to graduate students

77	Rex di Bona and Nicholas Tse	Lunch Box Labs – Utilising Small and Portable Practicals
81	Ken Louie, Paul Ewart and Jai Khanna	A double-edged sword: Use of computer algebra systems in first-year Engineering Mathematics and Mechanics courses
86	Kamrun Nahar and Rezaul Chowdhury	Effectiveness of Flipped Classroom Model in Distance Learning

Paper T3A Authentic and Work Integrated Learning *Chair: David Thorpe*

11	Nirmal Mandal and Frank Edwards	Authentic assessment in work integrated learning promotes student work readiness in industrial settings
43	Sally Male, Lesley Jolly, Esther Matemba and Andrew Valentine	Theory in the Service of Practice: WIL and the curriculum
51	Savindi Caldera, Cheryl Desha, Hiromichi Fukui and Shinya Yasumoto	"Biggs + ACAD =?" Evaluating an international authentic learning pilot in education for sustainable development

52	Yan Kuang	Enhancing graduate employability: An authentic work-integrated learning approach
76	May Lim, Buddhi Ranasinghe and Michele Hannon	Industrial Training for 4000 Engineering Students: How Hard Can It Be?

Tuesday Papers 3:45 pm – 5:15 pm

Paper T1B Visualisation and Automation in Teaching

Chair: Alex Kist

129	Sanam Aghdamy, Cheryl J. Desha, Dominic Ong, Shanmuganathan Gunalan, Hong Guan, Andy Nguyen and David Rowlands	From Concept to Reality: Sharing Insights and Pathways for Enabling Experiential Learning in Real-time Sensing
167	Sulakshana Lal, Anthony Lucey, Euan Lindsay, David Treagust, Mauro Mocerino and Marjan Zadnik	A study of the relative importance of student interactions for the attainment of laboratory-learning outcomes
173	Paul Corcoran, Deb Moulton, Liz Smith and Diana Quinn	Program Roadmap – a visual, interactive and self-regulating digital representation of the student learning journey

179	Ali Hadigheh, John Vulic, Joshua Michael Burridge, Tom Goldfinch, Jacqueline Thomas and Aaron Opdyke	Preliminary Evaluation of Immersive and Collaborative Virtual Labs in a Structural Engineering Unit of Study
180	Elsayed Abdelaal, Sithara Gamage and Julie Mills	Artificial Intelligence Is a Tool for Cheating Academic Integrity
181	Benjamin Winger, Tony Vo, Veronica Halupka and Scott Wordley	Scoping E-Assessment Tools for Engineering

Paper T2B Innovation in Teaching Practices

Chair: Jo Devine

67	Rosemary Chang, Scott Daniel, Claire Dixon, Mark Newbound, Melissa Toifl and Scott Rayburg	"Teaching people design-talk": Critically reflective conversations on cultivating learner empathy in humanitarian engineering
182	Rosemary Chang, Scott Daniel, Claire Dixon, Mark Newbound, Melissa Toifl and Scott Rayburg	Emergent themes in critically reflective conversations on (humanitarian) engineering teaching practice
152	David Walker	Surface Mining Techniques: A day at the beach.

163	Tiju Mathew Thomas	A Flexible Approach towards Delivering Qualifications to address the Skills Shortage Gap in the Industry
168	Etsuo Morishita and Toshiki Homma	Experimental and Theoretical Aerodynamics of a Sphere in Engineering Education
192	Ruby Michael	A relationship-based approach for improving a course co-taught with industry lecturers

Paper T3B Authentic and Work Integrated Learning *Chair: David Thorpe*

112	Marie-Laure Pype, Brian Hester, Duncan Middleton and Gilda Carvalho	Role-play learning tool to enhance student's view of industry operation complexity
121	Alexandra Nero, Timothy J McCarthy, Emily Ryan and Clayton McDowell	Capturing the student learnings from the Solar Decathlon Middle East 2018
149	Chris Whittington and Timothy Anderson	Transformative Change in Engineering Education

186	Helen Fairweather, Carolyn Jacobs, Afnan Bashir and Mark Paddenburg	GovHack: An engineering assignment
187	Rezwanul Haque, Selvan Pather, Robi Islam and Ayodele Olofinjana	Simulation games- An approach to teaching world class lean manufacturing techniques

