TENZ /ICTE 2017 Practice Papers and Workshops: Abstracts/ Overviews

Monday 9 October

10.00 am

Matamata Intermediates' Journey to Review Technology *Lorraine Stiles, Deputy Principal Matamata Intermediate*

Matamata Intermediate's journey to review their technology and specialist programme using a strategic planning approach has led to a revitalised team. The resulting restructuring has placed student learning at the centre of the programme with an emphasis on providing a learning environment to engage students fully. Teacher wellbeing has also been a key consideration in this restructuring. If your curriculum programme needs revitalising, or even revolutionising, this session will share tips and critical process steps that could easily be adapted for other schools with specialist teachers and programmes.

Creating Innovative ways to Collate Student Evidence for Assessment in Technology using an Online Platform *Sara Allpress, Waiopehu College*

Online submission of student work is becoming a key focus for NZQA. Because of teacher inquiry, a Fashion and Textile Technology teacher at Waiopehu College has successfully trialled online submission of student work using a platform called wix.com. Students during 2016 used this process to create their own online portfolio. Throughout the year students completed and submitted all work using this platform, where they trialled a range of digital techniques to support their outcome. Using this method of teaching and learning not only supports the move away from paper-based submission of work but also helps to create students that are becoming more technologically proficient. This method uses one platform for student work, assessment and moderation. This practice paper will benefit any teacher that wants to make the move towards a more digitally based classroom, which at times can be challenging in Technology.

Te Ao Tūroa Supporting Intergenerational Sustainability in the Primary Industries for Primary and Intermediate Teachers *Dr Vicki Compton & Dr Jaimie-Leigh Jonker, MPI, Wellington*

In our 21st century globalised economy, we all consume a mixture of local and international products. Our New Zealand primary industries include all those industries involved in the growing, production, processing, transporting and selling of food and fibre goods for domestic and international markets. We need to have robust and internationally renowned Animal Welfare, Biosecurity and Food systems that work well together to protect and grow our primary industries. In this workshop, we will share technology professional development and resource material recently developed by Ministry for Primary Industries to support learning in technology in primary and intermediate schools. The resources focus on developing a better understanding of the Animal Welfare, Biosecurity, and Food systems that underpin New Zealand's primary sector and in this workshop we will explore how technology continues to support and enhance these systems. Suitable for teachers of year 1-8 students focused on supporting learning across NZC level 1-4.

'Physical Visualisations' and 'Physical Direct Manipulation's Concepts for Networking Study *Kazuaki Yoshihara, Graduate School of Education, Hiroshima University, Japan*

Usually, we cannot see how networks work, so we imagine network systems and technologies. It is difficult to study network technologies because we cannot see and touch the network systems. We propose concepts of "Physical Visualizations" and "Physical Direct Manipulations" for intuitively studying networking. Usually, Visualization" means graphical visualizations through a display of a computer. However, "Physical Visualizations" uses physical items such as LED lamps, sounds, motion things and so on for visualization. Usually, "Direct Manipulation" means mouse and touch input interfaces (GUI Interface) of computers. However, "Physical Direct Manipulations" expands input methods to include physical devices such as dials, buttons and so on. "Physical Visualizations" and "Physical Direct Manipulations" provide a reality to users. We have developed new educational equipment for networking study based on these concepts. The equipment can visualize how networks work using physical LED. In addition, the equipment provides physical direct manipulation suing dials and buttons. We have developed two types of equipment: "Terminal" and "Router". As an example of the physical visualization, the equipment has a "ping receiving function". This function provides ping-receiving notification by an LED lamp. As an example of the physical direct manipulations, the equipment has a "config-function". This function sets its own IP address(es) using dials and butoon(s). Using the equipment, we can conduct an experimental study for networking technologies through constructing networks easily using cabling, configurations, evaluations of network paths and troubleshooting.

