Proceedings of the 7th Sino-New Zealand Vocational Education and Training Model Programme Symposium

Qingdao Technical College, China

14-15 October 2019

CONTENTS

FOREWORD

The New Zealand and Chinese Ministries of Education signed a strategic educational partnership in 2013 to strengthen the links between the two countries. In that agreement, the two countries committed to deepening and broadening their joint activities. It also launched the Sino-New Zealand Vocational Education and Training Model Programme (MVEP). An 'Arrangement to Operationalise' the MVEP was signed on 20 November, 2014 at the 8th Joint Working Group meeting in Wellington and a commitment was made to deliver an annual symposium, showcasing best practice in the delivery of vocational teaching. The MVEP provides a framework by which New Zealand institutes of technology and polytechnics (ITPs) can engage with Chinese counterparts with clear government-level support. The 2014 arrangement noted that within the scope of the 2014 arrangement, a work plan will:

> . . . be developed by the designated bodies which will include elements relating to research projects and the sharing of expertise through symposia; institution – institution relationships including joint programmes and the delivery of quality New Zealand qualifications in China; professional development and training including academic and administrator shadowing programmes; and additional cooperation as may be determined as China continues its TVET reform, including in relation to the development of "applied universities and cooperation between institutions and enterprises between New Zealand and China.

Both countries agreed to host an annual symposium, showcasing best practice in the delivery of vocational teaching. This symposium demonstrates that a shared commitment to ensuring technical and vocational education and training practices, programme design and delivery, teaching and learning, and evaluation in both countries are informed by applied research.

Vocational education and training focuses on the application and transfer of knowledge. The depth, breadth and scope of the annual presentations demonstrate how evaluation, reflection and research has been used to inform their practices. They illustrate how the vocational sector of our education system provides a fertile area for further in-depth evaluation and how that acquired knowledge can be shared to improve our common practice and inform the development of model programmes in both countries.

The theme of the 7th Sino-New Zealand Higher Tertiary Education Symposium was *Educate the Workforce for the Future*. Sub-themes were:

- Micro-credentialing
- Modern Apprenticeships
- Soft Skills
- 1+X Model

We are grateful for the input of the authors, discussants, panellists, and other participants at the 7th Sino-New Zealand Vocational Education and Training Model Programme Symposium for their valuable contributions. We would also like to thank the staff of the Qingdao Technical College, Otago Polytechnic and the Waikato Institute of Technology who helped plan and organise the Symposium; and our sincere thanks goes to Education New Zealand for their generous funding.

Chief Editor: Trish Chaplin-Cheyne, Director Learning and Teaching, Otago Polytechnic
Editor: Tony O'Brien, Sino-New Zealand Model Programme Director, Waikato Institute of Technology

PROGRAMME

Monday Morning, 14th October: Opening Ceremony
Chaired by Prof. Qin Chuan, President of Qingdao Technical College (QTC)
Location: Qingdao Technical College

9:00 – 9:08	Guests Introduced and Welcome Remarks by **Wang Jinsheng**, Secretary of the Party Committee of QTC
9:08 – 9:16	Speech by **Li Min**, Education Working Committee of Qingdao Municipal Party Committee, Committee Member /Qingdao Bureau of Education, Chief Inspector
9:16 – 9:24	Speech by **Tony O'Brien**, China Program Director of Overseas Education Bureau, Ministry of Education, New Zealand
9:24 – 9:30	Speech by **Ms. Liu Yufeng**, Director of the Division for International Cooperation and Comparative Education Research, CIVTE, P.R. China

Session 1: Sino-NZ TVET Keynote Speeches
Chaired by Tony O'Brien, China Program Director of Overseas Education Bureau,
Ministry of Education, New Zealand

9:30 – 10:00	Theoretical Reflections on the Practice of Apprenticeship in China	**Liu Yufeng**, Director of the Division for International Cooperation and Comparative Education Research, CIVTE, P.R. China
10:00 – 10:30	Practical Research on Soft Skills Training Path of Higher Vocational Students under the Five Forces Model	**Chu Jianwei**, President of Tianjin Light Industry Vocational Technical College
10:50 – 11:20	Vocational Education for the 21st Century-Future Proofing through Innovation	**Oonagh McGirr**, Deputy Chief Executive of Otago Polytechnic
11:20 – 11:50	1 + X Certificate System: An Important Guarantee to Promote the Connotation Development of Type Education	**Qin Chuan**, President of QTC

Session 2: Monday Afternoon, 14th October: Symposium **Chaired by: 1. Bao Fengyu, Secretary of the Party Committee of Liaoning Guidao Jiaotong Polytechnic Institute : Microcredit, Modern Apprenticeship System** **2. Yuan Yihua, President of Foshan Polytechnic: Soft Skills, 1+X certificate**		
14:00 – 14:20	Using Micro-credentials to Improve Pasifika Participation in Engineering Education	**Neel Pandey,** Head of Professional Engineering of Manukau Institute of Technology
	The Implementation of A Student Mentorship Program	**Johanna Rhodes** and **Mary McMillan,** Head of School, Nurse Educator of Southern Institute of Technology
14:20 – 14:40	Exploration and Practice of the Talent Training Model by Designing "1+N Micro-majors" Based on the Concept of "Micro-credit"	**Li Zhanjun,** Dean of Teaching Administration Department of QTC
	Exploration & Practice at Collaborative Innovation of Industry and Education in International Personnel Training Mode	**Chen Xuhui,** Vice President of Xiamen City University
14:40 – 15:00	Meeting the Needs of Industry: Piloting an Engineering Degree Apprenticeship with a Focus on Infrastructure Asset Management	**James Mackay,** Principal Academic Staff member, Wellington Institute of Technology (Weltec)
	Soft Skills for Hard Times	**Sean Bell,** International Tertiary Education Leader,Otago Polytechnic, New Zealand
15:00 – 15:20	Automobile Inspection and Maintenance Technology "1+N" Modern Apprenticeship System Exploration and Practice	**Ding Jibin,** Professor of Nanjing Institute of Industry Technology
	How to Embody the Basic Connotation of 1 + X in Professional Talent Training Program	**Wang Zhi,** Vice President of Guangdong Xin'an Vocational Technical College
15:20 – 15:40	Planning for Work & Life Balance: Work-Readiness and X Certificate-Micro-Credential Learning Design	**Hinerangi Eruera Murphy,** Instructional Designer and Teacher, Te Whare Wānanga o Awanuiārangi, New Zealand **Geng Fanna,** Teacher of Shaanxi Polytechnic Institute, China
	The Embedding of Soft Skills within Learner-centered Environments	**Tracey Carlyon** and **Amy Opperman,** Teaching and Learning Coach, Principal Academic Staff Member & Teaching & Learning Coach of Waikato Institute of Technology (Wintec)

16:00 – 16:20	Constructing Six Cultivating Systems as well as Forging Modern Aviation Craftsman, taking the Exploration and Practice of Advanced Apprenticeship in Xi'an Aeronautical Polytechnic Institute	**Geng Xiaotao**, Deputy Director of Academic Affairs Office of Xi'an Aeronautical Polytechnic Institute
	1+X Skill Level Certificate Pilot Project will Force the Reforming of "Three Ts" (Teachers, Textbooks and Teaching-methods)	**Li Bin**, President of Chasha Social Work College
16:20 – 16:40	Developing Laboratory Projects for a Joint NZ/China Mechanical Engineering Programme	**Avinda Weerakoon** and **Nathan Dunbar**, Senior Lecturer (Mechanical Engineering) of Otago Polytechnic
	'SHARP' Skills: The Need for Creativity for Tomorrow's Learners	**Vanessa Byrnes**, Head of School: Creative Industries of Unitec, New Zealand
16:40 – 17:00	Thinking on Modern Apprenticeship Model	**Dai Yaling**, Vice President of Sichuan Post and Telecommunications College
	Deepening the integration of production and education, Accrediting the growth of course and certificate	**Ma Xiaoming**, Vice Principal of Shenzhen Polytechnic
17:00-17:20	Developing Teamwork and Collaboration by Understanding Different Health Professional Roles	**Johanna Rhodes** and **Mary McMillan**, Head of School, Nurse Educator of Southern Institute of Technology
	A Model for Integrating Transferrable Skills into the Vocational Education Curriculum	**Lydia Harrell** and **Dani Mao**, Senior Lecturer, Lecturer of Otago Polytechnic Auckland International Campus

Tuesday Morning, 15th October: Demonstration of Lesson Designing Chaired by Bi Yumin, President of Taishan Polytechnic		
08:30 – 09:00	At the background of the new reform of vocational education, the rapid development of information technology, the major of Engineering Cost has made reform and innovation in its core course "Architectural Budget and Bill of Engineering Quantities" in order to cultivate relevant and high quality technical and skilled talents.	**Tian Ying**, Lecturer of Shanxi Polytechnic Institute
09:00 – 09:30	Taking a teaching unit of the national new energy specialty teaching resource bank course Single Chip Microcomputer Control Technology as a teaching case, this speech demonstrates that on the basis of implementing the reform of "three teachings" (teachers, textbooks, teaching methods), the modular teaching mode is adopted to explore "action-oriented" teaching, project-based teaching, situational teaching and work-oriented teaching. Teaching methods such as process-oriented teaching aim at the organic connection of "1" and "X" for millions of enrolment expansion, and training future skilled workers.	**Wang Chunmei**, Lecturer of Tianjin Light Industry Vocational Technical College
09:30 – 10:00	Introduction to Micro-Credentials and Edubits	**Oonagh McGirr**, Deputy Chief Executive of Otago Polytechnic
10:00 – 10:30	Analysis of the Learning Outcome Oriented Reform and Application Impact in the Higher Vocational Course "Chemical Engineering Principles"	**Li Yan**, Lecturer of Qingdao Technical College
10:30 – 10:45	Remarks and Conclusion by **Oonagh McGirr**, Deputy Chief Executive of Otago Polytechnic, New Zealand	
10:30 – 11:00	Remarks and Conclusion by **Qin Chuan**, President of QTC	

KEYNOTE SPEECH FOR THE 7TH SINO-NEW ZEALAND VOCATIONAL EDUCATION AND TRAINING MODEL PROGRAMME SYMPOSIUM, QINGDAO, PEOPLE'S REPUBLIC OF CHINA:

VOCATIONAL EDUCATION FOR THE 21ST CENTURY: FUTURE PROOFING THROUGH INNOVATION

Oonagh McGirr

Ni hao! Kia ora! Tēnā koutou, tēnā koutou, tēnā koutou katoa

Thank you to our hosts for welcoming us today to your beautiful city of Qingdao to the Seventh Sino-New Zealand Vocational Education and Training Model Programme Symposium conference to share our practice with you. We appreciate your warm hospitality and the kind generosity with which we, from Aotearoa New Zealand have been welcomed. On behalf of our delegation, I extend my thanks to you all.

My name is Oonagh McGirr, and I have the privilege of holding the post of Vice-President Learning and Teaching Services at Otago Polytechnic in the south of the South Island of Aotearoa New Zealand.

Thank you also, for the opportunity to give a keynote speech to this distinguished group. What I have noticed already is that we have much in common. Like China, New Zealand is in the process of a major reform of its vocational education sector. Today, I am going to speak about how we in Aotearoa New Zealand are facing the challenges, in the era of the Reform of Vocational Education (RoVE) and how we, at Otago Polytechnic, are innovating to support and indeed lead the change – for the benefit of those at the heart of our endeavours, the learners. In this way, we speak of future-proofing vocational education at a time of change and super-complexity.

To give you an overview of what I will be sharing with you today, let me show you the three main points I will be making. I have introduced myself, so you know who I am. Secondly, I address the notion of innovation, by speaking to our specific initiatives at Otago Polytechnic, notably our work-based learning unit, our learner capability framework and our micro-credentialling service, all of which are unique in Aotearoa New Zealand and which have been conceptualised, developed and implemented by Otago Polytechnic. We will also look at some of those in more detail, time permitting.

As we wish to address the uncertain and ever-changing future of work, we need to consider and reflect upon some key questions about the nature of learning and learners in the twenty-first century:

- How can employees be equipped for the fast changing world of work?
- Which capabilities or transferable skills are priorities for employers?
- How do we ensure education is equitable and accessible?
- What is learned, when does learning take place, how does learning take place and where does learning takes place?

Indeed, any solution we proffer needs to address those questions and propose a workable solution.

As we consider the future of work, we simultaneously consider the future of education; the responses are, therefore,

- the creation of portable, stackable credentials,
- the development of flexible learning pathways,
- the ability to validate learner capability in a timely manner,
- ensuring a focus on the importance of academic credit, and
- enabling the relevance of qualification to employers.

Taking a closer look at these work-based innovations, we can see that all of them are predicated on the notion of robust, just-in-time, quality-assured learning options informed by the philosophy of the flipped curriculum, and emphasizes the validation of skills and capabilities supported by appropriate and timely knowledge acquisition. In other words, confirmation that the learner is ready and able for the demands of the modern workplace.

Turning to our micro-credentials, I am going to run through some of the typical questions, in terms of what is important to the user, and why, indeed, you might be interested in EduBits©.

- We are leaders in Asia Pacific in micro-credentialling, having developed the platform, invested in a team to work up a suite of EduBits©, and Otago Polytechnic owns the intellectual property. As you will see, the brand is strong.
- EduBits© are quality-assured micro-credentials, endorsed by the national body, the New Zealand Qualifications Authority. As a category one provider, we have the highest quality rating possible, consolidated by having gained this categorisation twice.
- We have also embraced the concept of micro learning as additional offering vs micro credentialing. This means that where there is an identified need for training, we are able to wrap this around.
- Our work with national employers has shown us that micro-credentials improve organisational productivity by validating employee skills and knowledge quickly, and without having to wait.
- Micro-credentials are flexible, rapidly deployed, totally customizable and recognized internationally.

The question now, then to answer is where do these EduBits© fit, in terms of the traditional educational offering in the vocational realm?

EduBits© have multiple applications in so far as they may be supported by a facilitator who works with the learner to collect the required evidence or indeed provide training; the learner may choose to self-direct, there may be a blended approach, a mix of both of these, facilitated online, face to face, offsite, onsite or, more importantly, in the workplace.

You will be wondering how do micro-credentials work? The key is our digital platform, enabling a seamless process, marked by four steps: (1) people submit evidence of their skills online; (2) the evidence provided uses real-world examples; (3) this is then assessed against academically rigorous criteria by a qualified and trained assessor; (4) the learning is recognized with a digital credential, which may be shared on social media sites, in resumés or portfolios, and with employers.

So, that, in summary, is my keynote – a walk through our national reform and our innovations. Much of this, I hope, will resonate with you here, and indeed, I believe speaks to the same needs and challenges which are being experienced in China.

Thank you, ladies and gentlemen, for your time today. *Xie Xie*.

Oonagh McGirr, Deputy Chief Executive of Otago Polytechnic, is the strategic lead for academic development. She leads a diverse portfolio of directorates: Learning and Teaching Development; Research and Postgraduate; Global Engagement; Employability, the Otago Polytechnic Professoriate and the UNESCO endorsed Open Education Resource Universitas. Oonagh has worked in international higher education for over two decades in both the public and private sectors. She has established and led academic services units; developed education strategy for regional and national government bodies; devised and delivered staff development and upskilling programmes for higher education practice; and led institutional learning and teaching accreditation and recognition. She has taught on foundation, undergraduate and postgraduate programmes in modern foreign languages, cultural studies, linguistics, teacher education and research in multidisciplinary settings at new and legacy higher education institutes in Europe and the Middle East. Her research interests are teacher identity in practice in higher education, higher education leadership practice and the development of sustainable continuing professional development frameworks for higher education practitioners. Oonagh is a Fellow of the Royal Society of the Arts.

USING MICRO-CREDENTIALS TO IMPROVE PASIFIKA PARTICIPATION IN ENGINEERING EDUCATION

Dr. Neel Pandey & Lisale Falema'a

ABSTRACT:

This e2e project developed by the Manukau Institute of Technology and Tertiary Education Commission looks to promote STEM related tertiary education to Pasifika secondary school students and ensure seamless pathways into the New Zealand Diploma of Engineering. The project will offer micro-credentials (in mathematics, technical literacy, physics and other curriculum areas necessary for success in engineering education) to Pasifika senior secondary school students in the Achievement in Multi-Cultural High Schools (AIMHI) to:

- help AIMHI Pasifika senior secondary school students develop the necessary preparatory skills more quickly than other learning options;
- provide a high-profile alternative pathway for AIMHI Pasifika senior secondary school students into engineering education; and
- build on a range of interventions to promote STEM-related education options in schools with a significant Pasifika student body in the South Auckland region.

INTRODUCTION

The National Engineering Education Plan (NEEP) called for a significant increase in the number of engineers in New Zealand (Institution of Professional Engineers New Zealand (IPENZ), 2010). The objective of the plan was to address issues with pathways, entry requirements, career development, insufficient student enrolments at New Zealand Qualification Framework Levels 6 and 7, and the lack of a coordinated national network of provision. The plan concluded that the number of graduates with a New Zealand Diploma in Engineering (NZDE) needed to increase to 500 to meet New Zealand's annual needs, or to 750 graduates to allow New Zealand to establish an "innovation–lead economy." However, the number of equivalent full-time students (EFTS) enrolled in the NZDE program decreased from 1605 EFTS in 2015 to 1432 EFTS in 2016 (New Zealand Board for Engineering Diplomas (NZBED), 2016). This indicates the number of graduates is unlikely to increase substantially. It is also noted that a significant number of these graduates were international students.

The Engineering Education to Employment (Engineering e2e) Programme represents a partnership between the Tertiary Education Commission, the Institutes of Technology and Polytechnics (ITPs), Business New Zealand, and Engineering New Zealand (formerly known as IPENZ). The Engineering e2e Programme was formed in 2014 to address New Zealand's shortage of engineers and to improve the public's perception of engineering careers.

There are several persistent issues that impact on the effectiveness of the pipeline into advanced engineering education. These issues often reflect systemic problems within the tertiary education system. The system prioritises on-campus, full-time students, it does not cater well to New Zealand Māori and Pasifika, and it is too difficult for students to change direction once they have begun their course of study (Mischewski, 2017).

The Mischewski report (2017) indicates that Pasifika students are under-represented in the engineering profession and in engineering education programmes. This research indicates that:

- Pasifika communities do not prefer engineering because of its association with manual employment;
- there is a lack of awareness about engineering pathways amongst Pasifika students, families and communities;
- an inherent bias in the secondary school system means that Pasifika students do not view Science, Technology, Engineering and Mathematics (STEM) -related education as a viable option; and
- Pasifika students often develop an interest in engineering in senior secondary school when their earlier decisions regarding their study have foreclosed this option.

The proposed project in this paper will explore pathways to offer micro-credentials (in curriculum areas necessary for success in engineering education) to Pasifika senior secondary school students in AIMHI schools[1] (the 'Achievement in multicultural high schools initiative'). The aim is:

- to help senior AIMHI Pasifika students develop the necessary preparatory skills more quickly than other learning options;
- to provide a high-profile alternative pathway for senior AIMHI Pasifika students into engineering education; and
- to build on a range of interventions to promote STEM-related education options in schools with a significant Pasifika student body in the South Auckland region.