Paper T4B Understanding the Student and Teams *Chair: Melanie Fleming*

41	Behzad Beigpourian and Matthew Ohland	Documenting Engineering Students' Counterproductive Teamwork Behaviors through Peer Evaluation
48	Andrew Valentine and Iouri Belski	Exploring differences in perceived problem-solving and creativity skills between novice and experienced engineering students
71	Subroto Ghosh and Rupa Ghosh	Meeting Behavioural Challenges through Instructional and Assessment Methods in a Vocational Institute: A Comparative Study of Theory and Practice
72	Shahnaz Mansouri, Meng Wai Woo, Jonathan Li and Julia Lamborn	A quantitative method to evaluate student workload

93	Gavin Buskes	Assessing students' perception of self as a learner
160	William Schell, Bryce Hughes, Brett Tallman, Monika B. Kwapisz, Tessa A Sybesma and Shannon N. Ranch	How do students view leadership identity in engineering?
166	Kacey Beddoes and Todd E. Nicewonger	Interdisciplinary Teamwork Challenges in a Design Competition Team

Wednesday Papers 1:30 pm – 3:00 pm

Paper W1 Industry and Engineers of the Future

Chair: David Thorpe

22	Emiliya Suprun, Nikola Perisic, Rodney Stewart and Sherif Mostafa	Preparing Next Generation Civil Engineering Graduates: Identifying and Combating the Digital Skills Gap
23	Mabatho Gaula, Jan-Harm Pretorius and Antoine Mulaba-Bafubiandi	Harvesting mining engineering graduates' potential for value added to the organisation
34	Caroline Crosthwaite, Peter Lee, Robin King, Doug Hargreaves, Bernadette Foley, Tom Goldfinch, Julia Lamborn, Mark Symes and John Wilson	Preparing the next generation of engineers: what will an engineering graduate of 2035 look like?
91	Swapneel Thite and Jayashri Ravishankar	Role of effective team activities in engineering courses that satisfy requirements of Industrial workforce in Australia

114	Ashlee Pearson, Margaret Jollands and Colin Kestell	Learning Outcome Trends in Australian Undergraduate Engineering Education
156	Mohan Yellishetty, Roger Hu and Arun Patil	Role of Industry in Shaping Mining Curriculum in Tertiary Education: A Case Study
170	Syed Wahid, John Pumwa and Nosare Maika	Challenges of Engineering Education-Impact of Globalisation

Paper W2 Problem-Based Learning and Capstone Projects

Chair: Jo Devine

2	Brad Stappenbelt, Abheek Basu, Senevi Kiridena and David Hastie	Engineering Undergraduate Dissertation Supervision: a thesis for change
6	Huaizhong Li and Simon Howell	Engaging engineering students through project-based learning and industrial site visits in a mechanical design course
17	Megan Boston, Mark Dyer, Rachel Dyer, Federica Geremicca and Ali Shokri	Tokomaru Bay Wharf and Heritage Buildings Restoration Design: Innovating a Holistic Final Year Civil Design Project
25	Ellen Lynch, Jeremy Smith, Kim Blackmore, Sara Beavis and Larissa Schneider	A chemist, engineer and environmental scientist walk into a classroom… Outcomes from an interdisciplinary project-based course

26	Nicholas Tse and Rex Di Bona	Large Scale Vertically Integrated PBL
28	Mohammad Rasul and Nirmal Mandal	Performance of students' choice team vs teacher/facilitator's created team in project-based learning (PBL) units
79	Hong Guan, Shanmuganathan Gunalan, Benoit P Gilbert, Hassan Karampour, Jeung-Hwan Doh and Julie Crough	Project Enhanced Learning in Fundamental Mechanics and Structures Courses
153	Kourosh Dini, Elizabeth Levin and Aaron Blicblau	Designing Assignments and Rubrics for Multidisciplinary Capstone Projects for Engineering Students as Part of Integration of Curriculum and Programs

Paper W3 Teaching the Teacher to Teach *Chair: Alex Kist*

35	Anlia Pretorius, Jan-Harm Pretorius and Leon Pretorius	Supervisors' approach and other factors contributing to the successful completion of doctoral studies
60	Jai Khanna, Mohammad Al-Rawi, Maryam Moridenjad and Sarla Kumari	Incorporating Effective Teaching Pedagogies to Improve Learning and Teaching Approaches Globally
63	Melissa Marinelli, Sally Male, Lee-Von Kim and Zoe Sydney	Development of Educators' Resources for Creating Inclusive Teamwork in Engineering and Computing