11.00 am
Exponential Technologies and how they Might Influence the Future of Education: **Session 1** Introduction and the Nature of Disruption, and Brief Oversight of the Six Technologies *Michael Campbell, Mind Lab by Unitec, Christchurch*

This workshop discusses six exponential technologies, and how they could be game changers for education. Participants will understand why these technologies are disruptive, and the

importance of being informed about these, if they hold ANY type of leadership role. Participants will explore the inclusivity of these new considerations in their current practice, and discuss how future practice and policymaking decisions could be adapted to meet these new developments. These (3) sessions are sequential in delivery and it is advised participants select all three.

National Engineering Education Plan (NEEP) Project, *John Findlay, Otago Polytechnic, Dunedin & Michael Edmonds Ara, Institute of Canterbury, Christchurch*

The Tertiary Education Commission (TEC) responding to the 2010 National Engineering Education Plan (NEEP) project has funded a group to consider the challenges of moving young people into appropriate engineering education and then onto employment. (ee2e). As part of this project the TEC funded six Institutes of Technology and Polytechnics (ITP's) to carry out a variety of projects through 2017 and 2018 with the goal of increasing the number of school leavers entering Engineering study at ITP level (NZQA Level 6 and Level7). This increase is necessary to identify a shortfall in engineering graduates from the level 6 New Zealand Diploma in Engineering and the Level 7 Bachelor of Engineering Technology.

The NEEP report identified the need for 900 graduates a year from these qualifications and in 2015 only 530 graduated leaving a shortfall of 370 graduates just in that year alone. The six ITP's are Northtec, Unitec, Wintec, Western Institute of Technology, Ara Institute of Canterbury and Otago Polytechnic. The projects from these institutions include delivery of engineering developmental programmes of learning, identification of topics for which contextualised and cross curricula resources can be developed and the establishment of joint ITO secondary resource developers. This Practice Paper proposal will demonstrate how these projects are implemented, by referencing developments to date in the work of identifying and developing specific contextualised topics for learning, which have been developed to provide a cross curricula project based learning environment for secondary school students. These projects have in particular sought to reinforce effective STEM education is schools, demystifying mathematics and physics and lifting the status and importance of Technology education across the secondary curriculum and stressing the importance of continuing Technology studies into the senior secondary school environment.

Biotechnology: What's it all Really About? *Hayley Barrowcliff, Northcross School, Auckland*

How is it relevant to the future? How to integrate Biotech with school environment and sciences? This session will include practical hands-on ideas showing how the technology design process is used to develop prototypes/test/trial/ evaluate products using living organisms. There are possibilities for integrating biotechnology with school edible gardens

such as :creating seed balls, making a skin care healing salve/balm using native plants and herbs; ways to preserve by developing a herb seasoning; using bacteria and fungi to create a fermented vegetable juice or healthful beneficial crunchy garden vegetables- pickled carrots, beets seasonal. The possibilities are endless.

"I am passionate about this subject and how it can make learning fun, challenging and help students to keep in touch with the foundations of life starting from the seed."

Introducing Computational Thinking to the NZC: What's the big idea? *Professor Tim Bell, University of Canterbury, Christchurch*

The emphasis on P-12 engineering education has continued to gain momentum in the United States (Carr, Bennett IV, & Strobel, 2012; Grubbs & Strimel, 2015; Strimel, Grubbs, & Wells, 2017) and P-12 engineering education programs continue to be implemented across the country. Yet, the struggle to keep the technology education (TE) school subject strongly positioned in primary and secondary schools is enduring (Starkweather, 2016) which de Vries (2016) believes is a result of a lacking epistemic basis for the subject. TE worldwide is viewed currently to be deficient of agreed upon fundamental concepts, laws, and principles that could put it on an equivalent level with science and mathematics education (de Vries, 2016). Unlike these other school subjects, TE has had a history of dynamic content which once covered woodworking and metalworking, but now covers such topics as computer-aided design, robotics and lasers as well as fosters our students' abilities to tinker, design, create, critique, make, and invent (Starkweather, 2016). While these more recent topics may be the main reason that a student chooses to become an engineer, engineering technologist, computer scientist, and even a TE teacher, the subject remains to have a positioning problem. Therefore, Strimel, Grubbs, and Wells (2017) offered an outlook to harness the engineering momentum, realign TE with post-secondary engineering-related studies in efforts to use engineering as the epistemic basis for the subject and thus establish stable content, and create a better position for TE within schools. As a result, more students could be exposed to coursework focused on engineering and technological literacy and consequently, improve their capabilities to design, invent, innovate, and address societal problems. This paper will present rationales, recommendations, and current movements for recasting the field as P-12 engineering education, within the context of the United States.