WHY A PASIFIKA PATHWAY INTO ENGINEERING EDUCATION

The Tertiary Education Strategy 2014–2019, which sets out the strategic direction for the tertiary education sector, identifies Pasifika as a priority group for the Government; the goal is to improve socio-economic and cultural outcomes for Pasifika learners, including successful tertiary education and labour market outcomes. New Zealand's changing demographics mean that there will be an increasing reliance on improved education outcomes for Pasifika to meet future skill and labour market needs. To do this, we need all Pasifika equipped with the knowledge and skills they need for lifelong success.

Pasifika are a young, fast growing proportion of New Zealand's population. By 2038, the Pasifika population is projected to make up 10.9% of New Zealand's population compared to 7.8% in 2013 (Pasifika Operational Strategy 2017-2020).

The micro-credential pathway project sets up a bridging programme that will provide an effective way to prepare students for engineering education while acknowledging the credits achieved via the school curriculum. The students' National Certificate in Educational Achievement (NCEA) credits will be micro-credentialed against the NZDE course and the well-defined mapping process will bridge the gaps in their knowledge of mathematics and technical literacy. Upon successfully completing the pathway of study, the student will be cross-credited towards the NZDE Engineering Mathematics and Technical Literacy courses. It is envisaged that this will provide a seamless transition into the NZDE programme.

MICRO-CREDENTIAL MAPPING

For the purposes of this study, a micro-credential is formal evidence of knowledge, skills and abilities. Micro-credentials offer a personalised approach to ensure secondary students can select courses to match their own learning needs and chart their own learning pathway as offered through the NCEA credit system. In this case, the achievement relates to courses used in the execution of specific tasks and learnings undertaken in NZDE Engineering Mathematics and Technical Literacy courses.

What are the key stages?

The pathway project feasibility study was divided into five different stages.

Stage 1 – Project launch. This consisted of appointing a project team, allocating resources for the feasibility study, and defining the project purpose and objectives. Manukau Institute of Technology appointed the project manager and the chair of the AIMHI group put together a project team. The project team consisted of staff from Sir Edmund Hillary College School and Manukau Institute of Technology.

Stage 2 – Micro-credential mapping. The NZDE course(s) were mapped against the school NCEA curriculum and this identified the knowledge gap(s).

Stage 3 – Stakeholder workshop. This involved all the relevant stakeholders so they were aware of the project, engaged with the project team, and were able to highlight the likely challenges of bridging the knowledge gap though the delivery of courses in schools.

Stage 4 – Proposal design. With an emphasis on meeting the objective for the micro-credential pathway to improve Pasifika participation in engineering education, the project team developed a clear mapping process and delivery model, and ensured relevant stakeholders were satisfied and committed to the proposal during implementation phase.

Stage 5 – Final report. The project team shared the mapping process and delivery plan so stakeholders could explore the implementation of the pathway and share the lessons learned from this experience with the Engineering e2e Programme and other stakeholders such as other ITPs and the TEC.

CURRICULUM MAPPING PROCESS

To be prepared for the engineering industry, high school students need a solid education in science, mathematics, and technology, and an education beyond high school subjects, such as solid foundations in literacy, numeracy, and thinking skills.

A seamless pathway, from high school into the NZDE engineering education, requires recognition and credentialing of the knowledge gained through school curriculum. It is important that the students explore and understand the relevance of the pathway courses, hence there has to be a sense of purpose and achievement. This can be only achieved if the knowledge gained in school is micro-credentialed towards courses in the NZDE programme.

For the purpose of this study, two courses from NZDE programme, Engineering Mathematics 1 and Technical Literacy, were selected to map against the NCEA Level 2 curriculum in mathematics, technology and literacy. The mapping of the school curriculum and the NZDE courses was carried out by the working group who used their professional judgment to assess the knowledge gap taking into consideration the level, complexity and depth of the topics covered in the school curriculum compared with the NZDE courses.

Learning and teaching hours

NZDE Course

Each NZDE course is a 15 credit paper with 150 hours of learning. This equates to one credit to 10 hours of learning. Typically, a course comprises of 90 hours of directed learning and 60 hours of self-directed learning. While the number of weeks to deliver a course in each semester differs slightly between ITPs, for the purpose of this study, the semester is taken as 15 weeks of teaching and two weeks of exam time. In terms of learning, a student is expected to attend lecture/tutorial for six hours per week and four hours of self-study for each course.

NCEA Credits

The total number of teaching weeks in a school year is typically 40 weeks which comprises of teaching, revision and exam weeks. NCEA Level 2 students typically attend 32 to 34 weeks of classes in school, with two weeks of revision and four weeks of exam time. For the purpose of this study, the school teaching time will be taken as 32 weeks. This allows for an additional two weeks to prepare for external examination or delivery of the block course (as discussed in later sections). Each NCEA credit equates to 10 hours of learning. Schools typically offer 18 credits of standards to students to achieve the NZCEA credits and as standards offered can differ between schools, it is possible that no two schools in the AIMHI group would offer the same 18 credit standards. A total of 18 credits of standards requires 180 learning hours, and on average each credit is delivered for 5.5 hours per week over 32 weeks.

The offering of different standard numbers within schools poses a challenge to derive a delivery model of knowledge gap that would be suitable for each participating school. Hence a simple model that is suitable to deliver the courses needed to fill the knowledge gap is required.

Knowledge gap mapping of mathematics course

Engineering Mathematics Course

The NZDE engineering mathematics course aims to develop mathematical skills, concepts and understanding in order to perform calculations and solve problems within engineering contexts. The student completing this course should be able to:

1. manipulate and solve algebraic expressions and equations;

2. solve, manipulate and apply mathematical functions, including application of graphs where appropriate;

3. apply the rules and principles of trigonometry using both degree and radian measure;

4. demonstrate knowledge of differentiation and integration techniques and apply them to solve engineering problems;

5. demonstrate knowledge and application of one of the following:

    i.   complex numbers, logic expressions and numbers OR

    ii. basic statistical concepts and techniques.

Mathematics NCEA Level 2

Assessment of the mathematics curriculum in school is achieved through the internal and external credit system. The current internal/external credits in mathematics that cover topics similar to that in the NZDE mathematics course are as below.

- 91256 - 2.1: Apply co-ordinate geometry methods in solving problems – 2 credits

- 91257 - 2.2: Apply graphical methods in solving problems – 4 credits

- 91259 - 2.4: Apply trigonometric relationships in solving problems – 3 credits

- 91261 - 2.6: Apply algebraic methods in solving problems – 4 credits

- 91262 - 2.7: Apply calculus methods in solving problems – 5 credits

- 91264 - 2.9: Use statistical methods to make an inference – 4 credits

- 91267 - 2.12: Apply systems of equations in solving problems – 2 credits

From the mapping of topics and content, covered in the 24 credits mathematics course outlined above, it was apparent that the credits achieved in the mathematics course offered through school curriculum cover about 70 percent of the NZDE engineering mathematics course.

To cover 100 percent of the NZDE mathematics courses would require:

1. 18 credits of NCEA Level 2 mathematics, that is 180 learning hours (delivered as per school mathematics curriculum);

2. an additional 6 credits of NCEA Level 2 mathematics to complete 24 credits of mathematics, that is 60 learning hours;

3. additional mathematics to cover the knowledge gap, which is about 30 percent of the NZDE mathematics course. This equates to 27 learning hours (30 percent of 90 hours of directed delivery hours).

Knowledge gap mapping of technical literacy course

Technical literacy course

The NZDE technical literacy course aims to develop the required technical research skills along with oral, written, graphical and interpersonal communication skills. The student completing this course should be able to:

1. use information obtained from physical or online resources in technical problem solving and presentations

2. prepare and deliver an oral presentation on a technical subject

3. communicate ideas and technical findings in a written format

4. create and use pictorial sketches and pictorial/orthographic drawings to current drawings standards as a communication technique to present ideas and data

5. demonstrate interpersonal communication skills to develop project outcomes.

The technical literacy course offered in NZDE consists of 50 percent report writing and presentation skills that is contextualised to the Computer Aided Design (CAD) project taken within the course, and 50 percent of CAD knowledge.

Technology NCEA Level 2 course

The assessment of the technology curriculum in schools is achieved through the external credit system. The current external credits in technology that cover topics similar to NZDE technical literacy course are:

- 91063 - Design and Visual Communication – 3 credits
- 91064 - Design and Visual Communication – 3 credits
- 91102 - Construct and deliver a crafted controlled oral text – 3 credits

The 6 credits of Design and Visual Communication course cover 60 percent of the CAD section of the NZDE technical literacy course. To fill the knowledge gap at the required level of the NZDE CAD would require 40 hours of additional learning in engineering terminology and AutoCAD software.

To cover the report writing and presentation skills within the technical literacy course, in addition to the 3 credits of oral text, an additional 30 hours of learning would have to be provided. The additional learning would need to be contextualised to the CAD project so that the students could ascertain the relevance of engineering applications, and experience technical writing and presentation skills.

Therefore total learning hours required to cover the technology and literacy NZCEA Level 2 course plus the knowledge gap topics would be 160 hours consisting of:

1. 6 credits of NCEA Level 2 technology project, that is 60 learning hours delivered as per school technology curriculum
2. an additional 3 credits of NCEA Level 2 oral text, that is 30 learning hours
3. additional delivery of the CAD course to cover the knowledge gap of NZDE CAD, that is 40 learning hours and additional 30 hours of technical writing, a total of 70 hours.

Delivery model

The successful completion and transition of the students into the NZDE programme would depend on the implementation of the delivery model used to provide the learning hours required to fill the knowledge gap. Each delivery model needs to be explored in greater detail in terms of effectiveness, flexibility and implementation. The four models identified are:

- delivery over 32 teaching weeks within a school year
- delivery over terms 2 and 3 of the school year
- delivery in block format after completion of NCEA external examinations
- delivery in mixed mode of block format and over teaching terms 2 and 3.

MODERATION & QUALITY

To ensure that the quality of the pathway course meets the equivalent level of the NZDE course, the partner ITP, as the deliverer of NZDE programme, will provide the moderation support to the participating schools. The moderation support will consist of moderation of teaching materials, end-of-course class test, and provision and revision of NZDE past exam exemplars.

The quality management system would ensure processes and indicators are in place that provide the following evidence:

- **Achievements and outcomes.** That the delivery of the pathway programme provides meaningful and measurable learning outcomes (for example, knowledge gained is equivalent to the overall NZDE course standard).

- **NZDE programme needs.** That the courses delivered to fill the knowledge gap are current, regularly reviewed and updated, and address NZDE programme needs. That the programme is valued by the participating schools and students. That the delivery model is flexible and adaptable to participating schools and students' needs.

- **Learner engagement.** That the purpose and contents of the programme are clear and well understood by the students. That students are monitored and supported in their learning progress. That assessment is valid, reliable and transparent.

- **Governance and management.** That the governance and management roles providing direction to the programme are clearly defined and understood. That resources are sufficient and managed efficiently. That communication on the programme and with all relevant stakeholders is effective.

- **Continuous Improvement.** That training content is reviewed in alignment to changes in NZDE programme with evidence to be drawn from course satisfaction surveys and successful progression into NZDE programme.

- **Student monitoring.** That students participating and transitioning into the NZDE programme are regularly monitored for successful course completion and progression within the NZDE programme.

PROPOSED WAY FORWARD

Risks

There are a number of risks associated with developing and implementing any new system. These need to be proactively addressed where possible to lessen the likelihood of the system not delivering its required outcomes or becoming financially unsustainable. The main risks are low participation from the AIMHI group of schools, low uptake by students due to the perceived value of engineering education, students' lack of confidence in their academic skills to undertake engineering education pathway, low success rate leading to loss of interest in pathway programme, unsustainable high operational costs, and the micro-credentials pathway not being accepted as recognition of prior learning by other ITPs or schools. To address and minimise the risks, a number of mitigation measures need to be implemented:

- to undertake participation confirmation and on-going communication with all stakeholders to maintain confidence and credibility of the system;

- to carry out a pilot project to provide a better understanding of the engineering education pathway project and the issues related to the delivery of curriculum;

- to undertake an information campaign involving secondary students and potentially their parents to raise the profile and to provide information about the engineering education pathway project;

- to undertake suitable cost analysis of development and operational costs and establish adequate funding before the pathway project is rolled out; and

- to establish a committee to ensure quality and moderation process is carried out accordingly and student progress are monitored.

Pilot project

It is suggested that the next step in investigating the feasibility of the micro-credential engineering education pathway is to select a few AIMHI schools who are keen to participate in the trial of the project. Participating schools would work in collaboration with the partner ITP. The trial run of the project will provide invaluable insights of the ability to integrate the NCEA credits with the NZDE standards. The development and delivery of the micro-credential pathway will also provide valuable information on the issues and resource requirements associated with the new system.

The choice of the NZDE mathematics and technical literacy courses provides a good mix of topics that is covered to some extent in the school curriculum, and an example of feasible integration. The final choice of courses would need to be discussed further with the NZBED. The pilot would have to not disadvantage the participants. Students participating in the engineering education pathway should be able to continue their study in Year 13 should they change their mind not to progress into NZDE programme after completing the pathway option.

CONCLUSION

The paper concludes that a micro-credential engineering education pathway linked to NZDE courses could be developed and implemented. It is noted that the uptake and acceptance of such a programme would only become clear when the programme is implemented in joint partnership of an ITP with an AIMHI group of schools. However, we emphasise that to increase the participation of the Pasifika students in engineering education, pathway and proactive measures need to be taken. Therefore, the following recommendations are put forward.

1. A pilot study, in collaboration of some AIMHI schools with an ITP, involving development and delivery of two NZDE courses be undertaken to develop a better understanding of how the engineering pathway would work and how effective it would be.

2. The proposed pathway system to be extended to all AIMHI group of schools to provide opportunities to wider group of students into engineering education after the first iteration of pilot study.

3. Consultation be undertaken with NZBED and wider ITPs to make them more aware of the initiative taken to increase the Pasifika participation in engineering education.

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1. AIMHI Schools are Aorere College, Auckland Seventh-Day Adventist High School, De La Salle College, Mangere College, McAuley High School, Sir Edmund Hillary Collegiate, Southern Cross Campus, Tamaki College, Tangaroa College. More information can be found at: https://www.educationcounts.govt.nz/publications/maori/english-medium-education/towards_making_achieving_cool_achievement_in_multi_cultural_high_schools_aimhi

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THE IMPLEMENTATION OF A STUDENT MENTORSHIP PROGRAMME

Johanna Rhodes & Mary McMillan

ABSTRACT

Five inspiring Southern Institute of Technology Year Three nursing students wanted to implement a student led mentorship programme to provide guidance and support to new students in the School of Nursing at the Southern Institute of Technology. New students to the Southern Institute of Technology were invited to join the student-led mentorship programme during orientation week at the commencement of the academic year. The mentorship programme leaders then matched the mentors and mentees. The implemented programme also provided an opportunity for the mentorship programme leaders to improve their soft/intangible skills including interpersonal communication, time management and leadership. The significance of this programme was the opportunities for students to build relationships with other students, which helped, foster a closer engaged community within the School of Nursing.

The two aims of the student led mentorship programme were to foster better communication and community between students to reduce stress and anxiety. Essentially helping to improve a sense of belonging. The second aim was an opportunity for mentorship programme leaders and mentors to improve their intangible skills of communication and leadership.

BACKGROUND AND INTRODUCTION

Numerous factors can have an effect on nursing students entering tertiary study for the first time. Nursing students in their first year of tertiary study often express apprehension and a lack confidence (Foxwell et al., 2017; Rohatinsky, Harding, & Carriere, 2017). Five inspiring Year Three nursing students met with the Head of School of Nursing at the beginning of the 2019 academic year seeking support to set up a student-led peer mentorship programme (Bulut, Hisar, & Demir, 2010; Mault et al., 2019; Ssemata, Gladding, John, & Kiguli, 2017) at the Southern Institute of Technology's School of Nursing. This followed their discussions regarding how they had appreciated the support from the students in the years ahead of them that they knew when they began their nursing programme. Their experiences of the informal support, advice and guidance gave rise to the idea that students in their second and third year of the Bachelor of Nursing Programme could be formally paired together with Year One students to provide support, advice and guidance. Over the summer, the Year Three students had researched this possibility to establish the benefits and limitations of student-led mentorship programmes, and how they are run throughout tertiary institutions in New Zealand and internationally. Their exploration of the literature revealed that students, who are peer mentored in their first year of tertiary study, feel more integrated into the tertiary setting and have higher rates of retention, achieve higher academic grades, have lower failure rates and have an increased

likelihood of graduating (Tiew, Koh, Creedy, & Tam, 2017; Yomtov, Plunkett, Efrat, & Marin, 2017). A study conducted in Uganda investigated the effect of peer mentoring for students. This study showed peer mentoring had reduced stress and loneliness in addition to increasing students' sense of self-efficacy and psychological sense of belonging (Odongo & Wycliff, 2016). Following the informative discussion between the Head of School of Nursing and the five Year Three nursing students, the Head of School of Nursing enthusiastically offered guidance, support and encouragement for the proposed student-led mentorship programme.

At the Southern Institute of Technology's School of Nursing, there is a recognition that nursing is in an ecliptic changing climate, which requires a range of intangible skills often referred to as 'soft skills'. Within nursing curricula, tangible and technical skills dominate theory and clinical practice. However, the intangible skills of communication and leadership are less visible and measurable. Therefore, this appeared to be a good opportunity for nursing students to develop these intangible skills during their undergraduate nursing programme. The students proposing the student-led peer mentorship programme and the Head of the School of Nursing collaborated to realise the benefits of this opportunity to offer a myriad of ways to develop communication and leadership capabilities. The five nursing students noted that they are taught to have open minds, to notice problems and find solutions, which they felt they had done by proposing the student-led mentorship programme. They also valued being fostered to develop a social conscience. From a fiscal consideration, the student-led peer mentorship programme was easy to implement, as there were no financial costs.

The five nursing students formed the student leadership team for the inaugural student-led peer mentorship programme. The programme involved matching a Year Two or Three Bachelor of Nursing student or a Level Five New Zealand Diploma in Enrolled Nursing student to a Year One Bachelor of Nursing or Level Four New Zealand Diploma in Enrolled Nursing student. Students completed a short questionnaire enquiring if they wanted to be paired with someone of similar age, gender, study background and culture. The mentors' role was to provide social supports, not to act as educators as academic support services are already accessible on the Southern Institute of Technology's campus. The student leadership team was met with overwhelming enthusiasm by the students; within a fortnight, they were asked by both students and the School of Nursing to expand the student-led peer mentorship programme to include the New Zealand Certificate in Study and Career Preparation, Health and Wellness.

The two aims of the student-led peer mentorship programme were (1) to foster better communication and community between students to reduce stress and anxiety, and to improve their sense of belonging; and (2) to provide an opportunity for mentorship programme leaders and mentors to improve their intangible skills of communication and leadership. The first year of this inaugural student-led peer mentorship programme is now complete. A narrative inquiry focussed on the stories of the individuals who were part of this programme, and it offers an understanding of their experiences and the outcome of this programme.

