Professional and Practice-based Learning

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Reshaping Vocational Education and Training in Aotearoa New Zealand

Springer

Professional and Practice-based Learning

Volume 34

Professional and practice-based learning brings together international research on the individual development of professionals and the organisation of professional life and educational experiences. It complements the Springer journal *Vocations and Learning: Studies in vocational and professional education*.

Professional learning, and the practice-based processes that often support it, are the subject of increased interest and attention in the fields of educational, psychological, sociological, and business management research, and also by governments, employer organisations and unions. This professional learning goes beyond, what is often termed professional education, as it includes learning processes and experiences outside of educational institutions in both the initial and ongoing learning for the professional practice. Changes in these workplaces requirements usually manifest themselves in the everyday work tasks, professional development provisions in educational institution decrease in their salience, and learning and development during professional activities increase in their salience.

There are a range of scientific challenges and important focuses within the field of professional learning. These include:

- understanding and making explicit the complex and massive knowledge that is required for professional practice and identifying ways in which this knowledge can best be initially learnt and developed further throughout professional life.
- analytical explications of those processes that support learning at an individual and an organisational level.
- understanding how learning experiences and educational processes might best be aligned or integrated to support professional learning.

The series integrates research from different disciplines: education, sociology, psychology, amongst others. The series is comprehensive in scope as it not only focuses on professional learning of teachers and those in schools, colleges and universities, but all professional development within organisations.

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ISSN 2210-5549 ISSN 2210-5557 (electronic)
Professional and Practice-based Learning
ISBN 978-3-031-12167-8 ISBN 978-3-031-12168-5 (eBook)
https://doi.org/10.1007/978-3-031-12168-5

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Series Editors' Foreword

The goal of the Professional and Practice-based Learning book series is to contribute to discussions about and processes for improving the enactment of occupational capacities through practice-based learning experiences for both the initial learning of those capacities and their ongoing development. A related goal is associated with understanding how particular cultural and social circumstances shape these forms of development. We know that conceptions and practices associated with occupations differ across social and cultural contexts and, of course, history. Equally, the institutional arrangements that come to support initial and ongoing development of occupational capacities also differ across nation states because of these factors. Hence, understanding more about the particular shaping of occupations and educational systems that support them provides a vehicle for elaborating two sets of cultural practices. These are, firstly, how occupations become constituted in a specific social and cultural setting, such as a nation state. Arising from history, cultural practices and societal needs, occupations stand as exemplars of culturally derived practices. Yet, and secondly, the same is true for the institutional arrangements that arise and are enacted to support the initial and ongoing learning of these occupations.

In this way, elaborating these two processes within a specific national context provides a way of understanding the distinctiveness of these cultural practices. New Zealand, as it is commonly known across the world, is transforming its national identity through a process of renaming to Aotearoa New Zealand. This change of name characterises significant societal changes to become more bicultural in many aspects of national life, the nature of its communities and institutions. Yet, this very change process is set amongst other challenges and changes. No nation state is immune from global factors and forces that are impacting upon its economy, concerns about natural environment and increasing societal inclusivity. It is this complex of factors that is represented within the contributions to this edited volume.

These contributions include an account of the historical development of vocational education and training set within a British colonial context amid its manifestations within a Pacific nation whose natural environment was subject to exploitation in the name of economic development. Like other countries, the form and reshaping of the vocational education system was a product of history and

responses to emerging challenges, which continue to this day. Central to the second section of this volume is the responsiveness to engaging Maori talent and being inclusive of Pacific People as well as being more gender inclusive. These changes mark distinctions in the evolution of this vocational education system and how the complex of cultural and societal concerns is manifested within changes to the evolution of this system. Those changes seem as much about justice and restoration as equity. Part of the manifestations of the Aotearoa NZ vocational education system are how the focus of and provision of vocational education is enacted to meet the specific needs of these communities, again indicating its distinctiveness. This includes the intermingling of vocational and higher education into the basis of a unified tertiary education provision, which again offers a hybrid approach. Yet, despite the distinct context, issues faced by vocational education systems globally, such as the engagement with online educational provisions and preparation of teachers, feature in the final section of this volume. Yet, all of these are set within the particular issues being addressed, institutional context and national sentiments associated with biculturalism. In this way, the editors make the point that vocational education is giving carriage to the social and cultural evolution of Aotearoa New Zealand at times of significant change.