Tuesday 10 October

10.00 am

Cross Context Teaching, the Evolutionary Nature of a Technology Teacher, *Ceri de Boo*, *Cashmere HS*, *Christchurch*

Teachers are continually expected to evolve, what is the impact of this on teaching and learning at Senior level! Being a Technology teacher is a never ending process of learning and expanding on our skill set, what are new teachers faced with in the workplace? We enter as a teacher of a particular context and then are often expected to teacher within other areas of Technology, recent reports are showing that principals are continually under pressure to fill subjects with teachers that are now not necessary trained in the subject area that they have to teach in.

How is this affecting the teaching and learning programmes where you currently teach? Impact of the above on project based learning at senior level (Y11-13). Programmes of teaching and learning are evolving to reflect this evolutionary nature of teachers who are now expected to be multi-disciplinary teachers rather than context specific teachers, this allow for flexible learning options for students and for them to direct their projects in a way that best suits their learning and that also best suits their projects.

Student work to be shown to demonstrate how a flexible attitude allows for students to attain to the best of their ability through a highly creative process that allows students to take full direction of their own learning to produce well thought out prototypes that reflect a journey of discovery and learning through trial and error

"How We Have Progressed and Where to From Here?" *Gary Brinsden Innovative 3D Technologies and a teacher of Technology at Pakuranga College.*

In a little over six years affordable 3D printing has gone from obscurity, being a very little known technology to becoming a commonplace tool in most schools from primary to secondary. Students are now using 21st century tools to develop exceptional design skills. The rapid realisation of conceptual designs through the production of functional models is helping to extend our students. Students are now developing complex designs that would have been unheard of using conventional workshop tools. Similarly, laser cutters/engravers is extended the capabilities of teaching and learning in our schools'. Unfortunately, the expansion of laser cutting technology has been hindered by exceptionally high setup costs. Now as with the case with 3D printing, this is also becoming much more affordable. Through this workshop, I would like to share some of the experiences my students have had in developing design ideas using these modern day design tools. I would also like to demonstrate a new affordable laser cutter/engraver, the EMBLASER 2. Before you say "oh yeah how much is affordable" traditionally these machines have cost upwards of $35,000 whereas this machine which has been specifically design for classroom use is less than $5,000 and is much more portable and can be moved from room to room. Please come along and make up your own mind on the success of these technologies.

Soft Skills in Technology Education *Paul Snape, University of Canterbury, Christchurch*

The Technology and Knowledge Ages of the twenty-first century have brought about new understandings, new ways of doing things, and an array of new career and workplace opportunities as well as a much clearer idea of how the brain functions and learning is best achieved. Employees today are expected to bring more than an accumulation of traditional knowledge acquisition. Increasingly important today are a plethora of attitudinal skills and dispositions that enable workers to engage in much greater collaboration, communication, problem-solving, and critical thinking. What are these newly emphasised skills and dispositions and how should they be addressed within the education system? Meaningful learning of these 'soft skills' will occur best in authentic and integrated programmes where explicit teaching identifies the required learning. Technology Education provides an excellent platform for students today to experience and advance their skills in this area. This session will introduce a range of 'soft skills' to consider and then unpack contexts being used in programmes to see how explicit identification of them for students and teaching focussed can be enhance learning development.