144	Nicola Sochacka, Joachim Walther, John Morelock, Nathaniel Hunsu and Peter Carnell	Cultivating a culture of scholarly teaching and learning: An ecosystems approach to institutional change in engineering education
178	Ariana Henderson, Steve Campitelli and Brice Shen	Teaching the teachers to communicate
188	Alison-Jane Hunter, Dorothy Missingham, Kieran Bennett and Gianni Severino	Leadership Paradigms in Engineering Education

Conference Committees

The conference was supported by two committees; the Steering Committee, and the Technical and Editorial Committee. The steering committee shares extensive experience in the engineering education field and organisation of engineering education conferences.

Steering Committee

The Steering Committee outlined below includes USQ academic Staff, and leaders of the AAEE and IEEE community:

- Dr Steven Goh – University of Southern Queensland, Senior Lecturer and Program Coordinator (Mechanical and Mechatronic Engineering), School Coordinator (Students), School of Mechanical and Electrical Engineering; Secretary of AAEE; National Councillor (2015) and Congress member of Engineers Australia (Conference Chair)
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- Professor Les Dawes – QUT Science and Engineering Faculty; Editor of AJEE
- Dr Sasha Nikolic – University of Wollongong; Chair, IEEE NSW Section (2018); Chair, IEEE Education Society NSW; TALE2018 Conference Chair

Technical and editorial committee

The technical and editorial committee is composed of:

- Dr Steven Goh – University of Southern Queensland (Conference Chair)
- AProf David Thorpe - University of Southern Queensland, (Engineering/Technology Management), School Coordinator (Students) and Coordinator Springfield Campus, School of Civil Engineering and Surveying
- AProf Alexander Kist - University of Southern Queensland, School of Mechanical and Electrical Engineering; 2014 Australian Council of Engineering Deans National Award for Engineering Education Excellence
- Dr Jo Devine – University of Southern Queensland, Senior Lecturer (Construction Engineering and Management), School of Civil Engineering and Surveying; AAEE Executive Committee member
- Dr Rezaul Chowdhury - University of Southern Queensland, Senior Lecturer (Water Engineering), School of Civil Engineering and Surveying
- Dr Xiaoye Liu - University of Southern Queensland, Senior Lecturer (Surveying and Spatial Science), Program Coordinator for ADSS
- AProf Sally Male, Editor (or delegated associate editor) of Australasian Journal of Engineering Education

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General Information

Registration desk and info desk

The registration desk will NOT be attended for all hours during the conference. It will be open for 1 hour at various stages of the conference day; in the morning before the start of the day, morning tea, lunch, and afternoon tea. If you need assistance at other times during the conference, please contact one of the conference volunteers, committee members, and/or the conference chair.

If there is any emergency, please dial 000 for assistance to reach the police, ambulance or fire services.

Special dietary requirements

If there are any special dietary requirements such as food allergies and intolerance, lifestyle and/or religious reasons that have not been disclosed at registration stage, please make known to the registration desk or the conference volunteers immediately. The venue catering staff will make every effort to cater for last minute requests, but there is no guarantee that it will be fulfilled upon request.

Free WIFI

BCEC has a free complimentary wifi service for browsing the internet, checking emails, or posting on social media. If you are wondering around Brisbane CBD, Brisbane City Council now offers free wireless internet (wi-fi) access is available in parks and public spaces across Brisbane. Locations include the Queen Street and Valley Malls, Reddacliff Place, Victoria Bridge, South Bank and Roma Street Parklands, Mt Coot-tha Summit Lookout, Brisbane Libraries and on CityCats. Wifi hotspots can be viewed on https://www.brisbane.qld.gov.au/things-to-see-and-do/experiences-and-culture/free-wi-fi-in-brisbane

Name badges

Please wear your conference badge at all time during the conference including the welcome reception and conference dinner. This is the primary source of identification for conference attendees.

Welcome receptions *Smart Casual*

Although every possible precaution has been taken to ensure that these menu items are allergen free, certain items may still contain traces of allergic ingredients as they are prepared in facilities that also process milk products, egg products, gluten containing products, fish, crustacean, soybean, lupin, sesame seeds and nut products.