RESEARCH DESIGN

Ethical Clearance

Ethical clearance was received in 2019 by the Southern Institute of Technology Human Research Ethics Committee.

Aims of the research

This study had two aims:

1. To evaluate the effectiveness of a student-led peer mentorship programme in fostering better communication and community between students, reducing stress and anxiety, and improving a sense of belonging.

2. To evaluate the effectiveness of a student-led peer mentorship programme in enabling mentorship leaders and mentors to improve their intangible skills of communication and leadership.

Research methodology

A qualitative research methodology was selected based on narrative inquiry to illustrate personal stories relevant to understanding the phenomenon under evaluation (Berry, 2016; Holligan & Wilson, 2015; Riessman, 2008).

Data Collection

The data was collected by a two-part questionnaire developed by the researchers using the electronic learning platform, *Blackboard*. The data was collected in the final two weeks of the 2019 academic year. An announcement was placed on Blackboard with an information sheet explaining the study and the date the questionnaire would be no longer available. If students did not have access to an electronic device, they could complete the questionnaire using the on-site computer suites.

The first part of the questionnaire was a multiple-choice question that asked, "Were you a mentorship programme leader, mentor or a mentee?" The second part of the questionnaire was an essay question that asked, "Please share your stories of being either a mentorship programme leader, mentor, or mentee." Guidance was provided for this question that stated, "Your stories can be presented as single words, bullet points, narrative story, pictures or a mixture of all of these."

Participants

All students (n=188) who had been either a mentorship programme leader (n=5), mentor (n=78) or mentee (n=105) were invited via Blackboard to participate in this study. A total of 82 percent (n=154) responded. The participants who responded were made up of mentorship programme leaders (n=4), mentors (n=66) and mentees (n=84).

Data Analysis

The stories were grouped according to whether the student was a mentorship programme leader, a mentor, or a mentee. The data was analysed from each set of stories to capture a nuanced understanding of each group, and the results are presented in the three groups. The analyses of the written stories were conducted inductively using analytic memos to chart relationships between the groups.

RESULTS

Mentorship programme leader stories

The mentorship programme leadership participants' stories explained that they presented the student-led peer mentorship programme to students in all three year groups of the Bachelor of Nursing programme in the first two weeks of the 2019 academic year. They expressed a sense of achievement from the numbers of students who volunteered to mentor, and the students from the Year One cohort who wished to be mentored. Their stories explained that the programme rapidly expanded, when the New Zealand Diploma in Enrolled Nursing cohort and the New Zealand Certificate in Study and Career Preparation (Health and Wellness) cohort asked if they could also be part of the programme. The mentorship programme leaders expressed that this presented a new challenge, but one that was welcomed. One mentorship programme leader stated, "We were not expecting all the programmes to want to be a part of this, but it was fantastic as it began to break down silos between these programmes, I felt we become a unified School of Nursing." Another mentorship programme leader stated, "Bringing all the programmes together was great, we shared and learnt from each other, perhaps in the future the postgraduate programme could also be part of this." Collectively, the mentorship programme leaders expressed that in the first month they were faced with many challenges that they had not foreseen during their planning, including the number of students who wanted to be mentors and mentees. An additional challenge expressed by the mentorship programme leaders was managing their study alongside supporting the mentors, and each other. They explained these challenges were excellent learning opportunities and during the latter part of the first month, the programme was running smoothly. One story stated, "The opportunities this programme provided for me included the opportunity to increase my problem-solving abilities, to make decisive decisions and further develop my individual leadership style, this has been so valuable."

The mentorship programme leaders collectively noted that there had been resistance to programmes such as this being set up in other tertiary institutes. One mentorship programme leader questioned in her story why there would be such resistance to developing leadership opportunities and providing programmes to help further students' academic performance and mental wellbeing when it was so easy to establish. This thought was further highlighted by another mentorship programme leader who stated, "In reality nursing students are the future leaders of tomorrow and creating a safe environment to test their leadership skills now should be encouraged."

The student leadership team have built a solid foundation that will be passed to the new leadership team next year. The mentors' stories stated: "After passing the baton to the new leaders we are excited to see where they will take the programme. Our hope for the future is to see more students stepping into leadership roles and finding other areas within tertiary or nursing environments that they can help improve." Although this is a student-led programme, it could not have been done without the support of the Southern Institute of Technology nursing faculty. The staff created a safe environment for students to test their leadership ability, to push themselves further than they ever expected, and to figure out what works and what does not. This was a valued learning opportunity for all parties.

Mentor stories

The stories from the mentors expressed a sense of achievement, an opportunity to give back to fellow students, to develop their communication, time management and leadership skills. They expressed a sense of pride in the intangible skills developed that they felt would be essential as nursing preceptors in the future. The mentors' stories collectively noted how different the campus felt. One mentor explained, "We were receiving feedback from students that the peer mentorship programme had broken down the barriers between year groups, and even different nursing courses, with the EN [Enrolled Nursing] and SCP [Study in Career Preparation] students on board." A further story continued this thought, "Students interacted with each other much more than previous years." Another mentor expressed, "When I was in year one it felt very separate from the other years; I think we have broken the walls down."

A sense of collaboration between programmes and year groups emerged; collectively, mentors' stories expressed that connections with students throughout the School of Nursing were made.

A few mentors conveyed feelings of being needed in the beginning but not so much as the year progressed. One mentor stated: "It was great in the beginning. I felt like I was making a difference for her, but as she made friends she moved away and needed me less. In a way it was great, but I did feel a bit unneeded." Another mentor said, "I did not know my mentee had withdrawn from the programme, I kept texting and received no reply. I was unsure what I was meant to do about this."

In summary, the mentors' stories supported the view that they perceived their communication skills had expanded and their leadership skills were enriched. A common thread in the mentors' stories included feelings that the programme was a great initiative, well supported, and provided opportunities to meet new people and engage across the programmes and years within these.

Mentee stories

For the mentees, their stories expressed that they felt a sense of welcome and belonging. They conveyed that having a mentor helped them to settle into a new tertiary environment, gain advice on how to manage their workload, build friendships and network with other nursing students. A common statement in the mentees' stories was that being mentored had worked fantastically as a social support system for them. The mentees' stories expressed that throughout the year, the mentor support had helped combat burnout, bullying and stress. Their collective concerns regarding bullying and stress were stated in multiple participants' stories as being of significant concern to them with publications across different media expressing these concerns in nursing environments.

The shared activities were highlighted throughout the mentees' stories, who voiced that these enabled a sense of comradery in a relaxed shared experience. One mentee stated, "I loved sharing lunch with everyone, and during these I learnt heaps, it was just awesome." Another avowed: "Taking the time to share lunch with the whole school was tremendous, I met wonderful people and made firm friends across the school of nursing. I actually believed I belonged with these people, actually my confidence increased."

The future of the student-led peer mentorship programme was given emphasis in the mentees' stories with strong references to the continuation of this. A mentee stated, "I am excited to volunteer to be a mentor next year, I have so much to give, in a way I owe my mentor for being amazing." Another mentee stated: "I arrived at SIT [Southern Institute of Technology] terrified and was not sure if I would stay in the first week. My mentor spent time with me, helped me understand what I was feeling. I remember him taking me to the café and just listening. I want to be that person as a mentor next year, this programme has to continue."

DISCUSSION

The group stories from this study support the view that the first year of implementation of the student-led mentorship programme has been successful. The results of this study are consistent with previous evaluations of mentorship programmes. Bulut et al. (2010) highlighted in the conclusion from their evaluation of a mentorship programme that mentoring as a learning and developmental process had increased student satisfaction. A scooping review conducted by Jacobs (2017) concluded that nursing student peer mentorship is about support, connections, and a process of socialised learning. These conclusions (Bulut et al., 2010; Jacobs, 2017) can also be deduced from this study's results. The effectiveness of this inaugural student-led peer mentorship programme, in fostering better communication and community between students, supports the continuation the student-led mentorship programme in the next academic year. Furthermore, the success expressed by the mentorship programme leaders and mentors regarding their development of intangible skills further validates the continuation of this programme.

LIMITATIONS

This study has three significant limitations. Firstly, it demonstrates the results of the student-led mentorship programme in only one school of nursing. The results cannot be generalised to all other nursing schools. Secondly, although the Head of School of Nursing was in regular contact with the mentorship programme leaders, mentors and mentees during the student-led mentorship programme, no research data was collected during this time, which could have captured some of the issues revealed in the stories, in greater depth. The third limitation is the capture of data through written stories. The use of interviews or focus groups following the data collection may have enabled increased complexity of investigation of the codes identified. In spite of these limitations, we can conclude that the student-led mentorship programme contributed to positive experiences for the mentees with reduced anxiety and effective communication, while enabling a sense of belonging. Additionally, it can be concluded that the mentors and mentorship programme leaders experienced improved intangible skills of communication, problem solving and leadership.

ACKNOWLEDGMENTS

Johanna Rhodes is the Head of School of Nursing at the Southern Institute of Technology (SIT). She believes that in this tempestuous period of change, embracing teaching pedagogies that reflect the 'real world' is critical to developing 'work ready' graduates who are equipped to work in the electrifying, intricate, and fluctuating world of healthcare. The use of simulation modalities in education offers a willingness to advance the aesthetic narrative of healthcare, while embracing the realism of working with people, which is why Johanna includes this in her teaching. She is inventive, and seeks opportunities to develop her teaching, while maintaining focussed strategies to create interesting and realistic learning opportunities.

Mary McMillan is the Paper Coordinator for the Bachelor of Nursing Year Two, Professional Issues Paper and Year Three, Clinical Practicum Paper in the mental health practice settings at the Southern Institute of Technology (SIT). She also coordinates and chairs the Southland Interprofessional Education Programme involving Southern Institute of Technology, School of Nursing, University of Otago and the Southern District Health Board at Southland Hospital. Mary uses teaching pedagogies that reflect, "real world" and "work ready" graduate nurses. Her foundations for this work is 30 years of nursing in both mental health and primary health settings with huge diversity.

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MEETING THE NEEDS OF INDUSTRY: PILOTING AN ENGINEERING DEGREE APPRENTICESHIP WITH A FOCUS ON INFRASTRUCTURE ASSET MANAGEMENT

Dr. James Mackay

ABSTRACT

Worldwide, there is a critical shortage of infrastructure asset managers, engineers who are able to draw on their experience and interdisciplinary knowledge to address infrastructure deterioration and plan for the future needs of society. This project addresses this critical shortage through the development of a degree apprenticeship, tailor-made to meet the needs of industry, from both a curriculum as well as training point of view. The industry-led approach to curriculum design has resulted in an asset management pathway within each of the traditional Civil, Electrical, and Mechanical Engineering degrees that will meet the requirements for international accreditation and can be delivered in the workplace.

In this paper, the curriculum development process will be outlined, as well as an overview of the research design for the evaluation of the pilot, which is expected to start in 2020. We expect that this new curriculum will be able to:

- transform the way in which vocational degrees are taught in New Zealand
- contribute to the growth of the economy through the provision of a new cohort of infrastructure asset managers
- provide access to groups who have been historically underrepresented in engineering.

INTRODUCTION AND BACKGROUND

For centuries, apprenticeships have been a well-accepted form of training worldwide, particularly in the trades. Higher degree apprenticeships where work-based academic education is combined with vocational training, have been around in Germany, Austria and Switzerland since the 1960s and are widespread (Graf, 2016). In other European countries, such as the United Kingdom and Spain, they are relatively new and have really only taken off in the last five years (Rowe, Perrin, & Wall, 2016). This is largely to do with the increased demand for a skilled workforce, with employers wanting to have a stake in the development of people whom they will later employ. This is particularly true in Europe and the United Kingdom, where apprenticeships now are not limited to the trades, but include higher degrees, even at the Master's level. This model of apprenticeships not only spans higher level degrees but is also embedded within business frameworks. The direct involvement of employers in the design and delivery of Degree Apprenticeships in the UK implies that employer attitude has undergone some change and continues to do so (Powell & Walsh, 2018), particularly in the past five years.

The strength of the employer-led model of implementation is that a consistently high standard of training and development is embedded in the workplace that does not only take place during the training phase of the apprenticeship, but also once the apprentice has graduated. Thus, high levels of collaboration between employers and educationalists deliver better balanced individuals (Goodyer & Frater, 2015). This model can also be seen in the light of theories of social constructivism, particularly the ideas of Vygotsky (1978), where the role of the mentor in the learning relationship allows the apprentice to learn the tools of the profession while under guidance from an expert in the field as a paid employee. Critical to this model of delivery, is Vygotsky's concept of the *zone of proximal development* and the role of the *more knowledgeable other* in the development of the apprentice, which requires the provision of learning opportunities in relation to the work that the apprentice is expected to do, alongside a capable industry mentor. This notion is supported by Shah and Rashid (2017), who maintain that a person's first experience of learning comes from the sociocultural environment in which they live, and while Vygotsky focused widely on child-centred learning, his theory can be applied to adult learning as well, particularly in an apprenticeship situation. The benefit to the apprentice of this kind of learning is that they learn a specific task in a controlled and authentic environment with a more knowledgeable mentor to guide them. The benefit to the employer is that they are able to mould the employee in the way that is desirable for the organisation.

Studies by Clarke (2018) on the impact of degree apprenticeships on social mobility, provide evidence that such higher level apprenticeships improve social mobility, possibly due to the fact that professional education is now afforded to anyone, irrespective of societal standing. This is something that is particularly true for mature learners wanting to develop or change their career. For those who need to continue to support themselves or their family, entering (or remaining in) the workforce is the obvious solution. This method of working while learning enables people to develop skills from mentors who are experts in the field. The long-term results of this practice can help to provide the apprentice with a job at the end. This is particularly pertinent when looking at the gender balance of occupations. Many people returning to or advancing their education require flexibility in their learning environments, and a high number of those returning are women (Fowles-Sweet & Baker, 2018). Although mentoring is widely recognised as a valuable method of learning and New Zealand government policy documents over the last decade have committed to supporting Māori and Pasifika learners, there is little real support in place for learners in apprenticeships (Holland, 2012) and apprentice mentoring is not recognised as a key strategy for improving job retention. Bradley, Newhouse and Mirza (2019) note the importance of working collaboratively to raise the status of apprenticeships and how degree apprenticeships can help create skilled individuals to support national economic growth, as well as improve levels of social mobility.

Integral to traditional Māori society, is the tuakana–teina relationship, where an older or more expert tuakana (brother, sister or cousin) helps and guides a younger or less expert teina (originally a younger sibling or cousin). In a learning environment that recognises the value of ako, the tuakana–teina roles may be reversed at any time (Te Kete Ipurangi, n.d.). It could be that apprenticeship learning, if properly organised according to Māori or Pasifika society, has a greater impact on learning for these under-represented groups in engineering.

THE CURRICULUM DEVELOPMENT PROCESS

As the first degree apprenticeship designed in New Zealand, it was important to follow an approach to curriculum development that had already been refined and tested. The approach chosen was the Trailblazer approach (Powell & Walsh, 2018), pioneered by Manchester Metropolitan University, the largest single provider of degree apprenticeships in the United Kingdom. The development of the appropriate approach was the result of work done by Goodyer and Frater (2015). Essentially, the four elements of the approach used are as follows.

1. *Select a broad industry and a specific occupation within that industry.*

The broad industry that we were working in was engineering and within that we were tasked, by the Tertiary Education Commission of New Zealand, with developing a three year bachelor's degree in Engineering Technology. This is a broad qualification and spans three separate majors that is, Civil, Electrical, and Mechanical Engineering. The value of selecting this qualification was that there is a severe shortage of engineering technologists in New Zealand; low numbers of students are choosing this degree, which is delivered nationally through six institutions, as their career path.

Within this broad qualification are a number of distinct occupations that are linked to degree pathways. For example, a structural engineer is a civil engineer who would have taken a structural engineering pathway in their studies. One particular occupation was not present and was not recognised by the main engineering professional organisation. This was the occupation of infrastructure asset manager, a key engineering professional needed for the maintenance and future planning of the country's infrastructure. After much consultation with industry, this occupation was identified as the specific occupation around which the degree apprenticeship would be designed.

2. *Develop a Degree Standard*

The next phase of the curriculum development was the development of a document that would outline the specific occupation, the level of the qualification as well as list the key behaviours, skills and knowledge someone in that occupation would need. This is called the 'Degree Standard' (DS) and its importance cannot be overemphasized. In order to develop the DS, a group of 35 infrastructure asset managers were interviewed to get their thoughts on the graduate qualities they would look for in a new recruit. These asset managers were all drawn from the membership of the Institute of Public Works Engineering Australasia (IPWEA) and resulted in a memorandum of understanding being signed to secure their support in the development of this degree. After the interviews were transcribed, a comprehensive list of critical behaviours, skills and knowledge was made, fed back to the group, who were then invited to participate in two workshops to develop the definitive standard for the degree. This was then used as the basis for the later curriculum development that took place.

3. *Develop an End Point Assessment Plan*

If the Degree Standard is seen as a comprehensive list of outcomes that must be met for the degree to be awarded, then the End Point Assessment (EPA) Plan is the plan that outlines how those outcomes are to be assessed. Based on the DS, the EPA plan was created through a similar consultative and workshop process until the reference group set up for the degree development agreed and ratified the plan. EPAs are typical in all degree apprenticeships in the UK. In this project, we have decided to adapt the concept of a gateway assessment. In degree apprenticeships in the UK, the gateway assessment is typically a semi-final assessment that must be completed (and achieved) before the apprentice is allowed to sit for the EPA. In our plan, we have used the concept of the gateway assessment to be a mini-EPA plan, to ensure that after each block of project work is completed, all outcomes were assessed. In this way, a student can progress easily from one block of work to another and ensure that when they complete one block of work, all outcomes for that block have been assessed.

4. Constructive alignment of the DS and EPA with the Bachelor of Engineering Technology

The Bachelor of Engineering Technology (BEngTech) is a highly structured degree which is offered and accredited worldwide. In New Zealand, it is offered by six polytechnics and institutes of technology, and it is accredited by Engineering NZ and the New Zealand Qualifications Authority. To align the DS and the EPA with this degree meant that we needed to map each outcome distilled from our engagement with industry to the outcomes that are available within the BEngTech. This was done, and we also mapped a local diploma programme's outcomes as well as the 66 requirements of ISO 55001, the industry standard for asset managers. Once this comprehensive mapping was complete, courses were developed from natural groupings of outcomes that were not represented in the then current BEngTech programme.

Three new courses were developed to complement two existing asset management-focused elective courses as well as three core courses that already existed in the BEngTech. These are shown in Figure 1.

Existing CORE courses that can be adapted for asset managers	Existing Electives that have a specific asset management focus	NEW Asset Management focused courses
Engineering Communication (Level 5)	Risk Management (Level 7)	Introduction to Asset Management (Level 6)
Engineering Management (Level 6)	Resource & Environmental Management (Level 7)	Asset Management Planning (Level 6)
Professional Engineering Practice (Level 7)		Data Analytics & Statistics for Asset Managers (Level 7)

Figure 1. New and existing asset management focused courses. MacKay, James (2019).