To date, the volumes in this series have contributed a range of perspectives, approaches and outcomes to these discussions. This volume continues that tradition through its focus on how a vocational education system is evolving in a country at the time of significant social, cultural and economic transformations. In these ways, the volume makes a particular contribution to the field of professional and practice-based learning through exploring the intermingling of institutional mechanisms, practices and evolving national sentiments in this country. In this way, the volume stands as a detailed case study of the manifestation of these practices in a particular national context.

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Acknowledgements

Our especial thanks to the many experts, both international and in Aotearoa New Zealand, who gave of their time and wisdom in reviewing the contents of this book. Their contributions, knowledge, and cogent feedback are much appreciated. Our thanks also to the series editors for their support and encouragement, and to various colleagues at Ara Institute of Canterbury who assisted with editing and proofreading.

In this time of change, we would like to acknowledge the contribution of two organisations to vocational research. Firstly, the Industry Training Federation (ITF) which throughout its existence was a strong advocate for research into all aspects of vocational education and training (VET). In particular, the establishment of the annual NZ VET Research Forum was invaluable for providing the sector with a space to network, collaborate, share findings, and develop a sense of community.

Secondly, we thank Ako Aoteoara, the National Centre for Tertiary Teaching Excellence, for their support of VET research and practice. Through their national and regional project funding, Ako Aotearoa has made a major contribution towards the building of VET research capability and increased the visibility and reach of VET research through their support of many of the projects described in this volume.

Dedication

We dedicate this book to the people who together comprise Aotearoa New Zealand's vocational learning system: our educators, our workplaces, our developers, our researchers, and our apprentices, students, and other tauira.

'Ehara taku toa i te toa takitahi, ēngari he toa takitini'
My success is not due to me alone, but due to the strength of many.

Christchurch, New Zealand — Selena Chan

Wellington, New Zealand — Nicholas Huntington
May 2022

Contents

Acronyms

ACE	Adult and Community Education
CoVE	Centre of Vocational Excellence
EFTS	Equivalent Full-Time Student – for funding students enrolled in ITP programmes
ICT	Information and Communications Technology
ITF	Industry Training Federation
ITO	Industry Training Organisation
ITP	Institute of Technology or Polytechnic
MBIE	Ministry of Business, Innovation and Enterprise
MIT	Manukau Institute of Technology
MoE	Ministry of Education
NCEA	National Certificate in Educational Attainment
NZQA	NZ Qualifications Authority
NZQF	NZ Qualifications Framework
PTE	Private Training Establishment
RSLG	Regional Skills Leadership Groups
RoVE	Reform of Vocational Education
STM	Standard Training Measures – for funding ITOs
TEC	Tertiary Education Commission
TES	Tertiary Education Strategy
TITO	Transitional Industry Training Organisation
TOPNZ	The Open Polytechnic of NZ
UNZ	Universities NZ Te Pōkai Tara
WDC	Workforce Development Councils

Part I
Context and History of Aotearoa New Zealand Vocational Education and Training

Chapter 1
Introduction – Reshaping for the Future: Challenges and Innovation

Nicholas Huntington and Selena Chan

Abstract Aotearoa New Zealand (NZ) has a well-established vocational education and training (VET) system that contributes towards the country's economic standing and social outcomes. As in many countries, however, current and imminent challenges have led to a reconsideration and reconfiguration of our system. This chapter provides an overview of successive shifts as economic, political, and social factors have impinged on the connection between education and work.