V VEGETARIAN

VEGAN VEGAN

GF GLUTEN FREE

DF DAIRY FREE

NF NUT FREE

***** Signature ingredients sourced within QUEENSLAND

Sunday's Welcome Reception is hosted at the Plaza Foyer between 6:30pm to 8:30pm. Attendees will be treated to 2 hr of Queensland Beverage Package; includes Sirromet Vineyard Selection Sauvignon Blanc (White) and Witches Falls Syrah (Red). There will be

Canape Stations located at the Plaza foyer to provide attendees a sample of what Queensland foodies have to offer - Asian, Queensland, Fish and Chip, Souvlaki, Spanish.

Monday to Wednesday Catering *Smart Casual*

Although every possible precaution has been taken to ensure that these menu items are allergen free, certain items may still contain traces of allergic ingredients as they are prepared in facilities that also process milk products, egg products, gluten containing products, fish, crustacean, soybean, lupin, sesame seeds and nut products.

MONDAY DAY CATERING

COFFEE ON ARRIVAL
Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

MORNING TEA

- Plain and fruit scones, jam and cream **V**
- Mini Thai green curry chicken pie
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

LUNCH

SANDWICHES, WRAPS AND ROLLS

- Sandwich: Pastrami, sauerkraut, pickles, Swiss cheese, spicy tomato, mayonnaise Wrap: Chicken korma, red onion, lettuce, cucumber, eggplant, spicy mayonnaise
- *Roll: Guacamole, tomato, mozzarella, roasted capsicum, pesto, mesclun **V**

SALADS

- Roasted red vegetable salad, Thai herbs and spices, crushed cashews, tamari, ginger dressing **VEGAN, GF, DF**
- Paneer, chickpea, green bean, red onion, asparagus and tomato salad with Indian spiced dressing **V, GF**
- Salad of new potatoes, snipped herbs, capers, gherkins, lentil mayonnaise **V, GF, DF**

HOT ITEMS

- Indian butter chicken, basmati rice, cucumber yoghurt **GF**
- *Moroccan spiced vegetable tagine with fruity cous cous **V, DF**

DESSERT

- Strawberry and cream verrine **V, GF**
- *Sliced seasonal and tropical fruit **VEGAN, GF, DF, NF**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

AFTERNOON TEA

- *Lemon myrtle tea cake **V**
- Spinach and ricotta muffin **V**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

V VEGETARIAN | **VEGAN** VEGAN | **GF** GLUTEN FREE | **DF** DAIRY FREE | **NF** NUT FREE
***** Signature ingredients sourced within QUEENSLAND

TUESDAY DAY CATERING

COFFEE ON ARRIVAL
Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

MORNING TEA

- Mini muffin selection: double chocolate, lemon and poppyseed, carrot and walnut
- Mushroom and corn quiche **V**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

LUNCH

SANDWICHES, WRAPS AND ROLLS

- *Sandwich: Roast chicken, avocado, corn and kidney bean, cheese, chipotle mayonnaise
- *Wrap: Marinated tofu, grilled zucchini, avocado, carrot, rocket, pesto **V**
- Roll: Smoked salmon, cucumber, rocket, onion, caper mayonnaise **DF**

SALADS

- Harissa lamb, penne pasta, roasted Mediterranean vegetables, fetta, herb dressing
- Smoked salmon salad, cocktail potato, green beans, kale, tomato, roasted seeds, lemon mustard dressing **GF, DF**
- *Sweet potato salad, fermented cabbage, currants, pepitas, pumpkin, wild rice **V, GF, DF**

HOT ITEMS

- *Aromatic Thai green curried chicken, jasmine rice, fragrant herbs **GF, DF**
- Ricotta and spinach tortellini, creamed mushrooms **V**

DESSERT

- Ice cream break - Selection of Mini Magnums
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

AFTERNOON TEA

- •Peanut butter cheesecake brownie **V, GF**
- Leek and goat's cheese tartlets **V, GF**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

V VEGETARIAN | **VEGAN** VEGAN | **GF** GLUTEN FREE | **DF** DAIRY FREE | **NF** NUT FREE
***** Signature ingredients sourced within QUEENSLAND

WEDNESDAY DAY CATERING

COFFEE ON ARRIVAL
Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

MORNING TEA

- Coffee and chocolate sour cream cake **V, GF**
- Ham and gruyère brioche toasties
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