Within each of the three majors of this degree (Civil, Electrical, and Mechanical), a pathway with a focus on asset management was created which consisted of the following selection of courses from Figure 1 above:

- ALL the core courses
- BOTH new Level 6 asset management courses
- at least ONE of the three Level 7 courses on offer.

In addition, the synoptic project, which is in the final year of the BEngTech, must have an asset management focus.

DEGREE STRUCTURE

The degree apprenticeship for asset managers, follows the traditional structure of the Bachelor of Engineering Technology, recognised worldwide through the Sydney Accord, with four important modifications:

1. Grouped related courses to be delivered through an industry project that would normally be work that the apprentice was expected to do (see Figure 1 above for courses).

2. Gateway assessments between blocks of work (years of study) to ensure that none of the necessary outcomes of the integrated courses are lost and that the graduate profile is developed and met. The end-point assessment will evaluate the final synoptic project.

3. An asset management pathway within each of the three existing majors. This will require the development of three specialist asset management-focused courses designed to complement the existing asset management courses within the BEngTech.

4. Integration of industry short course micro-credentials into the degree, to enable cross credit of knowledge learned in industry into the degree.

The degree apprenticeship will be offered in all three majors of the degree, civil, mechanical and electrical engineering as all three have need of asset managers. Figure 2 shows the general structure of the degree including gateway and end-point assessments.

After the introduction of the asset management pathway, the second issue that needed to be addressed was how to deliver this degree as part of a work integrated project. To do this, courses were divided and grouped into three different categories.

Year 1		Year 2		Year 3	
3 stand-alone blended courses (45 credits)	First Gateway Assessment	4 stand-alone blended courses (60 credits)	Second Gateway Assessment	2 stand-alone blended courses (30 credits)	End Point Assessment
2 courses partially integrated into the workplace project (30 credits)				1 course partially integrated into the workplace project (15 credits)	
		2 courses partially integrated into the workplace project (30 credits)		5 courses fully integrated into the workplace project (75 credits)	
3 courses fully integrated into the workplace project (45 credits)		2 courses fully integrated into the workplace project (30 credits)			

Figure 2. Structure of the proposed BEngTech
(asset management pathway with apprenticeship mode of delivery).
MacKay, James (2019).

1. Stand-alone blended learning courses

These are offered as a combination of online, day release and block courses. Assessments are identical to those currently stipulated in the programme document, examples of which are Mathematics and Engineering Mechanics.

2. Courses fully integrated into a series of workplace projects that will have an asset management focus

Each assessment within the courses will be drawn and built around a workplace project. These will differ from project to project and therefore from apprentice to apprentice (since different workplaces will offer different projects). However, standardisation of assessment will be ongoing as well as during moderation at the gateway assessment workshops. These courses comprise all courses listed in Figure 1 above, as well as the final year's synoptic project.

3. Courses partially integrated into workplace projects

Some courses cannot realistically be fully integrated into a workplace project and so while some of the assessments are drawn from project work, other parts of the course might need to be taught and assessed as stipulated in the programme document. An example would be Engineering Computing, where learning the software of the industry will be done through a series of workplace projects but learning to code might need to be taught and assessed more traditionally.

INTEGRATION OF INDUSTRY MICRO-CREDENTIALS INTO THE DEGREE PROGRAMME

Embedded into the asset management courses in the BEngTech degree are industry micro-credentials. These are units of knowledge that can be done online for short certificates. In the degree context, they are used to provide the basic knowledge that can be built on to develop higher order skills (in terms of Bloom's Taxonomy) so that the courses will be set at the required cognitive level for degree study. This is illustrated in Figure 3.
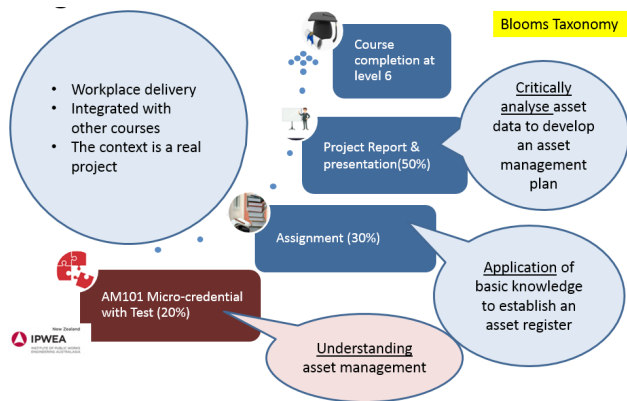
Figure 3. Integration of industry micro-credentials MacKay, James (2019).

MANAGEMENT OF THE DELIVERY OF THE DEGREE

Management of the delivery of the work integrated component of the degree will be effected through the creation of industry hubs. These hubs are agreed groupings of industry partners who are all concerned with the improvement of infrastructure asset management in a particular region and who together will provide a holistic experience for the apprentices.

The partnership between the asset owners, contractors and consultants within the industry is key to the way in which this degree will work. This relationship is shown in Figure 4. The opportunity for apprentices to gain experience in the three different environments will benefit both the apprentice and the employer.
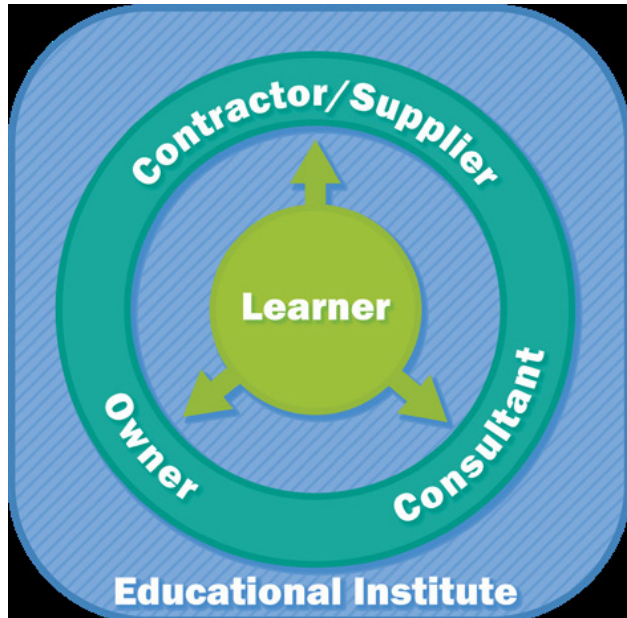
Figure 4. The hub model Richard Nyhof, (2018).

BENEFITS OF THE DEGREE APPRENTICESHIP IN ASSET MANAGEMENT TO NEW ZEALAND

We have identified six benefits of the degree apprenticeship pathway.

1. *A new BEngTech Major and delivery pathway*

One of the key outcomes of this project has been the production of a new pathway in asset management to be delivered in each of the existing Civil, Mechanical, and Electrical majors of the BEngTech. This will address the major shortages in asset managers in New Zealand.

2. *Industry Engagement*

From its inception, the curriculum development in this project has been employer-led. A strong and committed employer reference group has been formed, and through engagement with the curriculum we hope to bring polytechnics and industry closer together. As the project continues into the implementation phase, industry expertise will be integrated into the curriculum through the use of industry developed micro-credentials as well as drawing on key industry people to provide the degree training for the apprentices.

3. *Improved Enrolments/Completion Rates in Polytechnics*

Despite a growing need for engineering technologists in New Zealand, current BEngTech enrolments are declining across the country even though the qualification is still on NZ Immigration's critical skills list. We hope that the apprenticeship nature of the degree will attract more enrolments.

4. *Increased Social Mobility for Poorer Students*

Research in the United Kingdom (Clarke, 2018) indicates that the introduction of degree apprenticeships has had a positive impact on social mobility allowing for many students who typically do not have the opportunity to go to university. We hope that this will be one positive social impact of this degree.

5. *Improved Participation amongst Māori and Pasifika Students*

In line with the evidence showing the increase in social mobility in the UK discussed above, it is intended that this model of degree delivery can be used to target and improve outcomes for Māori and Pasifika students.

6. *Improved Participation by Women*

The participation of women in engineering is an issue worldwide. Here in New Zealand, less than 10 percent of typical enrolments in polytechnic engineering degrees are women. There is a better participation rate for engineering study at university, but it is still well below 50 percent. Recent work however suggests that degree apprenticeships in male-dominated professions such as information technology have significantly higher female enrolments than their full-time taught counterparts (Clarke, 2018).

ACKNOWLEDGEMENTS

Dr James Mackay teaches physics in the School of Engineering at WelTec. He has worked in the field of science and technology education for 30 years and has background in teacher training and physics education research. More recently he has shifted focus to vocational education and training. His current research interests include language use in the trades, the development of visual literacy, maths anxiety amongst trades students, and the use of analogies in explaining ideas in physics. He is currently the project leader of a Tertiary Education Commission project to develop the first degree apprenticeship in New Zealand.

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SOFT SKILLS FOR HARD TIMES

Sean Bell

ABSTRACT

Digitalisation has brought significant change to the labour market and provoked considerable anxiety about job security. Paradoxically though, now that the world of work is more technology enabled and data driven, the need for a human touch is more important than ever before. The provision of greater choice, flexibility and transparency for consumers puts a premium on communication skills, empathy and social intelligence. Soft skills are now at the forefront of adult education and are the core focus in language, academic and vocational settings. This can be seen in the recognition of cultural competency as an asset in the global workplace, and the embedding of learner capabilities in courses to ensure that graduates have the transferrable skills that employers need.

Drawing on my experience as an adult educator/facilitator in Italy and New Zealand and across three professions (insurance, law and tertiary education), this paper argues that prioritising soft skills necessitates a move to experiential, learner-centred delivery, in order for education to be truly effective in producing the requisite mind-set change for the workforce of the future.

INTRODUCTION

The theme and circumstance of the 7th Sino-New Zealand Vocational Education and Training Model Programme Symposium presents an interesting opportunity to reflect on the role of technology in our lives and what we prioritise when educating the workforce for the future. Certainly, technology played a significant role in bringing an international quorum of educators together, yet it will be the human interaction - the conversations had, the ideas shared and relationships forged - that endures past the conference itself.

The increase in automation and digitalisation present both opportunities and challenges to the labour market, and the education sector must respond accordingly. Now that technology is transforming an ever-expanding number of industries and professions, the key to employability is developing uniquely human cognitive capabilities. Claims that these are hard times and that the world is getting worse are persistent, although they are often formed by cultural/geopolitical bias rather than accurate data. The late Hans Rosling (Rosling, Rosling, & Rosling Rönnlund, 2018) argued that this "negativity instinct" threatens a shared, fact-based understanding of the world, which is essential to address the global challenges of financial stability, peace and sustainability (p. 61). There have always been cycles of terrifying, accelerated change – industrialisation, automation and now digitalisation – that have called on education to ease society through the transformation. Vocational education must embrace the opportunities presented by digitalisation and empower our learners to take advantage of them. Cohen (2018) notes digitalisation is about customer-centric paradigms while Arruda (2019) states that the rise of artificial intelligence offers an unprecedented opportunity to utilise our most underused asset – being human. Walsh (2018) urges learners to consider how cultural competency is key to future workplace success.

Research conducted in Europe and North America and published recently by the British Psychological Society (Reynolds, 2019) found that people view losing their jobs to robots as less threatening to their identity than losing them to a human competitor. This has two important implications for the symposium's theme:

1.   people see their work lives in a social context, and

2.   the retraining of the workforce should focus on building skills.

We need to teach people to be resilient as well as to give them the skills to be able to move on. Experiential learning ensures that those skills are developed in context.

The challenge facing governments worldwide is the same – getting people, especially young people, into work. The challenge facing vocational and tertiary educators is how we best serve people whose working lives will be defined by continuous technological change. How do we serve the ever-increasing number of learners, old and young, employees, business owners and gig workers, who now, thanks to technology, are on a continuous loop of learning and skills development? To answer these questions demands that we consider the 'how' as well as the 'what'.

THE EXPERIENTIAL CYCLE

Never before has Kolb's statement that "Learning is the process whereby knowledge is created through the transformation of experience," had such immediacy (Kolb, 1984, p. 38). Human beings learn by experience; it is the advantage we hold over machines and the reason why we remain an integral part of the digital revolution.

Experiential learning is a process – a cycle that goes beyond the timeframe of the lesson, course or degree and beyond the walls of the classroom. At a basic level, it is about giving learners experiences, but it is only when we guide them to reflect on those experiences and experiment in new contexts that the learning takes place. This is often not fully understood or implemented, even by the practitioners espousing the virtues of Kolb's experiential cycle. Project work and field trips on their own do not lead to insight and application, no matter how much the students enjoy those events (Wiggins, 2019).

Teacher trainers, therefore, should lead by example and encourage experiential learning in their students by embracing their own experiential learning journeys. Experiential learning has been the basis of my most profound learning, and to be honest, it is the reason why I hold the position that I do. This is where I need to stop quoting educational theory and start to practise what I preach. Soft skills are key to educating the workforce of the future. Experiential learning is the optimum delivery method for developing those skills and I now offer my own experiential cycle as evidence.

CONCRETE EXPERIENCE

The power of the jumping-off point, the concrete experience, can never be underestimated; the more intense the experience, the more memorable the learning. My experience begins in Italy, so it is also critical to my sense of self as a person as well as an educator (Adam, Obodaru, Lu, Maddux, & Galinsky, 2018). Forced into direct experience, I was, as Crichton (2014) has observed, hyper-conscious of who was having the experience.

When I taught at the Libera Università Internazionale degli Studi Sociali "Guido Carli" (LUISS) in Rome, I saw the anxiety and stress produced by a job market besieged by massive youth unemployment and the disillusionment that came from studying for degrees in traditional professions where there was an over-abundance of graduates

and increasingly fewer positions. As an adult educator in the private sector, my learners were coping with the changes brought about by digitalisation to professions such as insurance, law and journalism, while other learners in industries such as the fitness sector were embracing the opportunities offered by burgeoning global networks. I saw how professions began to morph. Lower entry filing and researching jobs disappeared from law firms, but digitalisation also removed time consuming hearing processes, freeing up practitioners to spend more time talking, and listening, to their clients, in many cases exploring Europe-wide or international business opportunities. Once the initial fear that 'insuretech' companies would replace brokers with data analysts subsided, insurance providers and lobby groups realised that there was a growing need for more personalised one-to-one consultation. 'People' skills were now in demand. At the Italian National School of Public Administration (Scuola Nazionale dell'Amministrazione - SNA) where I taught state attorneys, translators, economists, diplomats and state officials, a soft skills course which encompassed presentation skills, communication skills, hospitality and cultural competency, was the most popular in the institution.

My experience in Italy also taught me the effectiveness of the experiential cycle in the learning opportunities I provided. Most of my teaching was sold under the umbrella of language learning. English teachers abroad are often ghettoised but the fact remains that communicative language teaching has experiential learning running through its veins. Context, motivation and engagement are established, learners have an experience usually by interacting with each other or a text. They then reflect on what they did/read/listened to/saw and its meaning, before they identify the abstract (the vocabulary or structural features) and experiment with those words and phrases in another context, thus making the language (that is, the learning) their own. At SNA, the task-based, active learning workshops in law and economics provided by the English Department were more successful in terms of attendance, feedback and skills development than the courses delivered using traditional didactic methods.

English teaching itself also transformed during my time in Italy. An increased international focus across all fields meant that learners demanded not just the language but also the communication skills that would allow them to build international relationships.

REFLECTIVE OBSERVATION

From SNA, to the European Commission, to the LUISS, or Athlos gyms, what my learners were responding to was active, learner-centred, experiential learning - the importance of the 'how' not just the 'what'. Skills development was just as important as content and although I was contractually a language teacher, what my learners needed was a coach who provided new challenges and experiences in a relevant work-based context. We threw away the textbooks and the homework and co-created something meaningful, manageable and engaging because it related to what they did every-day in their workspace, which was, in many instances, where I taught them. Course content became collaborative skills development and the goal of every lesson was to make the learning their own.

ABSTRACT CONCEPTUALISATION

Returning to my native New Zealand, I was impressed by the innovation in learning and teaching I saw at Otago Polytechnic and their commitment to creating work-ready graduates and lifelong learners. As part of Otago Polytechnic's Learning and Teaching Development team, I have had the opportunity to apply my experience to a wide range of vocational teacher training and to articulate this experience through a teaching philosophy.

Aoun's learning model of "Humanics" (2017), provided me with a blueprint for twenty-first century, cross-disciplinary teacher training that chimed with my own experience. Designed specifically to "robot-proof" the workforce, Aoun's model of learning underlines the importance of three principles:

1. Focus on what is uniquely human – creativity, adaptability and mental flexibility, our ability to think across disciplines, and our belief in and passion for the non-logical such as stories, myths art, religion or the pop oeuvre of Taylor Swift (2017, p. 16).

2. Prioritise lifelong learning – machines will forever be improving requiring employees to forever be adapting (2017, p. 18).

3. Prioritise research – the creation of new knowledge and collaborating with industry is essential to predicting where new jobs will come from and to train people for them (2017, p. 22).

Aoun's thesis is that twenty-first century education must focus on not only studying a new body of knowledge but also developing a new way of thinking (2017, p. 53). Aoun describes this new knowledge as three literacies: technological (for example coding, mathematics, engineering), data, and human. Human literacies are applicable to all disciplines and are often discussed in terms of soft skills or learner capabilities including:

• how we deal with people

• how we communicate and engage with others and motivate them

• how we work in teams

• how we use elements of the fine, liberal and performing arts in order to foster creativity

• understanding the importance of diversity

• considering ethical quandaries posed by thinking machines such as what we programme them to weigh up and decide.

To forge a new robot-proof way of thinking, Aoun (2017) prioritises four cognitive capacities that learners must develop:

• Critical thinking: The ability to challenge assumptions and adding contextual analysis to the vast data analysis now available (p. 62).

• Systems thinking: Seeing the bigger picture and drawing from data from across disciplines (as I did in Italy). This is an essential step in the development of future leaders and original thinkers (p. 64).

• Entrepreneurship: Entrepreneurs will create the jobs of the future. Whether launching a start-up, evolving an established business or initiating a not for profit venture tackling wider societal and global challenges (p. 66).

• Cultural agility: The ability to perform successfully in cross-cultural settings is essential in our globalised world but also increasingly so in our own communities and institutions. The latest New Zealand census found that 27 percent of the country's population were born outside the country, with almost every nation in the world represented (Stats NZ, n.d.). As I discovered in Italy, this is not just about language. Nuance and cultural awareness that go beyond mere translation are crucial for managing global or multi-cultural teams and problem solving across borders.

When combined with the data from research into employer priorities regarding learner capabilities (Otago Polytechnic, 2019), Aoun's model provides a useful taxonomy for the discussion of soft skills – cognitive capabilities circling around an axis created by empathy and creativity (Figure 1).

Figure 1. A Taxonomy of Soft Skills. Bell, Sean 2019.