The chapter presents an overview of VET's development over time and its place in the wider Aotearoa NZ educational framework, including the impacts of socio-political-economic changes across the last 50 years. Additionally, the chapter presents and discusses the rationale for the range of topics and focus of this book. The NZ government's reform of vocational education (RoVE) as part of a wider review of NZ educational systems to meet the challenges posed by 'industry 4.0' on work are proposed as major reasons. The many difficulties RoVE seeks to ameliorate are not unique to Aotearoa NZ. As such, Aotearoa responses are likely to be of interest to many other countries seeking to ensure their VET systems provide for equitable and sustainable measures to meet the demands wrought by contemporary and future global and local issues. The chapter closes with brief overviews of the chapters in this volume.

Keywords Vocational education · New Zealand · Apprenticeships · Tertiary education · Workplace education · Reform of vocational education

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_1

Introduction

> The world around us is changing rapidly and our education system needs to keep up … Our proposals aim to ensure that the system is easier to navigate and provides the skills that employers and employees need. What we are proposing is ambitious, but it needs to be. We cannot continue to tweak the system knowing that the model is fundamentally broken, and isn't delivering our workforce the skills that they need to thrive. (Minister of Education, 2019)

On the 13th of February 2019 Aotearoa New Zealand's (NZ) Minister of Education, the Honourable Chris Hipkins, announced a wholesale restructure of the country's vocational education and training (VET) system. These changes, known as the Reform of Vocational Education (RoVE) programme, involve the disestablishment of sectors, the weakening of formal distinctions between 'on job' and 'off job' learning, new strategic bodies to steer the system, and the promise of new funding methods that will better reflect industry needs and social priorities. Collectively, the RoVE programme represents the most significant structural change to vocational learning in this country for thirty years.

As the excerpt from the Minister that opens this chapter illustrates, the RoVE programme has been framed as a response to both internal and external challenges. While many would disagree with the claim that VET in Aotearoa NZ has been "fundamentally broken", complaints about the system have been common. These include that VET provision is inconsistent across the country, that organisations compete rather than cooperate, that policy incentives reward perverse behaviours rather than meeting the needs of learners, employers, and society, and that the pre-reform system was financially unsustainable (see for example Minister of Education, 2018; Ministry of Education, 2018).

Beyond addressing these issues, however, the reforms are also positioned as a response to wider trends and pressures, many of which confront educational systems worldwide. As a small and outward-facing country, Aotearoa NZ has always been strongly affected by changing global trends. Current major international shifts in the nature of how people live and work are no exception as we face the same types of highly complex challenges as other countries. Aotearoa NZ is firmly in a period of 'demographic disruption' in terms of ethnic diversity, age structure, and fertility, as well as the ongoing concentration of population and economic growth in a small number of regions – most notable the 'golden triangle' of the upper North Island (Kiernan, 2018; Spoonley, 2020). At the same time, the country has begun to more directly and explicitly grapple with the legacy of colonisation and address the negative consequences of economic reforms in the 1980s and 1990s.

Economic and industrial transformation is likewise creating pressure for change. Much has been written on the challenges posed by rapid technological transformation, shifting global markets and trade patterns, and the disruptions caused by pandemics and climate change (see for example, Acemoglu & Autor, 2011; Autor, 2015; CEDEFOP, 2020; Chakroun, 2015; Sakamoto & Sung, 2018; World Bank, 2019). These issues are as relevant to Aotearoa NZ as elsewhere, as we face the need to ensure both economic and social prosperity by addressing the implications of

these changes for how we live and work (Business NZ and CTU, 2021; NZ Government, 2019; NZ Productivity Commission, 2020).

In this context, the government's reform programme is an ambitious response to the types of challenges that many countries are facing. It represents an attempt to reshape the national VET system in a way that reflects the future of employment, learning, and society. This involves not only adapting approaches to VET to reflect these changes, but also enabling it to better contribute toward building the capabilities that Aotearoa NZ will need to prosper now and into the future. The reform programme therefore presents not only a case of dramatically restructuring a national VET system, but also one of a government implementing a model that is specifically intended to reflect the early Twenty-First Century environment. As it progresses, RoVE will inevitably involve a combination of successes and failures, and these will generate clear lessons for other jurisdictions seeking to reform their VET systems.