Rethinking Tivaevae as the Model for Community Sustainability, Textiles Technology Collaboration and Wellbeing of Students *Sarah Wirth, Samuel Marsden Collegiate School, Wellington*

I saw an exhibition of Tivaevae, a quilting art form from The Cook Islands, Tahiti and Hawaii and felt that this was the medium through which I could connect to my students. When considering "rethinking Pacific Education" in my classroom, I thought I would be showing a beautiful Textiles Artform, however it was much more than that, the Tivaevae connected us to the local community, strengthened my class bond, leading to an appreciation of the art form and made strong connections to students' wellbeing. I made contact with a local Cook Island sewing group in Wellington and these women came to impart their knowledge to my students, in the same way as their mothers taught them. The women explained how they were made for functions, culture, the importance of society and heritage. The stories of Tivaevae were told and their significance explained. Students worked in the technology area of materials- textiles. They developed an understanding of the inclusion of Tivaevae to the importance of it as a beautiful storytelling ritual and as a significant female historical textiles art form.

Exponential Technologies and How they Might Influence the Future of Education: Session 2 Recap Nature of Disruption and A.I./Mixed Reality *Michael Campbell, Mind Lab, Christchurch*

This workshop discusses six exponential technologies and how they could be game changers for education. Participants will understand why these technologies are disruptive, and the importance of being informed about these, if they hold ANY type of leadership role. Participants will explore the inclusivity of these new considerations in their current practice, and discuss how future practice and policymaking decisions could be adapted to meet these new developments. These (3) sessions are sequential in delivery and it is advised participants select all three.

Explore Different Ways to Structure and Deliver Achievement Standard Programmes for Students *Carl Burr, Burnside HS, Christchurch*

This workshops aim is to provide an alternative viewpoint for Technology Teachers of Years 7-13, exploring different ways to structure, and deliver Achievement Standard Programmes for students. As a teacher at a large school, I have found that the Faculty often struggles to identify and align authentic issues for the 700 students that take a senior technology course (derived from the New Zealand Curriculum). We identified that assessing Technological Practice was often a barrier to student achievement. Technological Practice has increasingly become the conduit for student learning and activity in the last few decades. In particular, there has been a growing reliance on identifying authentic issues, and personalised/customised artefacts. It has also been the focus for the production of student evidence used for assessment purposes. This has evolved though countless iterations of Excellence exemplars to a point where the student evidence has become so templated and protracted that the knowledge and innovation, that the curriculum was designed to promote, can be seen as taking a back seat to the documenting of the procedural aspects of brief development, planning and conceptual thinking.

Recently programmes within my department implemented the Knowledge and Nature strands as a focus for assessment. Technological Practice is naturally occurring and not assessed. All are underpinned by a focus on literacy and the implementation of new technologies. In addition, every student is required to complete a UE literacy standard and encouraged to use either 3D printing, CNC routers and/or laser cutting. In a two-year period Resistant Materials and DVC student numbers have doubled and student achievement, as well as the artefacts they produce have improved significantly. Sharing and critiquing of student evidence will occur, as well as time for questions and exploration.

'Teching' up Your Programme using 3-D Printing Design *Linda Chong*, *St Margaret's College, Christchurch: WS101*

In 2015, the Centre for Innovation was established with the opening of new teaching facilities built after the Christchurch earthquake. From a unique vision, St Margaret's College Christchurch New Zealand has established this teaching space and vision leading learning in a disruptive environment. In this session, hear how St Margaret's College is working to integrate digital technology within existing programmes. A particular focus will be on the use of CAD - Tinkercad. Linda will share examples of learning activities appropriate for range of students (Years 6 to 13).

