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2017 Joint NZDE/BEngTech Forum – abstracts for presentations and workshops FINAL (08/02/2017)

No.	ITP	Name	Workshop or Presentation	Abstract
Plenary sessions				
P1	AAEE	Tom Goldfinch	Plenary	AAEE: Who are we, what do we do, and what CAN we do The Australasian Association for Engineering Education (AAEE) is a group representing enthusiastic and innovative engineering educators across Australasia. In this plenary session the President of AAEE will introduce the range of activities that AAEE supports, opportunities for engaging with the AAEE community, and accessing resources on evidence based teaching practices produced by the community. The talk will also include discussion on key challenges facing Australasian Engineering Education such as meeting employer expectations, inclusive curricula, pressures on teaching quality and managing diversifying student cohorts.
P2	NZBED	Bill Sole	Plenary	Dublin Accord
P3	NZBED	Christine Fenton	Plenary	Consistency of Outcomes This is a relatively new concept on the educational quality assurance front. While it focuses on evidence that supports that education providers have met the expectations of the qualification (through graduate outcomes), it needs to be well planned throughout the whole programme of study. Through collaboration between education providers and expectations of industry, the NZBED have provided guidelines on what are essentially critical control points (core evidence) – which are tasks within the NZDE programme that can provide guidance to all stakeholders and some assurance that the graduate will meet the expectations of the qualification. Further collegial conversations are needed to continue the discussion about acceptable thresholds – and where are the opportunities for improvement once the evidence is evaluated.



Presentations				
1A	WelTec	Gareth Gretton	Presentation	<p>A reflection on the use of project-based learning in two courses: Manufacturing Processes and Mechanics of Machines</p> <p>Whilst there is widespread agreement that project-based learning (PjBL) is particularly well suited to engineering education, it doesn't necessarily make it the easiest thing to get right! This presentation will give a personal reflection on the use of PjBL in two different courses, and will focus on analysing the extent to which the projects undertaken were successful in acting as a driver for the learning of content knowledge. It is also intended to generate a discussion on the extent to which PjBL should be focused on content knowledge versus more general workplace skills.</p>
1B	NMIT	Debbie Hogan	Presentation	<p>Bridge Building Project</p> <p>It's an oldie which is still relevant today – a bridge building competition for secondary school students as a good introduction to a career in engineering. Nelson Marlborough Institute of Technology's (NMIT's) inaugural schools bridge building competition held in August 2016 built bridges, literally and figuratively.</p> <p>This competition has built bridges with students at local secondary schools, physics teachers, IPENZ and the local civil engineering industry. Can this bridge be extended around New Zealand to all ITPs offering the NZDE and BEng Tech?</p>
2A	Queens	Junaid Qureshi & Anand Gopalakrishnan	Presentation	<p>Five Phases of Engineering Project DE6102 in Queens Academic Group</p> <p>Engineering project plays a vital role in the practical understanding of theoretical concepts. In this presentation, five phases of Engineering Project DE6102 (Version 2) in Queens Academic Group (QAG) will be discussed. Engineering project comes in many sizes and shapes but in QAG they are generally divided into five phases Initial Proposal, Preliminary Design, Final Technical Report, Oral Presentation & Final Demonstration. Innovative ideas are shared by the competent supervisors as per their area of expertise. Students are challenged to test their previous knowledge to come up with immediate tangible applications. Unique projects and how engineering projects will benefit education providers will be discussed in this presentation.</p>
2B	Wintec	Brent Phillips & Matt Foulkes	Presentation	<p>Automated machine team project</p> <p>Engineers frequently collaborate with diverse peers on project work to achieve the desired outcome, so let's get students to practice this too.</p> <p>Wintec's mechanical and electrical students joined forces to design and build an automated material-handling machine. Along the way they developed their technical</p>