ACTIVE EXPERIMENTATION

The importance of soft skills to prepare the workforce of the future is irrefutable. Research from Education New Zealand (2019) further highlighted that employers seek workplace-related soft skills when hiring international graduates. Many institutions acknowledge this need and have responded by embedding soft skills across their curricula. However, skills sitting in a curriculum will not create a robot-proof workforce if they are not delivered through an experiential learning model. A critical thinker requires context and an entrepreneur's journey needs to be lived and felt. As I witnessed in Italy, experiential learning now fills the gap once provided by low-level first jobs. The jobs, like the humble law clerk, now performed by algorithms and machines not experience-hungry graduates who need the workplace context.

Just as soft skills are embedded into courses and programmes, experiential learning needs to be embedded in how we teach and especially in the way we teach teachers. It means we need to be bold and experiment with this new knowledge and interrogate what work-based, experiential learning looks like for a vocational teacher on a teacher-training course. At Otago Polytechnic, our response has been to revise our Graduate Diploma of Tertiary Education to include the following:

- learning objectives that are in, for and through work

- flexible pathways including micro-credentialing and the recognition of prior experiential learning to assist time poor professionals

- a delivery method that works alongside teachers in their teaching environment, focussing on collaboration, facilitation and problem solving and aligned to practical assessments that test the application of core concepts

- international reach to meet the needs of our globalised sector through teacher training exchanges, in New Zealand, China and other territories and online, creating a truly global community of practice.

CONCLUSION

Rosling's plea (Rosling et al., 2018) for a shared, fact-based understanding of the world is key to educating the workforce for the future. The creation of a truly experiential learning experience, that produces the lifelong learners needed by the global economy, will benefit enormously from research and co-operation. Research is intellectual entrepreneurship which teaches critical and systems thinking, and unleashes creativity. Soft skills embedded in curricula will be brought to life through collaborative projects. If these projects are designed on a global scale, they will also offer opportunities to develop cultural competency, which begins with a recognition of the influence of your own culture on your work, life and learning.

Experience is the greatest teacher. By sharing my own experiential learning, I hope I have conveyed its importance to my lifelong learning, and have prompted reflection on what experience has taught you. Being a protagonist in your own (learning) story will guide you when you give your learners the confidence to do the same.

Sean Bell is a Learning and Teaching Specialist at Otago Polytechnic. Before joining the Learning & Teaching Development team at Otago Polytechnic in his native New Zealand in 2018, he enjoyed a varied career as a teacher, teacher trainer and facilitator in Europe. The institutions at which he has provided training include the European Commission, LUISS, British Council and National Public Administration School (SNA) in Rome, and London Metropolitan University and Central St Martins (University of the Arts) in London. His passion for teaching is further informed by graduate and post-graduate qualifications and professional experience in Law, Forensic Linguistics and the Arts.

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EMBEDDING SOFT SKILLS IN
LEARNER-CENTRED ENVIRONMENTS

Dr. Tracey Carlyon & Amy Opperman

ABSTRACT

Vocational education institutes play an integral role to ensure the workforce are educated for the future. This requires that graduates are 'work-ready' and have the necessary qualifications and skills to make a productive contribution to industry. While a vocational qualification requires the development of hard skills, it has become increasingly evident that soft skills are equally important to enhance graduates' employability. The Waikato Institute of Technology (Wintec) recognises the importance of these skills and is committed to ensuring students have opportunities to develop within learner centred environments. This paper reports on five case studies, from a wide range of disciplines within Wintec, to learn more about how tutors approach the development of students' soft skills. Aligned with Wintec's *Ako: Teaching and Learning Directions*, the tutors all demonstrated learner-centred approaches including encouraging students to take responsibility for, and reflecting on, their own learning. This practice of embedding soft skills alongside hard skills development is supporting Wintec students' future employability.

INTRODUCTION

Vocational education institutes play an integral role to ensure the workforce are educated for the future. This requires that graduates are 'work ready' and have the necessary qualifications and skills to make a productive contribution to industry. While a vocational qualification requires the development of hard skills, such as how to use an industry-standard tool or machine, it has become increasingly evident that soft skills including communication, social, higher-order thinking, self-control and positive self-concept are equally important to enhance graduates' employability (Lippman, Ryberg, Carney, & Moore, 2015). Research literature indicates that tutors need to provide opportunities for students to develop their soft skills by embedding them within the core curricula delivery (Fraser, Duignan, Stewart, & Rodrigues, 2019). Additionally, some tutors make explicit links to soft skills which relate to employability for their students so they can recognise and adopt those skills (Green & Blaszczynski, 2012).

This paper reports on findings from recent research using case study methodology to learn more about how Wintec tutors approach the development of students' soft skills within their teaching of the curricula. The research was informed by our roles as Teaching and Learning Coaches at Wintec which involves working with tutors and industry partners from a range of disciplines. This work led us to consider how Wintec prepares graduates to be work-ready and develop the necessary soft skills to make a productive contribution to industry. As an institute, Wintec recognises the importance of soft skills and, through its strategic goals, shows a commitment to ensuring graduates are highly sought after by employers (Wintec, n.d.(b)). While this is also evident in the Ako: Teaching and Learning Directions framework (Wintec, n.d.(a)) which advocates learner-centred approaches and a focus on the development of specific skills, we were interested in gaining a much better understanding of *how* this currently occurs.

Five highly effective practitioners from across Wintec's vocational education programmes were invited to participate in semi-structured interviews in August 2019. The tutors were from the following disciplines: information technology, culinary arts, media arts, nursing and early childhood education. To protect their identities, we have used the following pseudonyms: Mary, Carl, Sally, Leeanne, and Kirstin. During each interview, extensive field notes were taken which were later analysed for common words and themes. The research was based around the following two research questions:

1. What do tutors consider to be important soft skills for their students to develop in order to be work-ready?

2. What are the different ways tutors embed opportunities for their students to develop these soft skills?

FINDINGS FROM CASE STUDIES

In the next section, findings from each of the five interviews are presented.

Case study 1: Information technology – Mary

It was initially assumed that it would not be easy to embed soft skills into information technology due to the high technical demand of this discipline. Yet Mary provided examples which demonstrated she was adept at embedding opportunities for her students to develop soft skills. By sharing stories such as how missing class can lead to failing an assessment, students were able to understand the importance of taking responsibility for their own actions. Through storytelling, Mary was able to highlight the consequences of these actions and provide impact for her students to consider how their choices could in fact impact on their learning.

Humour was also used by Mary, which was particularly effective with her students who were predominantly male between the ages of 18 – 24. Using humour as a strategy to develop soft skills, such as punctuality and problem solving, helped her to build solid and trusting relationships with her students. Mary's genuine commitment to her students' success was evident as she provided extra classes and kept in touch with her students through emails and phone calls when she had concerns.

Case study 2: Culinary arts – Carl

Carl also used storytelling and humour to embed and teach soft skills in his discipline of culinary arts. Additionally, he regularly drew on teachable moments and role modelled soft skills, such as working well with others and being punctual, which are both crucial in the culinary arts industry. He explained that teachable moments such as students not cleaning up or taking responsibility for their own actions would often occur in his class. Taking advantage of these teachable moments was important therefore Carl would stop the class and draw attention to what was occurring and the implications these would have in the industry. The implications often related to health and safety, time management, team moral, stress and conflict resolution.

Carl went on to explain to the students how he expected them, as they would be in the industry, to step up and get the job done. He was explicit about embedding reflective writing activities that included how to write fair self and peer assessments. This deliberately connected vocational learning and soft skills development to industry expectations and thus prepared his students to be work-ready.

Case study 3: Media arts – Sally

Sally was highly aware of the need to embed soft skills. She explained the shift that had occurred in the media arts industry whereby employees were currently seeking graduates with soft skills and as such were willing to teach hard skills on the job. As a result, Sally's teaching and class activities were targeted and specifically drew attention

to industry requirements. She supported her students to study job advertisements, write cover letters, develop resumes, understand how to present themselves in a positive light, and articulate what they could offer an employer.

She was deliberate in her approach to embed soft skills such as punctuality by starting class on time with a fun activity or ice-breaker. As such, her students did not want to miss out and, by default, formed a routine of being on time to class. Another activity Sally used to embed soft skills was teaching reflective writing skills and she supported her students to write short reflections focusing on their communication, teamwork and empathy when working with others. Role modelling soft skills, with an emphasis on respect and empathy, was important to Sally. She always took a thoughtful approach when engaging with her students and was respectful towards them, particularly when addressing any concerns. These and other examples demonstrated the respectful, yet strategic approach Sally took to ensure her students developed an awareness and understanding of the soft skills they required in the media arts industry.

Case study 4: Nursing – Leeanne

Leeanne preferred not to use the term soft skills as she was concerned it could be interpreted as having less value than hard skills. Instead, she preferred *relationality* as a term that was better aligned to nursing. As Leeanne explained, relationality is developed through nurses sharing personal space and information with others and it can be known as the *ethical phase*. Furthermore, nurses are required to have high levels of self-awareness, be able to work together, communicate effectively and know how to respect others. She believes role modelling relationality is an essential part of teaching nursing and, like the other tutors, she takes care to get to know her students, takes a genuine interest in them and shows respect. Additionally, she models positive communication skills, including not talking over others, and takes particular care with wording emails and electronic messages.

She explained how she encouraged her students to unpack and discuss their values and cultural influences and described this as their *ways of being*. In doing this, her students were able to develop greater self-awareness and learn how to become critically reflective – both skills that are fundamental to nursing. Leeanne supported her students to write self-reflections using a framework that was adapted specifically for nursing. These, and other activities were designed to show her students how to build respect, work together effectively and communicate positively.

Case study 5: Early childhood education – Kirsten

Like Leeanne, Kirsten did not use the term soft skills preferring *dispositions* as it encapsulates the attitudes and attributes that could be learnt. She explained that dispositions, of both teachers and children, were considered a lot in early childhood education and are an integral part of Te Whaariki Early Childhood curricula. She talked about the importance of punctuality and, as with nursing, her early childhood students were expected to develop the skill of critical reflection. Kirsten makes explicit links to being on time when working in early childhood education centres and explains how this impacts others, including young children, parents and colleagues.

Further opportunities are provided in field-based practice for students to develop dispositions such as relationship building and using initiative which are both soft skills required for early childhood education. Within the programme, students are required to work two days each week in a centre of their choice to learn how to integrate theory and practice. Kirsten provides opportunities for her students to write reflections about their experiences and engage in class discussions so they can share examples of best practice and develop resilience by giving and receiving feedback. She explained how she takes care to ensure her classes are interpersonal and encourages discussion about responsive reciprocal relationships and what these may look like in different centres between different people.

DISCUSSION

Findings from the five case studies showed that all the tutors believed it was essential their students have opportunities to develop their soft skills in order to be work ready. While two tutors preferred relationality and dispositions to the term soft skills, the types of skills they identified as being important for students to develop were similar. These skills could be encompassed within *professionalism, teamwork* and *communication. Punctuality* and *engaging in critical reflection* about their work and actions, were specifically identified by all tutors as being essential skills for students to develop for employability.

The five case studies illustrate there are a variety of ways that tutors can explicitly embed opportunities for their students to develop soft skills. These are illustrated in Figure 1 below which shows that central to, and aligned with, this embedding is learner-centred environments.
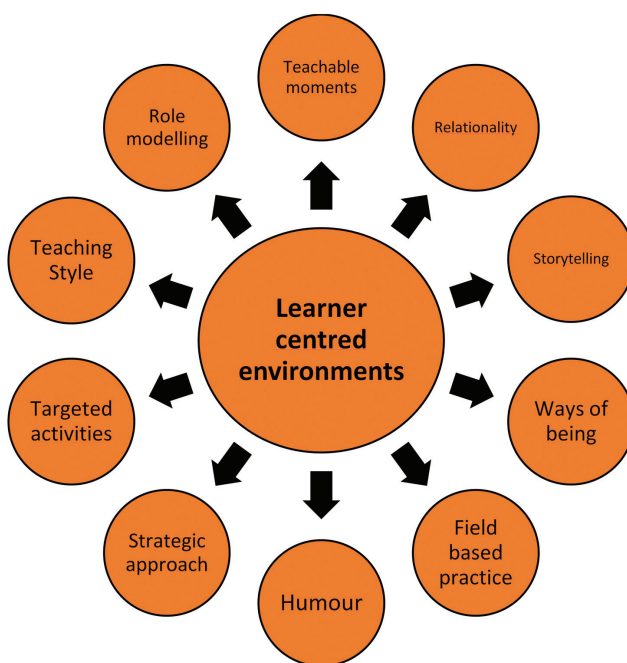
Figure 1. How tutors embed opportunities for the development of soft skills. Carlyon, T. and Opperman, A. 2019.

CONCLUSION

In seeking answers to the two overarching research questions, we have gained a better understanding of the soft skills tutors consider important and the range of ways they embed opportunities for students to develop these skills. Findings from the research reported on in this paper align with previous literature (Fraser et al., 2019; Green & Blaszczynski, 2012) which suggests soft skills can be successfully and deliberately embedded into curricula. Tutors across a range of disciplines engage in creative and varied approaches to ensure their students have opportunities to develop the soft skills required by their industries. Furthermore, findings confirm that while at times the links are implied, tutors frequently make these explicit for their students in order to illustrate the importance of soft skills that relate to employability.

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Amy Opperman is a Teaching & Learning Coach at Wintec. In this role, she provides support for tutors across Wintec around their practice, pedagogy and professional learning. Amy is a qualified chef, who travelled abroad for many years working in leadership roles in this field before joining Wintec's hospitality team as a chef tutor. Following this, she was seconded to the role of product development coach which involved working with project team members across Wintec to ensure programmes were developed with the right elements incorporated into content, teaching and assessment. Amy recently gained her Graduate Diploma in Information Technology for Education, and is now pursuing further study in educational leadership.

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DEVELOPING SOFT SKILLS IN PROJECT–BASED ENGINEERING LABORATORIES – A CASE STUDY

Avinda Weerakoon & Nathan Dunbar

ABSTRACT

Joint collaborative programmes in tertiary education between international institutes are becoming more accepted as globally relevant education experiences. Otago Polytechnic is developing joint collaborative programmes in engineering with like-minded institutes in Asia. Project-based learning has been recognised as providing the platform to embed essential graduate attributes and skills into an engineering programme. The motivation to pursue this methodology when developing engineering course curricula is to provide the graduates with required skills to manage problems, not previously encountered, early in their work life; and to help employers establish the suitability of the graduate's attributes to the required role. Our experiential teaching model implemented for collaborative joint tertiary level programmes focuses on combining a project-based learning environment that develops engineering problem-solving skills with language and cultural communication skills. The integration of English language and communication skills into these projects ensures learners have practical experience with language and culture in an engineering environment. We describe two project-based laboratory experiments that were developed for groups of 45 and 80 mechanical engineering students respectively. Through developing more project-based and team-centred laboratories for larger classes, we discovered there is potential to integrate technical knowledge and logical problem-solving techniques with important aspects of group culture and language learning.

INTRODUCTION

Engineering is a global profession, and workplaces and workplace interaction are increasingly becoming multicultural (Varner & Beamer, 2011). However, it is commonly accepted that communication problems can be exacerbated when people interact with people with a different set of beliefs and values (Liu, Volčič, & Gallois, 2019). It is vital, therefore, that engineering education develops methods that can help increase the communication and cultural awareness of both staff and learners, and improve their ability to deal with multicultural environments in the future workplace.

Project-based learning is a method of teaching and learning that emphasizes what learners can *do* after training (Shamel, Chung, Padmesh, & Al-Obaidi, 2010). Project-based learning helps to ensure both technical and 'soft' attributes such as communication and teamwork are embedded in any programme of learning. While project-based learning (or similar experiential models) is well-established in New Zealand technical and vocational institutions, engineering education at university in China has, until recently at least, remained more theoretical and classroom-based (Weerakoon & Dunbar, 2018).

The establishment of a joint engineering technology degree with Dalian Ocean University offered us an opportunity to introduce our project-based learning model to Chinese learners. In this programme, the initial three years of study are delivered in China, culminating in a final year of project-based study in New Zealand. This programme offered us an opportunity to observe the development of intercultural and language skills in an engineering context. We soon discovered that it also presented us with challenges and opportunities to develop our own 'soft' teaching skills in an intercultural environment where English was the medium of instruction.

In planning our courses, we were conscious of cultural and logistical challenges that were likely to arise when adapting the project-based learning model to a new environment. In this paper, we highlight some of the steps we took and issues we faced in integrating language and cultural skills into an engineering programme in a Chinese university environment.

INITIAL PLANNING

Some Cultural Considerations

Value Orientations and Behaviour

Hofstede's seminal study of work-related attitudes across cultures (most recently updated in Hofstede (2001)) identified several consistent cultural dimensions that influence work (and study) behaviours. Among these, it is noteworthy that there are significant differences between New Zealand and China in terms of the *individualism-collectivism* and *power distance* dimensions, and that these may have important consequences for introducing project-based learning.

Individualism-collectivism describes the relationship between an individual and the groups to which the individual belongs. This dimension could be particularly important in determining the way that individuals interact within the groups or teams that are an integral part of project-based learning. While New Zealanders tend to rank highly on individualism, China ranks more towards the collectivist end of the spectrum.

Power distance refers to the tolerance of perceived inequality in power distribution. New Zealand is characterised as a low power distance culture, while China ranks more towards the high power distance end of the spectrum. Again, such differences could potentially affect the way groups function in project-based activities. It could also create challenges for teaching staff when adopting a more learner-centred facilitative role in the lessons.

Group and team relations

Related to differing orientations and behaviour is the way group relationships are formed and maintained. Liu et al. (2019) for example, state that in hierarchical cultures in East Asia, relationship development is more formal, and often relies on third parties, while in more horizontal cultures (such as New Zealand) interactions are more informal and may be initiated directly. Davis (2001) suggests that teams in individualist cultures tend to be more goal-oriented (that is, it is a common goal that will hold the group or team together), whereas in collectivist cultures more emphasis will be placed on forming personal bonds with the members of the team, and only after the team relationships are sorted will the team focus on a joint goal.

Language Factors

English was determined as the language of instruction throughout the joint programme delivery, but it was clear from the outset that the English language level of many of the students was going to be a significant challenge.

Teaching assistants were available to provide translations / interpret as necessary. Students also had separate English language classes provided by the Chinese institute based on the Chinese College English curriculum. This curriculum, however, does not provide specific engineering-related support. We believed that, as far as possible, engineering classes and laboratories in particular needed to provide opportunities for students to build confidence in using English for engineering communication purposes. Therefore, we planned to embed some language development tasks into our project-based approach.

Logistical Factors

In New Zealand vocational institutions, class sizes are generally relatively small and easily manageable, and our institutions are relatively well-equipped. We were aware, however, that at Dalian Ocean University we would face much larger class numbers, and a lack of facilities for student-centred laboratory experiences. Study was traditionally focussed on strengthening work on fundamental theory, and laboratories were often 'observation' based, where students had little or no 'hands-on' experiential learning. The sourcing of materials was likely to be a challenge, and we needed laboratories that could function with a minimum level of technical assistance and equipment.