Te Ao Tūroa Supporting Intergenerational Sustainability in the Primary Industries for Intermediate and Secondary Schools *Dr Vicki Compton & Dr Jaimie-Leigh Jonker*, *MPI, Wellington*

The primary sector provides a wide range of employment opportunities. A highly skilled, technologically savvy labour force is required to deliver significant growth in the primary sector if we are to ensure we protect our natural resources and continue to provide safe high quality food and fibre products to the world. Many of the jobs that will be critical in this sector rely on a deep understanding of, ability to undertake sustainable technological development to solve known, future environmental, and production problems.

In this workshop, we will share a series of technology resources developed by MPI to support learning in technology in intermediate and junior secondary schooling. The resources are designed to broaden teacher and student understanding of the primary sector and discuss the importance of technology to an economically and environmentally sustainable future for New Zealand. Suitable for teachers of year 7-10 students focused on supporting learning across NZC level 4-5.

Wednesday 11 October

10.00 am

Digital as a Generic a Course *Trudy Keys*, *St Margaret's College, Christchurch*

Trudy is the Head of the Creative Technologies Faculty and Curriculum Leader Digital Technologies. Trudy has been a member of the teaching community at SMC for over
20 years. She moved over from Business Studies - Accounting and Economics to the Technology Faculty in 2009. During 2008 & 2009 she was part of the team involved in developing the Strategic Plan for Technology for the Years 1 to 13. She is passionate about Technology education and the many opportunities it offers students. About the workshop she states "Last year we looked at redeveloping our Year 11 Digital course to regenerate interest in the subject and also attract academic students. The students were given a range of contexts to choose from and were encouraged to learn skills to allow them to investigate a topic that interested them. The students really enjoyed the freedom this gave them and the quality of work was to a very high standard and has recently seen two students win awards at the Canterbury/Westland Science & Technology fair. These students will also be involved in the workshop telling their story".

Innovative Ideas for Teaching Foods at Year 7 & 8 *Ann Paterson Breen's Intermediate, Christchurch*

A number of Christchurch Foods teachers will share what they are doing in their programmes with the opportunity for discussion and others to share things they have found went well.

General Technology (GT) Curricula in Senior High Schools in China *Jianjun Gu, Jie Wang, China*

The presentation is targeted at a general audience who is interested in curriculum development and/or Chinese technology education. Curriculum reform has never been suspended to accommodate to students' growth, China's economic, political and societal transform as well as global change since 1980s in China.

Technology was initiated as one of eight domains of Senior High schooling in 2003 through efforts of some visionary technology educators. Ministry of Education soon issued National Experimental Standards for senior high General Technology (GT: differentiated from IT) Education to address the goal, process, content, method, and assessment of GT education. The standards set two compulsory courses: Technology and Design I & II, and seven elective courses: Electronic Control, Architecture & Design, Simple Robotics Building, Modern Agriculture, Housekeeping and Life, Clothes & Design, Car Driving and Maintenance. The national employment of the experimental standards has greatly increased the quality of Technology education in China. To meet the new needs of personal growth and societal change, the revision of the experimental standards were launched in 2014. It was finished in 2017. The new standards clarifies that GT curriculum in senior high is composed of four courses: Technology and Design I & II; Elective I & II. Elective I covers four modules of Technology & Life, Technology & Engineering, Technology & Vocation, and Technology & Innovation; Elective II covers four modules of Traditional Arts and Practice, Experience &

Exploration of New Technology, Technological Integrative Application, and Modern Agriculture Engineering). The revised curricula reflects a focus of technology education from practical skills to core competencies that cover five dimensions: Technological Awareness, Engineering Thinking, Drawing Patterns & Charts, Innovative Design, and Ability of Reification.