				<p>skills related to the modules Manufacturing Systems and PLC Programming 1 as well as applying complementary skills such as teamwork, design iteration process and project management.</p> <p>Different team dynamics emerged, which ultimately affected the level of achievement of the teams. Students and academic staff reflected on the positive learning aspects and the areas for improvement for future projects.</p>
3A	NMIT, NZIHT, MIT	Debbie Hogan, Mathew Hills, Nick Kusari	Presentation	<p>Reflections on the DE6102 Engineering Project (Civil) external moderation</p> <p>The course DE6102 Engineering project is the capstone course for the NZDE diploma qualification. This 15 credit course requires students to use the skills and knowledge they have developed over the two years of their study to complete an engineering project.</p> <p>According to the course descriptor the Aim of the course is <i>“To apply knowledge and problem-solving skills to plan and complete an engineering project relevant to the discipline strand studied (civil, mechanical, electrical or electronics) to accepted practice and standards from a given specification.”</i></p> <p>The three external moderators of the 2015 Engineering project (Civil) will share their reflections on the process and lead a discussion on “How can we do better while supporting each other?”</p>
3B	Queens	Dr Momen Bahadornejad	Presentation	<p>Is NZDE Programme Sufficient for Smart Grid Training?</p> <p>New Zealand is one of the leading countries in changing its Power System to a Smart Grid. The term refers to a system that includes intelligent electricity distribution devices, two-way communications, advanced sensors, automated metering, and specialized computer systems to enhance reliability performance, enhance customer awareness and choice, encourage greater efficiency decisions of the customer and of the utility provider. This system will facilitate greater penetration of distributed generation including renewable sources, plug in electric hybrid vehicles, micro-grids, energy storage systems, and other technologies that may be enabled by the core functionality.</p> <p>New Zealand Utilities are increasingly looking for Engineering graduates who are able to work in Smart Grids. In this presentation the adequacy of NZDE programme for Smart Grid is discussed and the shortcomings are highlighted.</p>
4A	Ara	Hossein Askarinejad	Presentation	<p>The Rising Need for Growth of Applied Research in Polytechnics</p> <p>With current exponential advancement of technology in 21st century, the modern industries will have an increasing demand for workforce with high level of critical thinking, transdisciplinary knowledge and novel & adaptive thinking skills.</p>

				<p>Therefore, it is essential for polytechnics to evolve and expand their research capabilities to remain up to date and ensure innovation and relevance to future jobs. Some strategies include, integration of applied research elements in teaching (for instance, as a part of PBL) or in student final year projects, promote publication and conference participations, and to systematically move towards building a sustainable applied research capability. This presentation will look at the above strategies and will discuss the challenges and opportunities.</p>
4B	MIT	Mohammad Al-Rawi	Presentation	<p>Integrating Learning Outcomes of Student Final Year Project with Objectives of a Research Project: Designing an All-In-One System for Climate Control and Air Purification</p> <p>This paper describes the experience of using student projects to inform tasks on an overarching research project. The goal of the research project is to design a climate control system for particular use in crowded low quality built environments. Individual student projects were tailored to achieve specific phased steps within the project. This paper describes the mapping of learning outcomes in student projects to objectives of the main project, and identifies how the marking schema used to assess student projects reflects achievement of these learning outcomes in the context of a project that fully explores all of them.</p>
5A	Wintec	Paul Ewart	Presentation	<p>Competition V Connectivity in the Market Place.</p> <p>Continued improvement in the tertiary education system is in many ways linked to decreasing financial input from the Government since disbanding the free education funding model in New Zealand. The other contributing factor being withdrawal of core funding allocations from our national research organisations to compete in the contestable funding process. This being detrimental to Academics with highly theoretical research interests or emerging researchers as they now compete for funding with professional researchers while balancing fulltime teaching. Recent changes to research funding mechanisms have seen areas of national significance and key growth areas targeted by long term financial commitments by the government. These resources are based on the provision that Academic, Institutional and Commercial Collaborations are the main project drivers. This presentation will undertake to identify how Academic freedom, Institutional identity and Commercial sensitivities might be managed to enable successful and ongoing collaborations.</p>

5B	WelTec	Andrew Kopnoff	Presentation	<p>The Mechanics of the Contemporary Company</p> <p>In this paper I present the results of my research project intended to investigate the “mechanics” of the contemporary company. My investigations included both New Zealand and overseas companies.</p> <p>I concentrate on three key areas – the structure of the company, management and people who work for the company. I discuss the roots of struggles and highlight the importance to understand the origins of these roots if improvement, development and prosperity are desired.</p> <p>The key topics highlighted in the paper are:</p> <ul style="list-style-type: none"> • The framework of the company and the Great Chain of Being. Fragmented reality. • Management aims and strategies. Growing leaders. • The relationship between people and their company. Double bind problems.
6A	WelTec	James Mackay*, Adrian Ferguson, Frank Cook and Sunethra Pitawala	Presentation	<p>Persistence of misconceptions in mechanics</p> <p>Common misconceptions in mechanics are often resistant to instruction and over the last four decades, many good diagnostic tests have been developed in order to detect and ameliorate these misconceptions. The most well-known of these are the <i>Force Concept inventory</i> and the <i>Mechanics Baseline Tests</i>, both of which have been statistically validated and used worldwide. This project aims to use these tests to track the persistence of misconceptions as students’ progress through the BEngTech and the NZDE programmes by testing them at various points in the programme. This paper will report on the findings from data collected in 2016.</p>
6B	Northtec	Mike Mullany	Presentation	<p>The meaning and application of ethics in an engineering context</p> <p>There have long been calls for ethical behaviour within the professions. However, no clear idea of this term within the engineering profession could be found. This paper aims to summarise the basic concepts associated with ethics. It then invites the audience to explore exactly what we are teaching when asked to teach ethical behaviour, against what we should be teaching, and why. The conclusions reached will inform the teaching of the participants in the area of ethical behaviour. This is not a paper on morals as might be preached from a pulpit.</p>