LUNCH

SANDWICHES, WRAPS AND ROLLS

- *Sandwich: Charred and marinated vegetables, goat's cheese, tapenade, pesto and rocket **V**
- *Wrap: Seared beef, Asian slaw, mesclun, crispy shallots, Nam Jim dressing **DF**
- Roll: Roast turkey, Swiss cheese, corn slaw, shredded lettuce, aioli

SALADS

- *Chicken and eggplant salad, Lebanese cous cous, capsicum, red onion, olives, sumac, sweet lemon dressing **DF**
- *Thai salad of daikon, grilled pineapple, cucumber, capsicum, snow pea tendrils, basil, mint and coriander **VEGAN, GF, DF**
- Smoked salmon salad, avocado, celeriac, dried cranberry, seeded mustard, frizee lettuce **GF, DF**

HOT ITEMS

- *Prawns, crab, mussels, tomato, chorizo and saffron rice, with Spanish flavours **GF, DF**
- *Thai green vegetable curry, jasmine rice **VEGAN, GF, DF**

DESSERT

- French pastries **V**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

AFTERNOON TEA

- *Chicken, pistachio sausage roll
- *Sliced seasonal and tropical fruit **VEGAN, GF, DF, NF**
- Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas served from stations

V VEGETARIAN | **VEGAN** VEGAN | **GF** GLUTEN FREE | **DF** DAIRY FREE | **NF** NUT FREE
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Conference Dinner *Smart Casual*

Although every possible precaution has been taken to ensure that these menu items are allergen free, certain items may still contain traces of allergic ingredients as they are prepared in facilities that also process milk products, egg products, gluten containing products, fish, crustacean, soybean, lupin, sesame seeds and nut products.

Tuesday's Conference Dinner is hosted at the Boulevard North Terrace Room starting with drinks at 6:30pm for a 7:00pm start till 11:00pm. Attendees will be treated to 4 hr Queensland Beverage Package; including Witches Falls Sauvignon Blanc (White) and Sirromet Vineyard Selection Cabernet Sauvignon (Red).

MENU

ENTRÉE ALTERNATE SERVICE

- *Entrée - Queensland hors d'oeuvres plate: Fraser Island crab and avocado, Noosa prawn and corn salsa, Moreton Bay bug and wasabi dressing GF, NF
- *Entree - Coconut chicken, kimchi, grilled pear, citrus caramel sauce, rice noodles GF, DF

MAIN ALTERNATE SERVICE

- *Main - Roast pork belly, turmeric rice, pineapple and green paw paw salad, palm sugar tamarind dressing GF, DF
- *Main - Crispy skin barramundi, roasted fennel, braised tomato and white beans, wattle seed, kale, lemon dressing GF, DF, NF

DESSERT ALTERNATE SERVICE

- Dessert - Pumpkin ice cream, pecan coral sponge, marinated pineapple, chocolate and pecan soil, maple cinnamon yoghurt V, GF
- *Dessert - Textures of Stanthorpe apple: apple and pistachio cake, apple foam, apple purée, apple sorbet, pistachio crumble V, GF

TEA AND COFFEE
Locally roasted, freshly ground Arabica coffee and a selection of Rainforest Alliance Certified™ teas

V VEGETARIAN | **VEGAN** VEGAN | **GF** GLUTEN FREE | **DF** DAIRY FREE | **NF** NUT FREE
***** Signature ingredients sourced within QUEENSLAND

QUEENSLAND BEVERAGE PACKAGE

SPARKLING AND WINES

- Sirromet Vineyard Selection Sparkling Chardonnay Pinot Noir (Granite Belt)
- Sirromet Vineyard Selection Sauvignon Blanc (Granite Belt) | Welcome Reception
- Witches Falls Sauvignon Blanc (Granite Belt) | Conference Dinner
- Witches Falls Syrah (Granite Belt) | Welcome Reception
- Sirromet Vineyard Selection Cabernet Sauvignon (Granite Belt) | Conference Dinner

QUEENSLAND CRAFT BEER

- Burleigh Brewing Co. 28 Pale Ale (Burleigh Heads, Gold Coast) | Welcome Reception
- Brouhaha Strawberry & Rhubarb Sour (Maleny, Sunshine Coast) | Welcome Reception
- Balter XPA (Currumbin, Gold Coast) | Conference Dinner
- Slipstream Brewing Co. 'Laguna' Tropical Pale Ale (Yeerongpilly, Brisbane) |Conference Dinner

OTHER BEERS

- Little Creatures Rogers'
- James Squire 'Orchard Crush' Apple Cider
- Hahn Premium Light will also be available