Rationale for This Book

The chapters in this book present a picture of VET in Aotearoa NZ on the cusp of change. Over recent decades the diversity and relative autonomy of providers, alongside the flexibility of the qualifications regime, has provided an environment in which different approaches to pedagogy, support for learners, curriculum, and delivery structures have been enabled to flourish. While it may have grown from an English seed, our approach to vocational learning has developed distinct characteristics and produced innovative, creative, and in some cases world-leading practices.

One of the most visible and dramatic outcomes of RoVE will be the merger of various sectors that provide or manage VET into a single large public entity: Te Pūkenga (the NZ Institute of Skills and Technology or NZIST). The 16 Institutes of Technology and Polytechnics (ITPs) have been incorporated directly into this new institution; as of the first of April, 2020 they have been operating as subsidiary entities of Te Pūkenga, and by the end of 2022 they will be completely absorbed into its structure. Industry Training Organisations (ITOs) are being disestablished, with many of the trainees they manage being expected to transition into Te Pūkenga over a similar timeframe. At the end of this process, Te Pūkenga will dominate VET provision in the country and in terms of student numbers will become the thirty-fifth largest tertiary institute in the world (Te Pūkenga, 2020).

Given this, it is an opportune moment to collect and collate the many ways VET has been enacted across the system. Rather than looking across the entire spectrum of provision, however, our focus in compiling this book has been on the 27 organisations that will effectively cease to exist once the reforms have been fully enacted. Private Training Establishments (PTEs) and Māori-led wānanga will continue – although the reforms will affect both those sectors and the way individual providers operate. For ITOs and ITPs, however, fully implementing the reforms will mean the end of systems that have been in place for decades.

As detailed in later chapters (see Chaps. 2 and 3), these sectors have rich histories. Their aims, visions and purposes have been honed over the years through their deep associations with the people, iwi, industries, employers, and regions they serve. Through meeting their obligations to stakeholders, each has developed systems and approaches most effective for their circumstances. Much innovation has been undertaken across all organisations, leading to positive outcomes for their learners. The Industry Training system, for example, has been recognised internationally for its responsiveness to industry/employer needs (Sung et al., 2006).

This volume seeks to record some of these innovations, processes, and initiatives, providing a means to archive these for future reference and enabling these practices to be made visible and shared across Te Pūkenga and other providers. The range of topics across this volume, provide a 'snapshot' of how vocational learning is enacted across both the workplace-led and provider-led sectors.

Setting the Stage: Historical Context

Aotearoa NZ's approach to VET is intertwined with its broader social and economic development. Internationally, we are often perceived as a young country. Settlement first began with fleets of waka arriving from the Pacific in approximately the fourteenth century CE, making this the last major landmass to be settled by humanity. Māori civilisation then expanded to span the full extent of the country, reaching as far as the remote Rēkohu/Chatham Islands. Although the very first European contact with Māori occurred in the seventeenth century, it was not until after the arrival of James Cook in 1769 that non-Māori – mainly sealers and whalers – began visiting the country.

The 1840 Treaty of Waitangi/Te Tiriti o Waitangi between the British Crown and most iwi (tribes) represents the foundation of Aotearoa NZ as a state. Following its signing, further immigration soon followed and this rapid settlement and accompanying desire for land – actively aided in many cases by the colonial government – brought conflict between the Crown and Māori. The combination of rapid settlement, expulsion, and other effects of colonisation embedded deep structural inequities in Aoteaora NZ. Within decades Māori had become marginalised in their own country, with the population falling as low as 42,000 (6% of the national population at the time). Māori were encouraged to assimilate into Pākehā culture and society, and the country developed as one designed for the majority-Pākehā settlers. The multigenerational scarring effects caused by colonisation – both direct and indirect – can be clearly seen today. In almost every social, economic, and health-related indicator Māori continue to experience poorer outcomes than non-Māori (Marriott & Sim, 2015; Poata-Smith, 2018; Stephens et al., 2020).