7	TEC	Sir Neville Jordan/ Angela Christie/project managers	Presentation	<p>Engineering e2e: Secondary-Tertiary Pathways Projects</p> <p>The Secondary-Tertiary Pathways Projects are an initiative targeted to increase the number of engineering graduates in New Zealand. The initiative supports secondary schools and ITPs to work collaboratively to deliver programmes that will successfully prepare and pathway students – particularly women, Māori, and Pasifika – into engineering study.</p> <p>Sir Neville Jordan, Engineering e2e’s Steering Group chair, will introduce the six projects and provide a brief overview of other current Engineering e2e initiatives. Sir Neville’s introduction will be followed by presentations from each of the project managers who will describe their work.</p>
8A	WelTec	Frank Cook	Presentation	<p>Students Perception of Laboratory Work.</p> <p>The presentation reports a case study carried out at WelTec investigating the student’s perspective of their laboratory classes and the contribution they feel the laboratories make to their understanding of the course as a whole. The results give interesting insights into the value of laboratories to the student and provide tutors with options for improvement through a better understanding of the student perspective. The presentation will also report on the literature covering the value of engineering laboratories, which provides useful insights although not numerically rich from either the student perspective or from an engineering educator perspective.</p>
8B	MIT	Snjezana Soltic	Presentation	<p>Assessment Manager</p> <p>A desktop application named Assessment Manager was designed to assist examiners in writing, publishing and marking assessments electronically. The application consists of two parts; Assessment Designer and Examinee. Assessment Designer is used by the examiner to write, publish and mark assessments. It provides tools for creating PDF documents of marked assessments and emailing them to students. Examinee is used by students who participate in an assessment. The application controls the timing of the assessment and ensures that the assessment is available for the scheduled date and time.</p> <p>The application, which is intended to work on Windows machines (from Windows 7 and up), is distributed as an installer. It targets the .NET 4.5.2 environment and is programmed in C# 6.0.</p>

9A	Unitec	Hugh Wilson	Presentation	<p>Use of interviews in Engineering Project Assessment</p> <p>One of the main issues faced when setting uncontrolled assessments is whether the work presented is the students own work. This is especially an issue with the Engineering Project which is a very important assessment in terms of demonstrating student competencies. For the last two years, Unitec has used a system involving an interview of each student to confirm their understanding of the work they have produced. This presentation will set out the system that was used and will comment on its effectiveness.</p>
9B	Ara	Ian Williamson	Presentation	<p>Online Assessment</p> <p>We have all experienced various forms of online assessment either surveys, questionnaires or full on tests. Most are likely to be in form of multiple choice or a variation on that theme. How do you set the questions and more importantly how you create the distractors? The biggest and common mistake an educator can make is to use common mistakes as the distractors. This reinforces wrong answers for those that have not quite understood yet. Best thing I have found is to get students to write the questions and the distractors and have the rest of the class try to answer them and then rate the quality of the questions. But I wanted to do better. I wanted to make assessments easier to create and web-based on common technology. But mostly I wanted to make it do more for the tutors understanding of the students' knowledge and deliver more learning moments for the student. My Research had shown that standard multiple choice and other forms of online assessment can be enhanced by adding a level of confidence assessment to the process. This serves to reinforce the questions and focus the student on the process and not just guess and move on. In fact 2 levels of enhancement are possible and I shall explain them both.</p>
10A	Connexis	Graeme Teesdale	Presentation	<p>Utilizing NZDE modules in Electricity Supply Industry Qualifications</p> <p>The Electricity Supply Industry for many years has had a well-defined role for power technicians in the work force. A power technician carries out acceptance, installation, commissioning and maintenance testing of primary and secondary plant and equipment installed in the generation, transmission and distribution sectors of the industry. For many years, most of the off job theory units of the power technician qualification have been sourced from the NDE and now the NZDE qualifications. The mode of delivery of these units and equivalent study to the Electricity Supply Industry is very important for the completion of the qualification by industry trainees who are distributed all around New Zealand.</p>