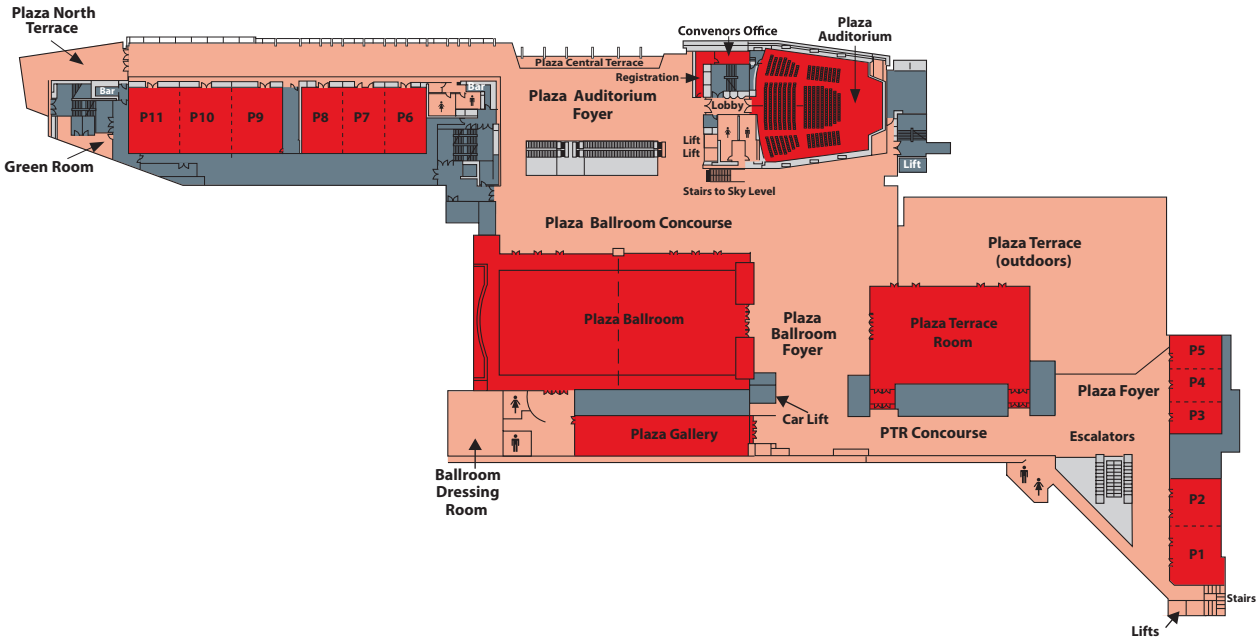
OTHER BEVERAGES

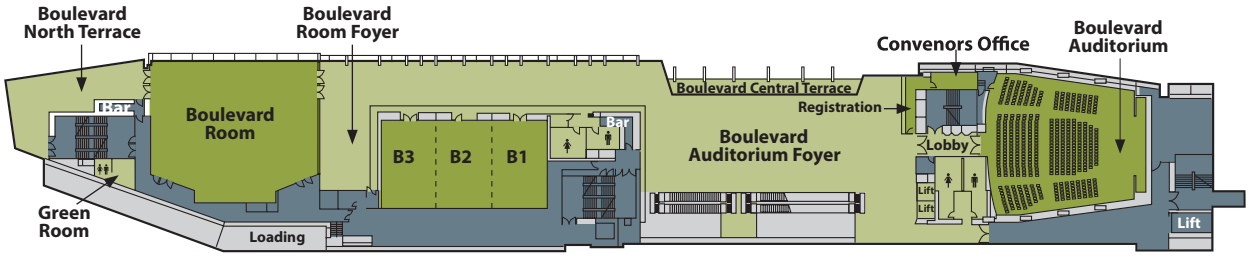
- Orange Juice, Coke, Coke No Sugar, Sprite,
- Sparkling Mineral Water

Beverage package must match the length of the event. Cash bars and beverages on consumption cannot be added to the end of a beverage package.