DEVELOPING PROJECT-BASED LABORATORIES

With the above issues in mind, in 2018 we planned two pilot laboratories based on a CDIO (conceive-design-implement-operate) model: one for a strain gauge laboratory for a Strengths of Materials course, and one for a solar hot water heater for a Thermodynamics and Heat Transfer course. The former was designed for a class of 45 students, and the latter for a class of up to 80 students.

The following figures summarise the process of implementation of these two laboratories. For a more detailed description, refer to Weerakoon and Dunbar (2019).

Figure 1. Strength of material laboratory. Source: Avinda Weerakoon.

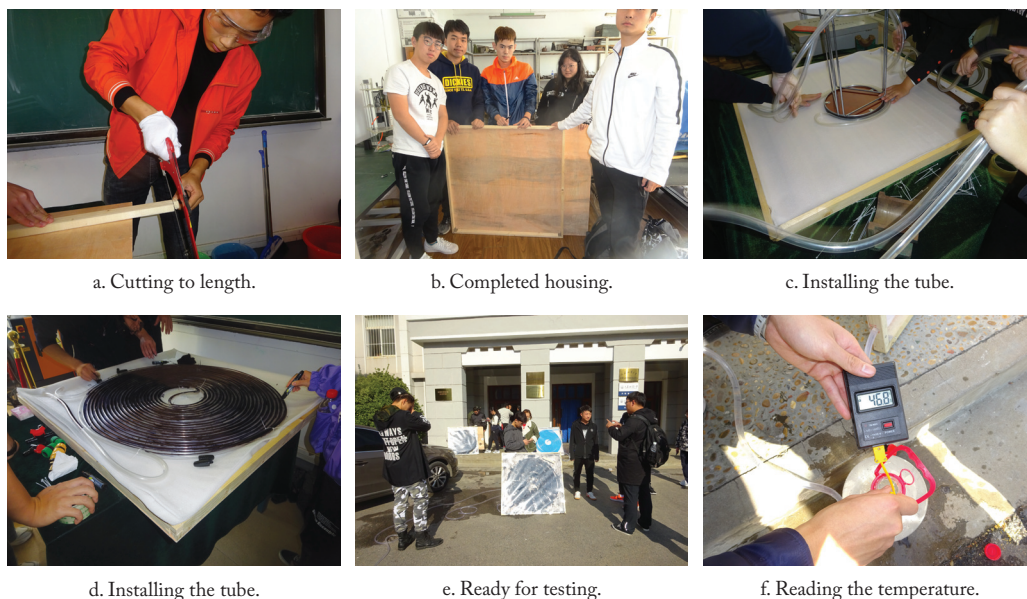| a. Cutting to length. | b. Completed housing. | c. Installing the tube. |
| d. Installing the tube. | e. Ready for testing. | f. Reading the temperature. |

Figure 2. Constructing the solar hot water system. Source: Avinda Weerakoon.

In the strain gauge laboratory session, students were divided into six teams and had to perform all laboratory tasks independent of other teams. In the solar hot water system laboratory, there were 80 students split among two classes, with only one lecturer and limited resources. We needed to develop a manageable process in which all students were involved in each stage of the process, but one that could be monitored for learning outcomes by one lecturer (with the help of a local teaching assistant). The approach we took was to first divide the students into 10 teams, five teams in each class. One team from each class was then paired (to make five larger "project groups") to conceive, design and construct the solar hot water panel. As the two teams that made up each project group came from different classes, they conceived a common final design solution for the solar hot water panel during self-directed learning outside classroom hours. During the construction phase, the first team would hand over the construction responsibility to the second team at the end of each 90 minute laboratory session. When the panel was completed and ready for testing, the project groups were split into the original teams and testing of the panel was carried out outdoors by each team separately. Using this process added complexity with respect to interpersonal relations, negotiating a common goal, responsibilities and time management, as well as team communication when handing over the construction.

RESULTS

Initially we had been concerned about the effectiveness of teamwork given the lack of exposure to group learning among Chinese students. In collectivist cultures, this team 'bonding' can take longer than in individualist cultures, because team unity is based on relationships more than goals (Davis, 2001). However, we found that teams generally functioned more smoothly than we had expected. One reason for this may be because these laboratories were introduced at second year level, where students were already familiar with each other and had already established relationships.

The implementation of project groups, in which two teams from separate classes were combined to work on a single project, proved to be particularly insightful because we were able to identify opportunities to build in communicative attributes through the exchange of information at handover time. At first, students struggled with this handover, and this caused some mistakes in construction due to miscommunication. This offered us the opportunity to reflect together with students on the importance of describing the development of a project and giving instructions and accurate steps carefully. One way, that we believe may be effective in future, is to show students how to develop checklists that they could use to ensure that all relevant information has been transferred accurately.

Feedback from evaluative interviews and focus group discussions with the students was overwhelmingly positive (Weerakoon & Dunbar, 2019). Students reported feeling more motivated because they were *actively involved* in the laboratories and were keen to have more laboratories in future. They felt that they benefited from the opportunity to communicate in realistic team-based scenarios. They enjoyed the opportunity to try ideas in the design and construction phases and felt that they could understand the fundamental ideas more deeply after completing the projects.

From a teaching point of view, we were also happily surprised that the students accepted the lecturer adopting a more facilitative role during the laboratories. Initially, students were inclined to look to the teacher to provide solutions and explicit instruction on how to complete the laboratory, but they soon realised that these were not going to be forthcoming, and settled in to the task of developing solutions themselves.

We did notice a tendency for students from different teams and groups to share information, and needed to ensure that teams focussed on developing their own ideas, rather than following innovations from other groups. However, we were happy that once they had decided the design, teams stuck to these during construction and each team had a unique outcome. Students reported being motivated by the semi-competitive nature of the laboratories, and were proud of their successes.

LANGUAGE LEARNING OPPORTUNITIES

Currently, English language outcomes are not measured directly in the engineering courses of this programme (although this is set to change in future). However, we have observed that without increased opportunity to use language in a context-rich environment, language improvement is likely to be severely limited (Weerakoon & Dunbar, 2019). Our observations of the laboratories, and feedback from students and local teaching assistants have confirmed for us that in an English as a Foreign Language (EFL) context, students need to be offered increased opportunities to use the (English) second language in context.

In the strain gauge laboratory, we introduced the concept of laboratory report writing, ensuring that students were guided through the necessary language and genre for writing a simple laboratory report. In this laboratory, the structure of the report was provided for students, and they only needed to fill in the details for each section, and complete the calculations. In the solar water heater laboratory, students wrote a simple report outlining their experience with the project. From our experience of these two laboratories, we believe there is ample opportunity to build in further English language opportunities into these projects, and to add language assessment tasks to these as appropriate.

Students in this programme have College English language classes, and are offered optional extra International English Language Testing System (IELTS) preparation classes in the evenings. However, we believe that embedding language and communication skills into engineering laboratories has several benefits. Firstly, there is a chance for students to speak and pronounce technical words that may never be encountered in the more generic English language courses. Further, students have a range of props and techniques (drawings or tools for example)

that can help them put language into a real communicative context and hopefully form connections between the language and the actual product or process in the students' minds. This also helped the staff member who could simply show students a prop and name it without the need to have a translator present all the time. Finally, students often feel more comfortable communicating in English in small groups, and this can avoid the anxiety of speaking up in front of a whole class where there is a chance of significant face loss.

CONCLUSION

This programme in still running through its initial implementation, and the first students will be entering the engineering programme in Otago Polytechnic in 2020. We will be monitoring their adaptation to the project-based learning environment in New Zealand over the next couple of years, and hope that feedback from students who complete the programme in Dunedin will help us to refine our project-based laboratories for Dalian Ocean University further. We are also looking to develop ways to monitor and increase the take-up and effectiveness of English learning opportunities. Anecdotal evidence suggests that some naturally occurring English language opportunities (for example, intra-group communication during design and construction) were taken up more readily than others. These opportunities must be identified and evaluated further. We also need some means of assessing the development of communication skills within teams, so that the techniques can be adapted and reused in future laboratories and practical classrooms, and we can measure their effectiveness in terms of the overall communicative competence of students.

Avinda Weerakoon is a Senior Lecturer in Mechanical Engineering at Otago Polytechnic, specializing in advanced thermodynamics, energy engineering and sustainable building construction practices. He has a Bachelor (Hons) degree in Marine Technology from the University of Newcastle upon Tyne, UK. Following graduation, he worked for University of Portsmouth on a Ministry of Defence and Marine Technology Directorate funded project to examine the fire extinguishing potential of fine water mist for Royal Navy ships to replace chlorofluorocarbon systems. This work was then expended for water spray application in underground mining industry fires through European Coal and Steel community funded project. After immigrating to New Zealand in 2001, Avinda completed his PhD at the University of Auckland, in Mechanical Engineering. Prior to joining Otago Polytechnic, Avinda acquired a strong scientific research background in New Zealand and in the UK both experimental and Computational Fluid Dynamic modelling directed towards addressing heat transfer, fluid flow, combustion and energy related projects.

Nathan Dunbar is currently a Senior Lecturer and Programme Leader in a study abroad programme for English and Engineering at Otago Polytechnic. He has a Master of Arts in Applied Linguistics from Victoria University of Wellington, specialising in English for specific purposes, as well as an MA (Hons) in Japanese from Massey University. Nathan has over seven years' experience teaching intercultural communication and language skills at universities in China, as well as extensive experience working in intercultural communication in local government in Japan. His current teaching and research focus is on integrating language, culture and technical content skills through project-based and learner-centred learning.

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'SHARP' SKILLS: THE NEED FOR CREATIVITY FOR TOMORROW'S LEARNERS

Dr. Vanessa Byrnes

ABSTRACT

Now, perhaps more than ever, the world needs creativity and the complete set of attributes that traditionally lie in the creative sector. All sectors are being asked to find fast, alternative solutions to both new and age-old problems in ever-changing times. Some would say that humanity is at an evolutionary tipping point that requires empathetic, critical, and agile innovators and communicators. Innovation – but particularly creativity - is vital in the modern world, and will be an essential skillset for tomorrow's learners. Soft skills are perhaps better known as 'SHARP' skills, and creativity provides the answer.

Creativity is a skillset, an attitude, and a way of being. Above all else, it is a way of seeing the world with a positive mindset and the capacity to think beyond known rituals and perceived boundaries. It is often a binary set of circumstances from which something new emerges. It can also be taught. This paper draws on recent global perspectives on creativity, plus extensive research that sheds light on New Zealand and Unitec's approaches to creativity. It offers a notion of creativity that makes us unique in Aotearoa New Zealand. One thing is certain: the creative domain is no longer just for creatives. 'SHARP' skills are essential for tomorrow's learners.

INTRODUCTION

Tēnā koutou, tēnā koutou, tēnā koutou katoa.

In speaking to the Sino-New Zealand 2019 symposium theme about the needs of tomorrow's learners, I am convinced that creativity is at the centre. Of course, as Head of Creative Industries at Unitec in Auckland, I am probably somewhat biased. However, over the past thirty years as a director, actor, performance teacher, producer, and in other creative roles in education and the creative sector, I have witnessed not only the deep transformative power of creativity for individuals and groups, but also the lifelong impact of having a creative mindset and skillset in all professions. Therefore, I am speaking here for all students and teachers who will need to possess a complete set of capabilities embedded in their skillset, both now and in the future.

To advocate the need for creative skillsets in this regard is not new, and many others also understand the potency of this approach. Daniel Pink, Sir Ken Robinson, and countless others have written extensively on this as the essential 'human' skillsets as we enter what Pink calls the Fourth or "Conceptual Age" (Pink, 2005). Human creativity is the one thing that the 'bots' cannot do, and we know it will be a central attribute with technological displacement firmly and certainly on the horizon. Current views on this future landscape agree that adaptability, agility, and the

Proceedings of the 7th Sino-New Zealand Vocational Education and Training Model Programme Symposium, 2019.

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ability to pivot when opportunities arise are a subset of a larger set of creative capabilities that will ensure lifelong employability. We must be ready for a creative r/evolution. As Shakespeare's Hamlet says, "The readiness is all."

Now, perhaps more than ever, the world needs creativity and the complete set of attributes that traditionally lie in the creative arena. All sectors are being asked to find fast, alternative solutions to both new and age-old problems in ever-changing times. Some would say that humanity is at an evolutionary tipping-point that requires empathetic, critical, and agile innovators and communicators. Innovation - but particularly creativity - is vital in the contemporary world, and will be an essential skillset for tomorrow's learners. The importance of this speaks to an essential set of capabilities; 'soft' skills are perhaps better known as 'SHARP' skills, and I argue that creativity provides the answer.

I want to offer a perspective on creativity that brings our approach in Aotearoa New Zealand to the wider world and into multiple domains for non-creatives by looking at how we operate. In our School of Creative Industries at Unitec in Auckland, we teach Performing and Screen Arts and Design and Contemporary Arts in applied practice. We educate aspiring professionals in a range of creative practices including acting, dance, screen arts, painting, graphic design, animation, and others. We are interested in pushing boundaries and challenging conventional thinking, and our School has experienced great success in the past few years with our programmes. Our students and graduates are winning awards and making an impact both locally and internationally, such as the recent win and highly commended placements in the 2019 Eden Arts Art Schools Award. This burgeoning success reflects our aim to be ahead of the curve - to "lead the world from the edge", to borrow from New Zealander and *Saatchi & Saatchi* advertising guru, Kevin Roberts. (Roberts, 2003). We are a nation of renowned and great innovators, and this attitude of self-leadership combined with inquisitive minds is reflected in the way we teach creative practice in Aotearoa New Zealand.

BEIJING DANCE ACADEMY

One such example of creative success is our School of Creative Industries' Dance programme partnership with the Beijing Dance Academy (BDA). We have a strong collaboration with the BDA that, if I can be so bold, endorses our place as leaders in creativity. A cohort of students from the BDA joined us at Unitec in July 2017 for 18 months to learn Contemporary Dance. The BDA students learnt in a highly relational approach, underpinned by *Mātauranga* Māori and broader applied practice. This is the first time since the BDA was founded that they have entered into the delivery of a double degree in this unique way. It has been a hugely successful and very rewarding exercise in educational collaboration and delivery, and we have learnt as much from the BDA and their students as they have from us.

This led me to think we are onto something quite unique. At first glance, there is a clear distinction between the exacting somatic proficiency of the BDA students and the psycho-somatic skillsets of the Aotearoa New Zealand students. The programme followed highly relational pedagogical practice that ensures the students are taking responsibility for their own role as creative makers. In this sense, our successful partnership with BDA also reflects the best of artistic and creative excellence. Research agrees that any creative endeavour or artwork must fulfil three fundamental requirements in order to be successful. Former Creative New Zealand Arts Council Chair, Alastair Carruthers, called these "the three limbs of artistic excellence" (Carruthers, 2008). Successful creative endeavour can be described as a situation where all of the following apply:

- the idea or concept is strong, original, or innovative;
- the execution of the form is high quality;
- the impact on its desired audience or reader is immediate, long-lasting, or both.

We hope the immediate and long-term ripples of this bilateral BDA project will positively affect generations of practitioners both now and in many years to come. So, I wonder what else do we have brewing in educating creative disciplines that the BDA might look to Unitec to teach, and can this be transferred to other realms?

The identity word cloud (Figure 1) represents the myriad of ways the staff in our School of Creative Industries view our approach to creative practice. As you can see, we have different understandings of it as, even amongst creative people, it is very subjective. But there are some common denominators in here that speak to structure and freedom, thinking and feeling, to name a few.

Figure 1. Creative Industries staff word cloud, Unitec, Auckland, 2017.

21ST CENTURY SKILLSETS

Creativity can also be applied to great effect in other domains. To thrive in the future workforce, we know that students must be adept at collaboration, communication, and problem-solving, which are some of the skills identified in a 2015 World Economic Forum report, *New Vision for Education: Unlocking the Potential of Technology*. This report defined a set of sixteen crucial proficiencies for education in the twenty-first century. These skills include six 'foundational literacies' such as literacy, numeracy, and scientific literacy, and ten skills that are labelled as either 'competencies' or 'character qualities'. It can be argued that creativity underpins all sixteen educational proficiencies, since it encompasses this essential range of abilities. Creativity is a panacea skillset.

CREATIVITY

What do I mean by 'creativity'? Creativity is a skillset, an attitude, and a way of being. It is the ability to form an idea into substance; to think beyond ritual into the unknown, and to 'draw into being that which may not yet exist.' (Ings, 2019). The word 'create' comes from late fourteenth-century Latin 'creatus', past participle of 'creare', 'to make, bring forth, produce, beget,' which is itself related to 'crescere'; 'arise, grow'. Creativity is fundamentally concerned with the specific unearthing of newness, innovation from the inside out, and also growth, adaptation, and development. It is capable of being both universal and culturally specific.

Creativity relies on oppositional and reciprocal points of view; dichotomy is central to creative practice. Creative brilliance often stems from the marriage or clash of opposites that combine to teach and unlock creative processes: thinking and feeling; planning and application; structure and freedom; habit and disruption; logic and imagination; tradition and the search for originality, to name a few. It implies an oppositional dance between divergent and convergent thinking.

Above all else, creativity is a way of seeing the world with a positive mindset and the capacity to think beyond known rituals and perceived boundaries. It is often a binary set of circumstances from which something new emerges (Ings, 2019). It can also be taught, even when we accept that individual neuro-diversity and innate character dictate we are all different, and learn in diverse ways. Embedding creativity in all our discipline areas of learning is critical to a more disruptive and adaptive future.

Moreover, despite what prevailing orthodoxy has perhaps socialised us to believe, my view is that we are all creative. Creative ability is not a set left or right brain attribute that you are born with, and it can be taught and applied in all professions. However, we have to have the courage to be disruptive, to sit with the unknown, and to challenge conventional and accepted knowledge in order to allow creativity to flourish in all domains.

~~SOFT~~ 'SHARP' SKILLS

This leads me to ask the following questions: How can creative approaches be applied in other spaces to elicit more divergent and convergent – or imaginative and selective - thinking? How do we embed creative skills in all learning areas?

I want to be disruptive here and suggest that we banish the term 'soft' skills, which can be seen as a pejorative term. I prefer to call them 'SHARP' skills (see Figure 2). They are not passive, but essential skills that cut through and give individuals the edge in all professions. I would like to offer a matrix here based on dichotomous concepts contained in this acronym of SHARP. I propose that these attributes – while not a finite or complete list of skillsets - can be applied to any programme or subject area in educational design, practice, and the workplace to encourage more creativity in all walks of life.

S - Skills and Structure

Here, I am referring to the learnt skills of the craft or discipline at hand, or the learnt tradition. This is fundamental, yet it is often overlooked when we refer to condensed models of learning. It is vital that students have the ability to learn their craft well in a time-based and appropriate way germane to their discipline. It takes a minimum of three years to educate an artist. Furthermore, to break the mould, it is essential to know what the existing form is. Skills take time to learn and test.

The concept associated with skills is structure, which is arguably aligned to any creative process. The process of being deliberate and engaging with methodology appropriate to the discipline gives flight to the imagination. The saying that 'structure gives freedom' resonates well here.