Teaching with Simple and Effective Analytics *Mazharuddin Syed Ahmed, Ara Institute of Canterbury, Christchurch*

Data visualisation is transforming research and academia enabling to make the most of data sets to tell complex patterns at a glance. This workshop will prepare you to harness its potential, refining raw data into high-impact communications, presentations, dashboards and collaborate with peers. You will learn about data analysis and visualisation and more as Data is the foundation of the Digital Age. You will also learn how to organize, analyse, interpret and visualise big and small data these new cloud hosted tool and technologies. The goals of the workshop are introduce you

1. to common sources and types of data
2. to identify and correct common issues with data
3. to format data in useful ways for analysis
4. to produce trendy infographics

Accelerating and Adding Value to Students' Learning and Understanding Who Start Year 7 with No or Very Little Technology *Katy Smele, Heaton Intermediate, Christchurch*

Discussion and examples of good practice on how to accelerate and add value to students learning and understanding who start in Year 7 with no or very little technology in their education to date. How do we ensure we are preparing the students for high school?

11.00 am

Exponential Technologies and how they might Influence the Future of Education: Session 3, Human Interface, Future of Employment, Bioengineering, Energy/Space Exploration & Transport *Michael Campbell, Mind Lab, Christchurch*

This workshop discusses six exponential technologies and how they could be game changers for education. Participants will understand why these technologies are disruptive, and the importance of being informed about these, if they hold ANY type of leadership role. Participants will explore the inclusivity of these new considerations in their current practice, and discuss how future practice and policymaking decisions could be adapted to meet these new developments. These (3) sessions are sequential in delivery and it is advised participants select all three.

Going Beyond Kahoot- Exploring Digital Tools to Promote Learning *Danny Gorman, Te Waka Technology Centre, Christchurch*

Starting to Flip! "Take a look at Google Sites and a range of learning tools to start the journey towards flipping your classroom. In the workshop Daniel will share how he uses online tools to enhance learning and empower students. There will be time to explore a number of different tools and hopefully get your own learning site started. Likely tools that will be covered include Google Sites, Quizlet and Vizia."

Virtual and Augmented Reality *Brendan Davidson, St Mary's Cathedral College, Sydney*

Technology based subjects continually evolve as new technologies emerge. Two such new and emerging technologies are Virtual Reality (VR) and Augmented Reality (AR). Research is showing that the use of VR and AR can increase student motivation, enhance visual and spatial awareness, support different learning styles, accelerate the design process, foster creativity and allows students to communicate their ideas in new and improved ways. This workshop will provide hands-on demonstrations of the use of VR and AR in Technology Subjects. Demonstrations will focus on AR and VR being used as an aid in the design process and as a tool to display and interact with designs. Intended audience for this workshop is secondary and tertiary educators but anyone with an interest in AR/VR is welcome to attend.

Using Resources Available Online *Wendy Webb, Core Education, Wellington*

This workshop will be an opportunity for teachers to find out how the resources available on Technology Online can support them to teach technology. This presentation will include highlighting the latest resources available on the site including:

- video gallery stories of best practice
- technology contexts in the School Journal and Connected series
- keeping in touch with Technology Online newsletters
- free online professional learning events
- curriculum support materials including introductory modules exploring key concepts, resources and research findings
- news items and Ask an expert facility
- updates on the curriculum development project.

12.00 pm
What Can We Expect? Neville Myers

This session will focus on the shifts in student and parent expectations of learning in schools that until recently delivered in single cell learning spaces. The 2011 earthquakes in Canterbury have seen a change in the learning environments; however, the changes to physical learning environments and related pedagogy are a New Zealand wide initiative. Here

I look at the pending changes in the technology learning spaces. We will briefly discuss the changes since the 1995 curriculum and how many of these practices exist today, consider if these have any relationship to the current inclusive classroom pedagogy found in the MLE /ILE schools.   I will refer to the 100+ schools that I have worked in-depth over the past 10 years as a technology advisor and secondary student facilitator. I will discuss some of the findings and suggest uncomplicated practices that achieved within a single cell environment to address student achievement and underachievement. I will briefly speak to the implications of the Millennials children entering on mass the senior primary and junior secondary learning environments. Conclude with recommendation to senior primary and junior secondary teachers.