10B	MIT	Mohammad Al-Rawi and Snjezana Soltic	Presentation	<p>Blended delivery for clinical engineering.</p> <p>In 2016 the School of Engineering at Manukau Institute of Technology (MIT) introduced a new specialisation within the NZDE Electronic strand, called Clinical Engineering, aimed at preparing students to become medical equipment technicians in hospitals and other health care institutions. Students receive practical training in the maintenance and repair of mechanical and electrical medical equipment in clinical engineering environments, as well as classroom experience in foundations of healthcare and medical equipment. The Clinical Engineering specialisation is obtained by completion of four new elective subjects in the second year of their NZDE-Electrical study: Anatomy and Physiology for Clinical Engineering Technicians, Fault Finding for Clinical Engineering Technicians, Medical Equipment 1 and Medical Equipment 2. The new subjects are delivered in a blended mode, in partnership with the Middlemore hospital, who provide support for the laboratory sessions and final year projects.</p>
Workshops				
W1	Otago Poly	Dr Barry Law	Workshop	<p>A Snapshot of Graduate Engineers perceptions of their capability</p> <p>This workshop follows the Research Project conducted with Successful Graduate Engineers 1-5 years in the workplace (TEC commissioned, Law & Wagg, 2016). The first part of the workshop will explore the feedback of Graduate engineers, the perception of employers and the key findings by researchers. Both the capabilities requiring attention and the strategies for keeping tertiary education relevant will be scrutinised. The second part will explore solutions to the issues identified and also examine the opportunities presented by workshop participants of good practice currently in use, or in development to promote high levels of graduate capability. This workshop will be interactive and collaborative. See: http://www.engineering2e.org.nz/Documents/Making-Tertiary-Studies-In-%20Engineering-More-Relevant.pdf</p>
W2A	WelTec	Ralph Springett	Workshop	<p>21st Century Learning and Teaching Practice</p> <p>Approaches to learning and teaching practice in the 21 century are gaining consensus. Increased accessibility and flexibility, supporting learner awareness of their understanding of subject matter, and an emphasis on authentic learning experiences are all hallmarks of emerging, people-based approaches to 21 century learning and teaching practice.</p>

				<p>21 century learning and teaching practice must address the relationships between physical spaces, technological systems, and learning. But, perhaps more importantly, must also consider how learning and teaching practice supports the positive human relationships.</p> <p>This presentation explores practical approaches to developing appropriate 21 century learning and teaching practice where vocational training is predominant.</p>
W2B	WelTec, Wintec, Ara, MIT	Penelope deBoer (Weltec), Mark Hutchinson (Ara), Ken Louie (Wintec), Mohammad Al-Rawi (MIT)	Workshop	<p>How can we improve the pass rate of DE4102 (Engineering Maths 1) students?</p> <p>It has become apparent in recent years that the pass rate in DE4102 (Engineering Mathematics 1) is much lower than in other first-year modules, and perhaps lower than when Mathematics was taught as a year-long (two-semester) course. The main barrier appears to be the national exam where a minimum mark of 40% is required to pass, regardless of the student's internal coursework mark. In the Workshop, we hope that other tutors will join us in teasing out the reasons why students struggle in the exam. We will also outline what strategies we have been trying to address the problem and our successes (or failures) to date.</p>
W3	Various	Tutors delivering DE5204	Workshop	<p>Discussion on course matters for DE5204 Highway Engineering</p>
W4A	Unitec	Hugh Wilson and Morgan Look	Workshop	<p>Simple E-learning apps</p> <p>This workshop will look at some online apps that can be used as part of a blended learning pedagogy. The apps that will be presented are free, easy to learn (i.e. less than 5 minutes), available online using a smart phone and applicable to teaching engineering. The apps that are presented will cover activities such as augmented reality (Aurasma), virtual reality (Google Cardboard), 3D photos of objects (Google Streetview), video recording (Snagit and Screencastomatic) and online quiz games (Kahoot and Socrative). Attendees are encouraged to bring smart phones or tablet computers to try the apps and to share simple apps that they have found useful.</p>
W4B	NZBED	Jim Doyle	Workshop	<p>The role of leadership in teaching and learning environments</p> <p>The workshop will consider three aspects of leadership: (1) establish a clear understanding of what leadership really is, (2) the teacher as a leader in the learning process and (3) the role of the institution's leadership in the learning process.</p>

				<p>Research tells us that leadership is a critical success factor within any organisation. Leadership should not be seen as something that applies only to a few individuals at the top of an organisation, especially in educational institutions where every single teacher holds, by definition, a leadership role. The workshop will explore how the development of leadership skills throughout a TEO can benefit the learning process.</p>
W5	AAEE	Tom Goldfinch	Workshop	<p><i>Building relations between ITP's and AAEE</i></p> <p>Current activities with AAEE are biased towards supporting Engineering Educators within Australian Universities. With the wealth of experience open to AAEE, there is a desire to broaden its activities to benefit members in other engineering education sectors. This workshop will develop a list of actions for building greater interaction between ITP Engineering Educators and the wider AAEE Community. Participants will:</p> <ul style="list-style-type: none"> • List challenges faced by engineering educators in ITP's • List strengths of engineering education within ITP's • Determine topics for professional development events and content • Set timelines for exploring exchange of expertise and experience between AAEE and ITP engineering educators. <p>Outcomes of this workshop will be reported to the AAEE Executive committee for further action and dissemination within the AAEE membership.</p>