~~SOFT~~ SHARP skills

- **S** – Skills + Structure
- **H** – Habit + Heuristics
- **A** – Awareness + Agility
- **R** – Risk + Responsibility
- **P** – Position + Perspective

Figure 2. 'SHARP' Skills. Byrnes, Vanessa 2019.

Both skills and structure are underpinned by an appreciation of the value of process itself. Creativity can happen in a flash, but it usually develops when you move through layers of experimenting, discarding, and selectively keeping; of trying and failing. It is often a messy, iterative process, where the only known is a deadline such as opening night. 'Have the courage to fail' is a familiar refrain, and with this approach firmly in mind, our job as educators is to create the conditions where failure can happen through process.

H - Habit and Heuristic Knowledge

This leads us to habit, which ensures that practice is recurrent and also gives a framework to push against. New York-based choreographer Twyla Tharp calls creativity a 'habit'; she commits to a highly predictable structure every day in order to find freedom within the work. As Tharp (2006) states in her book, *The Creative Habit*, her premise is that "[i]n order to be creative you have to know how to prepare to be creative." She suggests that habit is the way to make a ritual of your creativity, to work through creative blocks, to escape, and most of all, to avoid ruts.

I like this bi-lateral and quite structured way of thinking about creativity, which proposes that it is a learned habit or craft underpinned by structure, or an inherent duality. To be on the edge of freedom but tethered by the known or familiar is very powerful. Once again, this implies that oppositional and reciprocal points of view are central to creative practice, and that an ability to work with (and between) inherent tensions is vital.

Habit needs to be balanced with heuristic process and tacit, implicit, and explicit knowledge. It is essential to enable a person to discover or learn something for themselves through curiosity and a bank of assumed knowledge. Heuristics employs a practical method which is not guaranteed to be perfect, but is sufficient for the immediate goals. It also offers a reflexive approach that mimics a kind creative process - that of check, reflect, refine, and adapt.

In a wider context, heuristics also refers to lifelong learning and enabling people to invest in education as an ongoing journey. It is vital that graduates now see themselves as lifelong adaptors, problem-solvers, and learners who have ultimate agency.

A - Awareness and Agility

This brings us to awareness, that is, being self-aware, concerned with and well-informed about others, and conscious of contemporary issues. Awareness and collaboration come from a relational way of being in the world. Cultural competency is critical here. Māori and *Pākehā* in New Zealand are constantly working towards a better understanding and embodiment of biculturalism in a dynamic postcolonial environment. In one sense, this is a creative act that is highly relational and dynamic. Agility is vital here; being able to move quickly when needed and to respond to provocations enables us to have an adaptive and agile mindset, and the necessary skillset to be alive.

Both principles of awareness and agility are needed to have a good team that is capable of being reciprocal and dynamic. In the rehearsal room and in 'non-creative' disciplines, it is important to be challenged and be in the company of others who believe in your potential, but who can do this in an aware, agile, and relational way.

R - Risk and Responsibility

Risk is the next part of this matrix, and courage is needed to take risks. Courage is of course derived from 'coeur' (French for 'heart'), so this speaks to a definition of the concept as 'heart-bringing'. We have many ways of speaking about courage including entrepreneurship, backing your talent, tenacity, resilience, and being fearless. Creativity is not possible without risk, since true creativity takes courage. To create something new, as if for the first time, can mean sitting with the unknown until a path forward becomes clear, to remain fearless, and to have the capacity to sit within chaos to find harmony.

Responsibility is the counterpoint here. *Response-ability* is the ability to respond; to be able to position your viewpoint proactively in response to, or in front of, or in relation to, the actual conditions around you. This includes notions of self-authorship and self-determination, creative or technical empowerment, and conscious action rather than unconscious reaction.

P - Position and Perspective

Position is critical; knowing whether your point of view resides inside (emic) or outside (etic) the culture or point of 'knowingness' on an issue is vital. Positionality also means having critical thinking abilities that contextualise the work in relation to others. We live in an age of information overload, but this only concentrates the need to have a clear position in relation to such constant, active, and available intelligence. Is the response coming from within the social group and the endemic perspective of the subject, or from outside the paradigm and from the external perspective of the observer? Creating something new relies on a conscious positioning of the self, and this is an ever-changing, highly relational notion.

Cultural proficiency is again important here. A key point is understanding and knowing the complete set of identifiers such as who make up the relational connections, 'why' or the purpose of the work, 'how' or the methodology, and 'what', that is the knowledge, so learners can situate themselves in relation to the craft.

This leads to perspective, which relates on a micro level to wellness and mindfulness, being empathetic, or expressing notions of 'truth' that others may not see. On a macro level, it can mean building networks, starting an entire movement, leading or promoting change, and continuing or challenging assumed notions of truth. Knowledge – and real wisdom - comes from a renewed sense of self in relation to the world. Creativity provides the door to deep knowledge of accumulated wisdoms that survive social structures, political systems, and the attempted decimation of cultural knowledge. A ransacking force will often destruct the library or temple first, then the people who hold that knowledge. Why? To obliterate evidence of cultural memory, belonging, identity, and creative practice. Such is the power of creativity, knowledge, and notions of truth in every culture's identity.

KNOW THYSELF

In closing, I want to mention the third statement of the Ancient Greek Oracle of Delphi, which supposedly read, 'Know thyself'. This is still perhaps the real and only true guidepost needed to live and practice a creative life, and for us as educators to remember when we are seeking to apply creativity in all domains. To pursue self-knowledge is the essence of true creativity, and that true creativity is only possible with a deep and abiding commitment to the knowledge of the unique and individual self. With this bilateral view, it is clear that our greatest challenge and opportunity lies in educating the whole person, whatever the discipline. This is arguably the real crux of education.

We understand this at Unitec, and try to instil in all our students the ability to be innovative, practical, collaborative, and connected to the community. This aligns with the necessary opposites in 'SHARP' skills that combine to unlock creativity. It is critical that we embed creativity in all educational practice.

If we do this, I believe that the future landscape is full of more transformation, increased creativity in all fields, and as a result, more unseen and exciting possibilities to think beyond ritual into the unknown and draw into being that which does not yet exist in all our different domains. That vision is an exciting future I want to be part of.

Tēnā koutou katoa.

Dr Vanessa Byrnes is currently Head of School: Creative Industries at Unitec, Auckland, New Zealand. She is an award-winning director, actor, producer, and performance teacher who has worked extensively in film and theatre in New Zealand and overseas. Vanessa has led and collaborated on more than 160 theatre and screen productions during the past 30 years in everything from independent, self-funded works to major international productions. Vanessa was the first Australasian to assistant-direct at Shakespeare's Globe Theatre in London, staging *The Two Noble Kinsmen* for the Globe's main stage with director Tim Carroll and the Red Company.

In tertiary environments (including Te Kura Toi Whakaari O Aotearoa: New Zealand Drama School, Victoria University, and Unitec) and professionally, she has directed many classic, contemporary, devised, and text-based theatre productions. She has worked in China, London, Canada, the USA, and Singapore in multiple mediums. Vanessa has led various arts education bodies, and is a past Board Member of Downstage Theatre, PlayMarket (NZ), the Shakespeare Globe Centre (NZ), and TAPAC: The Auckland Performing Arts Centre.

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DEVELOPING TEAMWORK AND COLLABORATION BY UNDERSTANDING DIFFERENT HEALTH PROFESSIONAL ROLES

Johanna Rhodes & Mary McMillan

ABSTRACT

Traditionally health professional undergraduate education occurs in self-contained specialty silos. The assumption is that the soft skills of teamwork and collaboration will be acquired during clinical practice; however, this leaves symbiosis to serendipity.

The Southern Institute of Technology delivers an Interprofessional Education (IPE) Programme in conjunction with Southern District Health Board (Southland Hospital) and the University of Otago, (for the purposes of this paper this will be referred to and called the Southland IPE Programme). This programme provides an opportunity for symbiosis of professional roles and development of teamwork and collaboration within the changing landscape of healthcare. A significant aspect of the Southland IPE programme is the opportunity for participants to share with each other what their professional roles are in this tempestuous period in health care.

BACKGROUND AND INTRODUCTION

In 2015/2016, nurse educators explored their place in the teaching of simulation via an auto-ethnographic narrative inquiry, (Rhodes, McMillan, Strathearn, Madden, & Knowler, 2018). From this study, one of the themes that emerged was the value of interprofessional simulations, '*Breaking down the silos*'. Interprofessional Education (IPE) as defined by the World Health Organization (2010), "occurs when two or more professions learn with, about, and from each other to enable effective collaboration and improve health outcomes" (p.7). From a broader systems perspective, the integration of health workforce planning and policymaking is essential to IPE and collaborative practice.

Throughout the development and growth of the Southland IPE programme, it became apparent to all the educators involved, from the learning objectives of health professional students, that there were three objectives which ran as themes through the core syllabus. The objectives were IPE by means of shared learning, active communication, and optimisation of team dynamics. Furthermore, collaborative assessment and treatment planning can potentially improve teamwork (Stefanidis, Ingram, Williams, Bencken, & Swiderski, 2015). These core IPE objectives were developed in 2014, and reviewed and added to in 2015. We practise these objectives within the Southland IPE programme.

From the development of objectives, an overall learning outcome was formed. The outcome was for all participating health professional students to demonstrate an ability to use evidence-based practice to make informed decisions

within an interprofessional team. The values developed and instilled in the health professional students is a respect for the intra and inter professional individuality, difference and diversity firstly. Secondly, to sustain, promote and celebrate the identity and expertise of each profession, and thirdly, to promote parity between professions within the learning environment.

Our IPE programme runs over one day and includes the opportunity for each profession to present their professional role to each other. This enables a better understanding of each health professional student's roles and how these can work together for increased teamwork, collaboration and communication leading to health professional safety, teamwork, collaboration and potentially improved patient outcomes.

WHY JIGSAWS AND WHITEBOARDS AS STRATEGIES?

The objectives mentioned above reflect our shared mantra for the Southland IPE days. Through role modelling and constant reviewing of the objectives, the educators were able to assess, evaluate and develop the IPE days to meet the needs of the students.

One educator in particular had an interest in 'edutainment'. "Edutainment is defined as an application compounded with educational aims and measurements and providing learners with regarding the value of life, using resource and methods and having a good time with the way of creating and having experience" (Aksakal, 2015, p. 1232). Jigsaw puzzles in their various forms are used in education for both children and adults. Jackson (2003) promotes that creativity in higher education learning adds value to the teaching and learning experience. Learning in this way supports the capacity to generate and connect new ideas, create frameworks that enable the ability to judge different situations and potentially come up with solutions (Jackson, 2003). Jigsaw puzzles have been used as method and strategy based on "cooperation within group (team-learning), where each participant (student) has a specific task to perform and the responsibility to relay acquired information to the other students" (Toader, 2015, p. 446).

The use of jigsaw puzzles in the Southland IPE Programme was obvious as the methods and strategies supported the day's objectives of shared learning, active communication and optimising of team dynamics. We developed a timetable, as illustrated by Figure 1, for the Southland IPE day that encompasses the objectives, outcomes and values of the programme.

Themed jigsaw puzzles such as Mickey Mouse or Dora the Explorer are used with similar colours and pictures. Immediately after the 'meet and greet', the health professional students are taken out of their health professional groupings and randomly placed together to do at least two jigsaw puzzles per team. There are usually three teams of health professional students comprised of medical, nursing and physiotherapy.

IPE TIMETABLE

Morning

> Meet and greet student health professionals.
>
> Team building/Jigsaw Puzzles & Debrief of Observations.
>
> Preparation by student health professionals for "describing their professions training and role".
>
> Presentation of "role", by student health professionals.
>
> ISBAR Tool for communication between professionals.
>
> Pre-operative video for Health Scenario/Simulation & Formulation.

Afternoon

> Shared Lunch (please bring a plate to share).
>
> Health Scenario/Simulation and handover to next group.
>
> Debrief.
>
> Evaluations and FINISH.

Figure 1. Southland IPE Day Timetable, (Rhodes & McMillan, 2017).

The strategy employed is to get the puzzle or 'patient' in one piece, working as a team, communicating and collaborating. The jigsaw puzzles pieces are scrambled and the health professional students are unaware that the other teams hold pieces for their jigsaw so they must interact and negotiate with the different teams. Educators are watching the teams taking notes to feedback to the health professional students how the objectives are being met. This strategy has been successful in developing teamwork and collaboration (Toader, 2015).

The other part of the Southland IPE day that is vital to develop teamwork and collaboration involves developing an understanding of the different health professional students' roles. The health professional students in their professional groupings prepare a presentation to share with the other students. The presentation describes 'their health profession's training and role'. Each health profession student group must present and answer questions about their training, and their understanding of their chosen health profession. This happens before they divide into their inter-professional teams to collaborate, communicate and work as a team in a healthcare simulation staged over three phases using Mask-Education™, (Mask-Ed™) (Reid-Searl, 2011). Mask-Ed™ KRS Simulation, employs highly realistic, life-like silicone props (e.g. facial mask, body prosthetics) worn by specially trained educators, with the educator 'becoming' the character who requires collaborative assessment and treatment by the health professional students interprofessional teams.

RESEARCH AND DESIGN

After the development of the Southland IPE training day, as educators we had many questions, particularly about how the day was received and how it supported the health professional students knowing and learning. Were the IPE day's objectives met and how? The question we wanted to answer from these days and the activities was if the IPE exposure advanced teaching, learning, and interprofessional collaboration in health disciplines. The only way to answer this question was with research.

UNDERSTANDING OF STUDENT HEALTH PROFESSIONALS' ROLE IN IPE USING GENERAL INDUCTIVE APPROACH

In 2017, the Southland IPE Programme focused its attention on the health professional students over a period of three IPE programme days. A mixed method quasi-experimental design was used for this research. Ethical clearance was received in 2016 from the Southern Institute of Technology Human Research Ethics Committee. The aim of the research was to advance teaching, learning, and inter-professional collaboration in health disciplines through exposure to IPE.

Pre-, post-, and follow-up questionnaires were used to provide both quantitative and qualitative data. Data was collected via two separate modes:

1. questionnaires with a combination of questions employing numerical Likert-like scales, and

2. questions which required a written narrative response.

Each student completed two questionnaires on the day, a pre-questionnaire (at the commencement of day) and a post-questionnaire (at the conclusion of day). There was a third follow-up questionnaire six weeks after the Southland IPE day, delivered by email with consent. This however, proved to be an unreliable tool as only three follow-up questionnaires were returned. This measured the students' thoughts of the programme. For the purposes of this article, we explored the qualitative data from the post evaluations.

Fifty-one health professional students of nursing, medicine, physiotherapy and dietetics participated in this research, by attending a day of interprofessional education, learning and teamwork. Questions with the facility for constructing a written narrative response were devised. Four questions were asked:

1. Please comment on the strengths of this interprofessional education session.

2. Please comment on the limitations of this interprofessional education session.

3. Please comment on improvements that could be made to this interprofessional education session.

4. Any additional comments welcomed.

METHODOLOGY FOR THE QUALITATIVE MATERIAL COLLECTED

Thomas's (2003) general inductive approach for qualitative data analysis was used to explore the narrative responses from the health professional students. General inductive analysis is a systematic procedure that has the primary purpose of allowing research findings to emerge from the most significant themes apparent in raw data (narratives). A general inductive approach has a number of procedures that must be followed. Firstly, the raw data files need to be prepared ("data cleaning") (Thomas, 2003). After this, close reading of text in detail is required to understand the themes and details in the text. Thirdly, we identify and define themes or categories which may be general or specific. Next, we review overlapping and exploration of un-coded text, as narrative can fit across two different categories. The fifth and final part of the inductive analysis is the continued revision and refinement of categories or themes (Thomas, 2003).

FINDINGS AND RESULTS

It was important to remember the research aims when reading the raw data. The results are only preliminary as a second person is presently doing a data analysis to ensure validity and reliability. From the first round of 'data cleaning', a top-level theme or category was recognised - the theme of *'learning about each other's roles'*. This was a main theme that was extremely apparent after analysing the qualitative material. Examples from the narrative responses of health professional students were:

> *"It was great learning about each others professions and how we can all work together to provide great patient care."*

> *"Having medical students to help and work alongside us & learning to work collaboratively."*

> *"…awesome to work in a MDT. Their knowledge added to my learning knowledge."*

Another category or theme similar to *'learning about each other roles'*, became also very apparent and obvious, *'learning to work with'*, was mentioned at least fifteen times when coding the narratives that explored the strengths of the IPE session. This was apparent in the narratives written by the health professional students:

> *"…learning to work with other professions"*

> *"…learning about working together as a team"*

> *"…learning about the other professions"*

> *"…working with other health professionals and see how they plan their pt. care"*

Lower level text categories and themes were identified and noted. Some of the health professional students identified that learning in a relaxed and non-stressful learning environs was important to them. An example from narrative response was:

> *"Relaxed learning environment."*

Another lower level category or theme that clearly presented itself in processing the narrative data was how the upper level categories and themes of *'learning about each other's roles'* and *'learning to work with'*, supported the interaction with, and the health outcomes for, a patient. The students felt they were expanding their learning and knowledge about the caring of patients. Examples of narrative response from health professional students were:

> *"Learning the roles of members of the MDT…and how they contribute to the health outcomes of the patient."*
>
> *"Case study was valuable to see how each profession interacts with the patient."*
>
> *"To understand other health professionals' roles within caring for a patient."*
>
> *"Learning the roles of members of the MDT and how each member contributes to the health outcomes of the patient."*

The art of working as a team and teamwork as a multidisciplinary/interdisciplinary team was important and a notable sub-theme or category.

> *"Able to do team work which is significant in the Healthcare setting."*
>
> *"Experience teamworking with professionals."*

Another lower level category or theme from the health professional students was their desire to work and be involved with other health professional students not represented on their IPE day. For example, their narrative responses included:

> *"An OT would have been beneficial."*
>
> *"This session was limited only to Dietitians, Nurses and Physiotherapists."*
>
> *"To include OT, Social Worker, etc."*
>
> *"Not all MDT members present. Occupational Therapists, Social Workers, medical students."*

DISCUSSION

In discussing the outcomes present in this piece of research, we must also look at the limitations and bias. The cohort was a group of just fifty-one health professional students over three consecutive IPE days in 2017. This is a very small and limited sample size to answer the research question. It is potentially a snapshot of initial data that gives an insight into the question but cannot answer the question in absolutes. It was somewhat grandiose to collect information over only three IPE days and try to measure its impact on teaching, learning and inter-professional collaboration in health disciplines; however, the intent of the research was positive and will potentially lead to a bigger piece of work.

Obvious biases were apparent in the research. A neutral party administered the questionnaires. However, the lead researcher is the IPE administrator, coordinator and nurse educator in the Southland IPE Programme. As much as we tried not to influence the research outcomes, the clear desire to ensure the health professional students had a positive day was inherent.

The clear top-level themes identified *'learning about each other's roles'*, and *'learning to work with'*, give an insight into an important part of the research question concerning 'inter-professional collaboration'. Turrentine et al., (2016) explored inter-professional training and whether it enhances collaboration between nursing and medical students. They had encouraging pre-test and post-test scores in the areas of collaboration, "this learning activity increased my knowledge of another profession" (p. 38). They also found, as was suggested in the sub categories or themes/narratives of this research, that the IPE learning activity was enhanced when done as a collective team of health professional students.