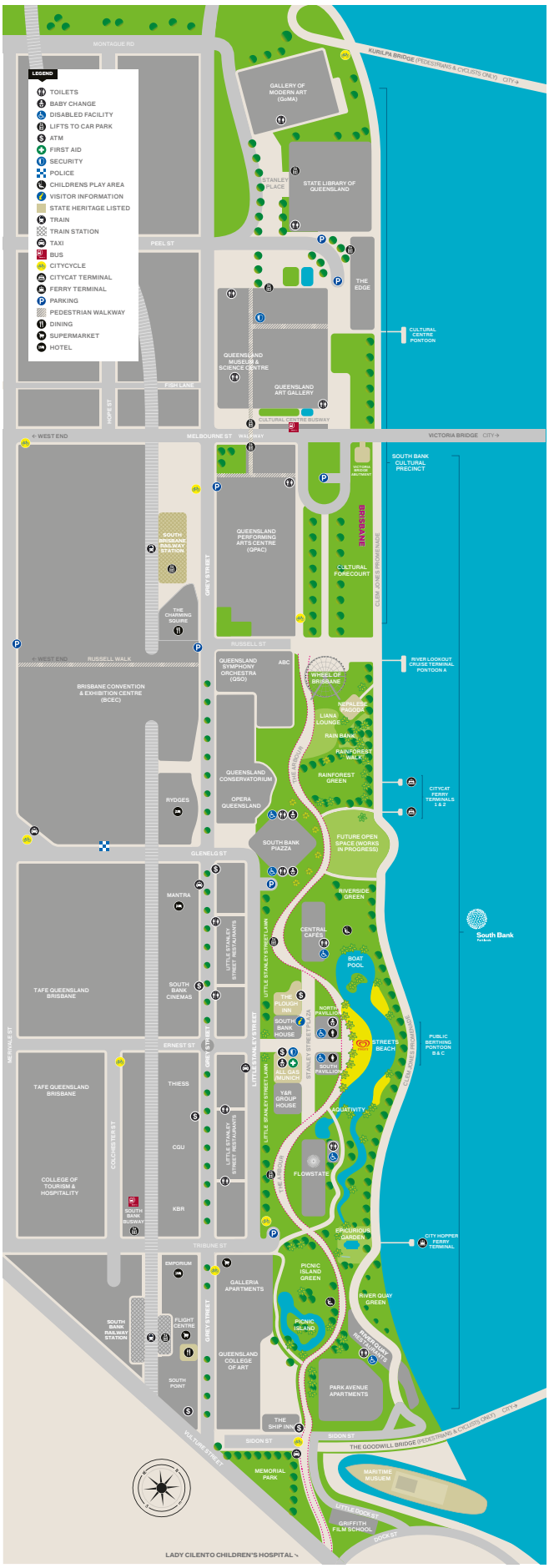
Conference Venue Map

The Welcome Reception and conference is located in the Plaza level Foyer and P1-4 Rooms. The Conference Dinner is located at the Boulevard North Terrace Room.