Certainly, this small piece of research offers some insights into IPE and the health professional students' experiences in 2017 in the Southland project. The narratives suggest some evidence supports the overall aim of the research with the top-level categories, *'about each other's roles'*, and *'learning to work with'*. Liaw, Siau, Zhou, and Lau, (2014) found evidence in their research that there was significant improvement in perception of medical students towards nursing students in the areas of academic and decision-making skills. The nursing students' perceptions of the medical students' skills were apparent in the areas of team play and interpersonal skills where there was noted improvement. This assisted breaking down professional stereotypes and attitudes and enhancing collaboration.

CONCLUSION

IPE pioneers the thesis that learning from, of, and with each other within the health professions is a foundational tenet for advancing the narrative of trust and communication, and hence it reduces the tendency of health disciplines to train and function in relatively self-contained silos (Gregory & Austin, 2016; Rhodes et al., 2016). IPE advances the notion that the harvesting and subsequent distillation of collective inter-professional wisdom will lead to an innovative and optimal health outcome (Gregory & Austin, 2016; Rhodes et al., 2016). The desire of this piece of research is intended to contribute to the thesis of learning collaboratively and, via IPE, adding value to health professional students' learning, trust and communication.

ACKNOWLEDGMENTS

Johanna Rhodes is the Head of School of Nursing at the Southern Institute of Technology. She believes that in this tempestuous period of change, embracing teaching pedagogies that reflect the 'real world' is critical to developing 'work ready' graduates who are equipped to work in the electrifying, intricate, and fluctuating world of healthcare. The use of simulation modalities in education offers a willingness to advance the aesthetic narrative of healthcare, while embracing the realism of working with people, which is why Johanna includes this in her teaching. She is inventive, and seeks opportunities to develop her teaching, while maintaining focussed strategies to create interesting and realistic learning opportunities.

Mary McMillan is the Paper Coordinator for the Bachelor of Nursing Year Two, Professional Issues Paper and Year Three, Clinical Practicum Paper in the mental health practice settings at the Southern Institute of Technology. She also coordinates and chairs the Southland Interprofessional Education Programme involving Southern Institute of Technology, School of Nursing, University of Otago and the Southern District Health Board at Southland Hospital. Mary uses teaching pedagogies that reflect, "real world" and "work ready" graduate nurses. Her foundations for this work is 30 years of nursing in both mental health and primary health settings with huge diversity.

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A MODEL FOR INTEGRATING TRANSFERRABLE SKILLS INTO THE VOCATIONAL EDUCATION CURRICULUM

Lydia Harrell & Dani Mao

ABSTRACT

While the Chinese Government actively encourages integrating workplace training into vocational education, the employee engagement or collaboration strategies it adopts might be variable. The workplace training that the policy prescribes might involve very close relations with a single local employer where there will be an extensive focus on technical skills. This poses a risk that the skills gained by the student may not be transferrable as there is very limited focus on soft skills such as communication, critical thinking, problem solving, creativity, responsibility, and accountability which are important for occupational and social mobility. Chinese employers struggle to find employees with twenty-first century skills such as communication, working in teams, problem solving and other such skills and there is an urgent need to incorporate transferrable skills into the curriculum and have tangible assessments of these skills. We propose a model for integrating transferrable skills in Chinese vocational education in areas such as curriculum design, teaching and delivery methods, and modes of assessment. The curriculum will have a substantial focus on the development of capabilities that are promoted by China's vocational education reform.

RATIONALE AND EVIDENCE

There has been increased emphasis on the importance of integrating transferrable/soft/sharp skills into the vocational education curriculum, and the urgency to address the gap between education and the workplace has been recognised more than ever. There are many terms which are used for twenty-first century skills, such as soft skills, sharp skills, capabilities, transferrable skills and so on, which are used interchangeably. For consistency, we will use the term transferrable skills/employability skills.

While the Chinese Government actively encourages workplace training through its recent Vocational Education policies, the employee engagement or collaboration strategies it adopts might be varied. The workplace training, that the policy prescribes, might involve very close relations with a single local employer where there will be an extensive focus on technical skills. This poses a risk that the skills gained by the student may not be transferrable as there is very limited focus on skills such as communication, critical thinking, problem solving, creativity, responsibility and accountability which are important for occupational and social mobility.

The Organisation for Economic Co-operation and Development (OECD) (2011) policy review of vocational education and training in China suggests that the policy needs to engage employers and unions in curriculum development, providing young people with the transferable skills to support occupational mobility, and the specific

skills to meet employers' immediate needs. Media and survey reports have suggested that employers feel that the graduates of today lack the complex employability or transferrable skills that not only helps them gain meaningful employment but also to sustain and succeed in their employment. A 2017 survey by the global talent recruiter Hays suggests that 97 percent of 1,200 Chinese employers said they struggle to find employees with twenty-first century skills such as communication, working in teams, problem solving and other such skills and the situation is worse than ever (Jing, 2017).

Interviews conducted with the managers at Boeing and Walmart suggest that when hiring Chinese tertiary graduates from engineering programmes, it takes them another two years to get the graduates up to a United States bachelor's level standard in engineering due to their lack of applied experience and their reluctance to undertake hands-on work. Hence there is an urgent need to incorporate transferrable skills into the curriculum and have tangible assessments of these skills.

Both of us work in an international campus catering mainly to Chinese and Indian students where we have witnessed first-hand of how our international graduates struggle to articulate their skills and competencies in their CVs, job applications, and answer those behavioural type of questions in job interviews.

We can see that there is a critical need for addressing the gaps between what happens in the classroom and what happens in the workplace. For this reason, every course, every project and every activity that students engage in should be linked to an employer or a real world brief. Industry placements or internships are only a part of the solution. The employers and the institute need to collaborate at all levels but particularly in the design of courses.

AN INTEGRATED APPROACH

Figure 1 below shows that the model will not be a 'bolt on' approach where the skills will be developed independently of the core discipline. Research evidence suggests that students often fail to grasp the value of 'bolt on' approaches where skill enhancement is separated from the students' overall teaching and learning experience. The model we propose would be an integrated approach where these transferrable skills will be integrated into regular coursework.
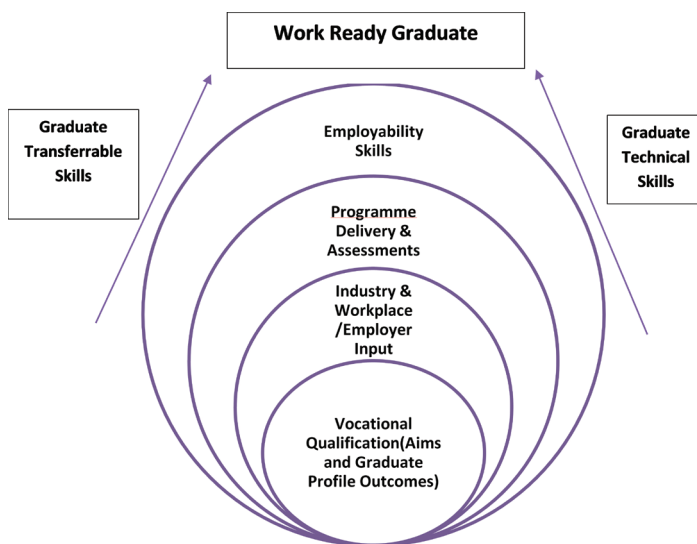

Figure 1. An Integrated Approach. Harrell, L. & Mao, D. 2019.

The alignment has to start with qualification and programme design. Here, the transferrable skills would be explicitly addressed in the graduate profile outcomes by involving employers and industry training organisations in the process. Once there is a set of transferrable skills that are mapped to a qualification or a programme, then the skills are aligned or mapped to individual courses and internship/training projects.

21ST CENTURY SKILLS

It is important to understand what are twenty-first century skills and their significance in this rapidly changing economy and society. 'Twenty-first century skills' is a catchphrase used by a range of thinkers and experts in and out of education. The most common skills identified as twenty-first century skills include creativity, problem-solving, critical thinking, communication, and ethics and responsibility. Andreas Schleicher, Director of the OECD Education Directorate of Skills (2018) says: "Today, because of rapid economic and social change, schools have to prepare students for jobs that have not yet been created, technologies that have not yet been invented and problems that we don't yet know will arise."

Steve Wheeler, the academic and learning technologist, makes these economic concerns clear in his blog titled 'Content as Curriculum?':

> After all, it is the ability to work in a team, problem solve on the fly, and apply creative solutions that will be the common currency in the world of future work. Being able to think critically and create a professional network will be the core competencies of the 21st Century knowledge worker . . .
>
> (Wheeler, 2015).

Richard Susskind and Daniel Susskind (2015) in their book *The Future of Professions* say that even the traditional professions such as medicine, accountancy, law and teaching which were considered safe and reliable may be dismantled or transformed in the future owing to technology:

> The introduction of a range of increasingly capable systems will entirely replace the work of traditional professionals . . . this will give rise to new ways of sharing expertise in the society and will lead to the gradual dismantling of the traditional professions. This is where the latest evidence and thinking leads us
>
> (Susskind & Susskind, 2015).

Based on these experts and many other thinkers, one can argue that workplace demand for routine cognitive skills based on memorisation of easily digestible knowledge is in the decline, as these tasks can be automated and outsourced. The future lies in the twenty-first century skills such as problem solving, creativity, interpersonal skills. A twenty-first century curriculum cannot simply have just the transfer of knowledge at its core for the simple reason that the selection of subject matter has become problematic in an information-rich age.

> As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial . . . Capabilities for selecting relevant and disregarding irrelevant information, recognising patterns in information, interpreting and decoding information as well as learning new and forgetting old skills are in increasing demand
>
> (OECD, 2007).

Employer and academic research has highlighted the key twenty-first century employability skills which include the following themes: creativity; critical thinking; problem solving; communication and collaboration; ethics, accountability and responsibility. This is backed by OECD research (2011) as well as research by education and employability experts.

EMPLOYABILITY SKILLS FRAMEWORK

Based on the themes outlined above, 20 transferrable skills have been selected to be a part of the Employability Skills Framework 2019 (see Figure 2 below). These are based on employer research in the Chinese vocational education context and are in line with the global research on twenty-first century employability skills.

➢ **Effective Written Communication**	➢ **Solves Problems**
➢ **Effective Verbal Communication**	➢ **Thinks Critically**
➢ **Effective Visual Communication**	➢ **Organises Effectively**
➢ **Effective Interpersonal Behaviour**	➢ **Demonstrates Resilience**
➢ **Cultural Competence**	➢ **Thinks Creatively**
➢ **Transcultural Proficiency in a Chinese Context**	➢ **Displays Leadership**
➢ **Works Independently**	➢ **Enterprising**
➢ **Works in teams**	➢ **Practises Ethically**
➢ **Reflects on Performance**	➢ **Demonstrates Digital Competence**
➢ **Acts Responsibly**	➢ **Practises Health & Safety**

Figure 2. Employability Skills Framework. Harrell, L. & Mao, D. 2019.

SKILL INDICATORS

Each employability skill from the framework will be broken down into three skill indicators: a personal skill indicator, an interpersonal skill indicator, and a cognitive skill indicator, which are used for tracking the development of the particular skill. These skill indicators are useful for assessing the evidence of the skills submitted by the students, and the students track their own development of a particular skill against the skill indicators.

For example, the transferrable skill of 'Thinks Creatively' is broken down into:

- ✓ use a wide range of idea creation techniques (such as brainstorming) which is a **personal skill indicator**;

- ✓ develop, implement and communicate new ideas to others effectively which is an **interpersonal skill indicator**; and

- ✓ demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas which is a **cognitive skill indicator**.

PROGRAMME LEVEL MAPPING

The alignment starts with programme/qualification level mapping which maps the graduate profile outcomes of the qualification to the employability skills. The Higher Level Diploma can focus on 10 to 12 skills from the employability framework, while the Technical Secondary School Certificate can focus on 8 to 10 skills. The selection of the employability skills for each qualification can be done by consulting with the local employers, curriculum designers and the discipline specific academics.

An example of programme level mapping is shown in Figure 3 below.

Graduate Profile Outcomes	Employability Skills
Engage in self-directed learning	Reflects on Performance and applies Personal Learning
Engage in advanced study	Works Independently
Demonstrate intellectual rigour	Solves Problems
Demonstrate analytical rigour	Thinks Critically
Understand and evaluate new knowledge and ideas.	Thinks Creatively

Figure 3. Mapping Graduate Profile Outcomes with the Employability Skills Framework. Harrell, L. & Mao, D. 2019.

INDIVIDUAL COURSE MAPPING

Now that the skills required for the qualification have been selected, it is important to map them across individual course outcomes and internship/work place training outcomes. Individual courses can be mapped against one or two employability skills from the total number of skills selected for that qualification. The mapping needs to adhere to the following four principles:

- **Learning Outcomes** and **Course Aims** include employability skills, or are aligned with the skill indicators explicitly.

- **Indicative content** and key concepts identify which employability skills are explicitly taught.

- **Learner centred teaching techniques** are deliberately used for learning and teaching.

- **Assessment tasks** outline where skills are assessed and what evidence demonstrates skill acquisition.

It is important to differentiate the skills that can be developed through classroom learning and in class assessments and those skills that can be developed in the workplace during the training or internship. Skills such as communication, teamwork, interpersonal skills can be developed in the classroom learning while the internship/workplace training is more likely to give the learners opportunities to develop skills such as problem solving, critical thinking, working independently and creativity.

Mapping learning outcomes and key concepts to assessment, experiential learning and employability skills		
Start of the Course	**Mid Course**	**End of Course**
Learning and Teaching Context Field Based/Work Place based Activity	Group/Individual Reflective Practice	
Learning Outcomes & Key Concepts		
Assessments Self/Peer/GroupAssessment Formative Summative	What are you assessing?	
Transferrable skills Skill Indicators	Evidence examples	

Figure 4. Individual Course Mapping. Harrell, L. & Mao, D. 2019.

TRANSFERRABLE/EMPLOYABILITY SKILL DEVELOPMENT THROUGH CLASSROOM LEARNING

For individual courses taught in classrooms, each learning outcome or key concept (technical know-how) will be mapped against employability skills, and aligned with the teaching and delivery methods and the assessments types. It is important to note that learner-centred teaching methods such as experiential learning, project-based learning, along with reflective practice, need to be deployed to enable skill development and enhancement.

The types of authentic assessments which would facilitate skill development are covered in Figure 5 below.
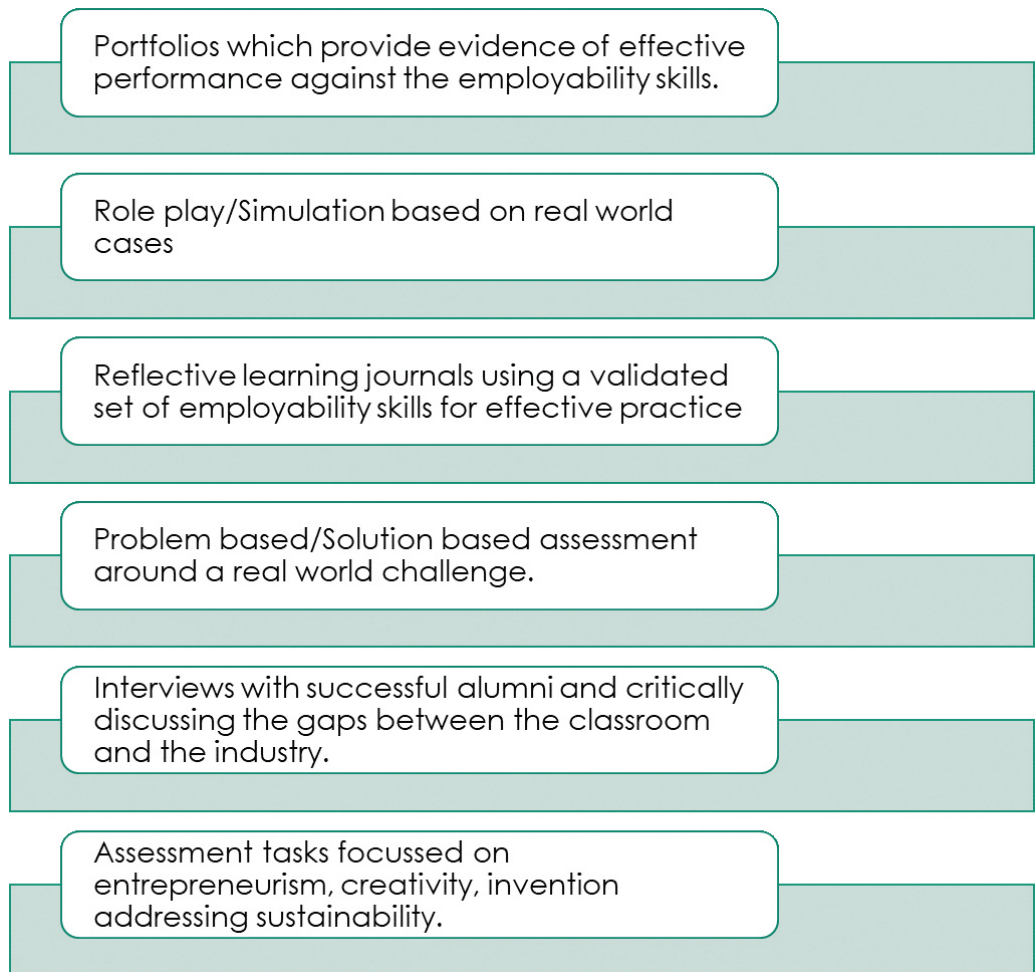
Portfolios which provide evidence of effective performance against the employability skills.

Role play/Simulation based on real world cases

Reflective learning journals using a validated set of employability skills for effective practice

Problem based/Solution based assessment around a real world challenge.

Interviews with successful alumni and critically discussing the gaps between the classroom and the industry.

Assessment tasks focussed on entrepreneurism, creativity, invention addressing sustainability.

Figure 5. Examples of Authentic Assessments in Classroom Learning. Harrell, L. & Mao, D. 2019.

TRANSFERRABLE/EMPLOYABILITY SKILL DEVELOPMENT THROUGH WORKPLACE TRAINING/INTERNSHIP

The process of skill development during workplace training can be done using the following steps.

- Students assess their own skills to create an initial skill profile at the start of their training.

- Students then review their initial skill profile with support from academic tutors and workplace supervisor/ employer, identify gaps and set personal development objectives and timeline.

- Students collect evidence to support each skill and share discussion with their workplace supervisor/ employer and tutor.

- Students generate a skill profile outlining the skills and the subsequent evidence that they can share with their future employers.

CONCLUSION

There is an urgent need to integrate transferrable skills into the vocational education curriculum of China. We have highlighted the gaps in the current workplace training policy which has an extensive focus on technical skills. We propose a model for integrating transferrable skills in the Chinese vocational education in areas such as curriculum design, teaching and delivery methods, and modes of assessment.

ACKNOWLEDGEMENT

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