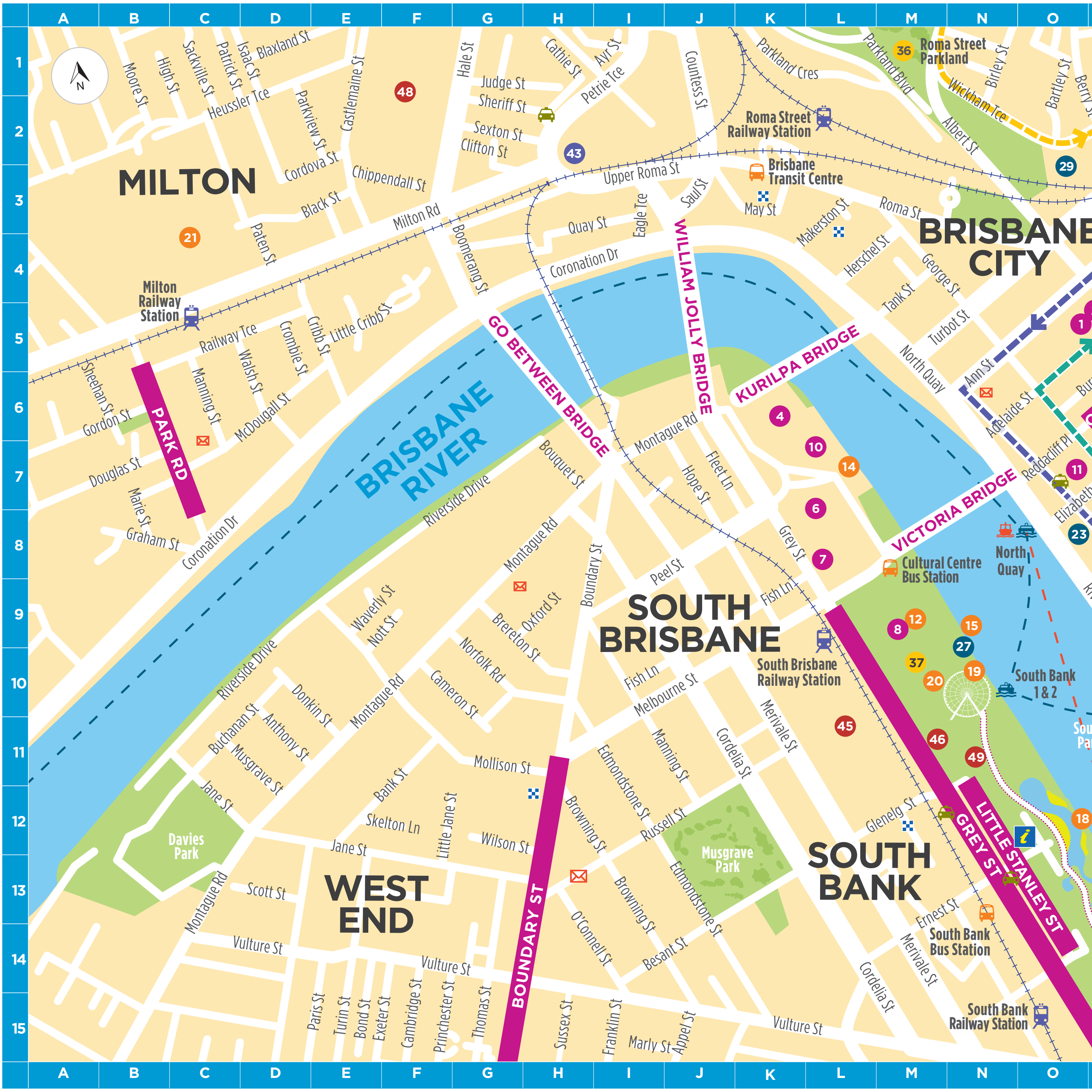




BCEC and Southbank Map



Brisbane CBD Map



PLACES OF INTEREST

Arts & Entertainment

- 1 Brisbane City Hall & Museum of Brisbane O5
- 2 King George Square P5
- 3 Metro Arts S6
- 4 Gallery of Modern Art K6
- 5 Queen Street Mall Stage P6
- 6 Queensland Art Gallery L7
- 7 Queensland Museum & Sciencentre L8
- 8 Queensland Performing Arts Centre (QPAC) M9
- 9 Riverstage S13
- 10 State Library of Queensland L7
- 11 Treasury Casino & Hotel O7

Attractions

- 12 Brisbane by Bicycle M9
- 13 Kookaburra River Queens T5
- 14 Mirimar Cruises L7
- 15 River City Cruises N9
- 16 Riverlife W9
- 17 Story Bridge Adventure Climb X4
- 18 Streets Beach O12
- 19 Wheel of Brisbane M10
- 20 X-Wing Tours M10
- 21 XXXX Brewery & Alehouse C3

Heritage

- 22 Anzac Square War Memorial Q3
- 23 Commissariat Store O8
- 24 Customs House U1
- 25 MacArthur Museum R4
- 26 Maritime Museum S15
- 27 Nepalese Pagoda N10
- 28 Old Government House S12
- 29 Old Windmill Observatory O3
- 30 Parliament House R10
- 31 St John's Cathedral T1
- 32 St Stephen's Cathedral S5

Parks

- 33 City Botanic Gardens T10
- 34 Kangaroo Point Cliffs V12
- 35 Post Office Square R3
- 36 Roma Street Parkland M1
- 37 South Bank Parklands J19

Shopping

- 38 Brisbane Arcade P5
- 39 MacArthur Central R4
- 40 QueensPlaza Q4
- 41 The Myer Centre P6
- 42 Tattersall's Arcade R5
- 43 The Barracks H2
- 44 Wintergarden Q5

Stadiums & Venues

- 45 Brisbane Convention & Exhibition Centre L11
- 46 Queensland Conservatorium – Griffith University M10
- 47 Queensland University of Technology (QUT) R10
- 48 Suncorp Stadium F1
- 49 The Courier-Mail Piazza N11