As Maurice-Takerei's (2016) comprehensive whakapapa of vocational education and training notes, the first glimmerings of a VET system stretch back to these first decades of the country's existence. As early as 1865 the Masters and Apprentices

Act regulated aspects of apprenticeship relationships, albeit arguably with little force until it was combined with later labour market legislation. In general, however, vocational education in this period was informal and left to the devices of individual workplaces. Lacking a significant manufacturing base and able to rely on an ongoing supply of skilled migrants, there was little pressure for Aoteaora NZ to develop a more regulated system (Abbott, 2000).

The provision of institutional VET commenced at the turn of the nineteenth century with the establishment of technical classes in schools. This was followed by the formal creation of separate Technical High Schools through the 1908 and 1914 Education Acts. These evolved due to concerns that secondary schools of the time were designed as elite pathways to university and concentrated on academic subjects over technical learning; Technical High Schools effectively bridged the gap between the end of primary school and entering employment (Maurice-Takerei, 2016). However, they also suffered from a lack of social esteem and investment and embedded class differences (Openshaw et al., 1993; McKenzie, 1992). Technical Schools were associated with what would now be termed 'poor career pathways' as their narrowed curriculum effectively closed off options for people from working class backgrounds (Reid, 2000). As Guscott (2000, cited in Maurice-Takerei, 2016) puts it, they were a vehicle for social control that "taught students … to stay in the working class and come out into a working-class job" (p. 60).

The country's first true apprenticeship system arrived in 1923, with legislation formalising how such relationships should function. This included creating apprenticeship committees, setting national training standards, and establishing entitlements to wages and conditions for apprentices – entitlements that were strongly opposed by employers at the time as an inappropriate intrusion on their business models and employment relationships (Murray, 2001). At this point, with the Technical High Schools firmly established and the Apprentices Act 1923 in place to regulate initial in-work training, Aotearoa NZ's VET system had moved from a juvenile to a more mature position.

The country's post-World War Two prosperity and near-full employment saw a surge in VET, but technological shifts and trends such as automation also created significant demand for more advanced skills than the system was seen to be delivering (Maurice-Takerei, 2016). Meanwhile, post-war labour shortages led to measures intended to encourage the attractiveness of skilled trades and reduce reliance on immigration, including further regulation of apprenticeships through the Apprentices Act 1948. Targeted Māori Trade Training schemes were established both to address labour force issues and promote the assimilation of Māori into urban society. By 1957, the country had one of the highest rates of apprenticeship amongst school leavers in the world (Murray, 2001).

These trends led to the abolition of Technical High Schools in the early 1960s. That secondary schools should provide a broad-based education irrespective of class or career now dominated views on education policy (Reid, 2000), and VET was seen as more appropriately provided by a dedicated class of post-secondary providers. The existing urban Technical Schools were divided into a secondary

institution and a new class of technical institutes (or polytechnics).[1] Regional Community Colleges emerged in the 1970s and quickly developed a vocational focus; these were later to form the regional core of the Polytechnic network. At this point, vocational education largely left the schooling system. Technology and applied classes were still part of the school curriculum, but education connected to work was seen as the role of apprenticeships or the programmes offered by technical institutes (Dougherty, 1999).

The general stability of post-war Aotearoa NZ society was dramatically shaken in the 1970s and 1980s. The country's infrastructure and economy had developed to support its role as a supplier of agricultural products to 'the motherland', and much of the country's social structures and aspirations were tied to those of the UK (or England at least). The UK's entry to what was then the European Economic Community (EEC), saw the end of an effectively guaranteed market for the country's core exports, and unemployment began rising. Social changes exposed significant ethnic fault lines in the country. A strong Māori-led movement demanding that the government honour the principles of Te Tiriti emerged, involving marches, land occupations, and the renewed celebration of Māori culture (sometimes referred to as the 'Māori renaissance'). Conversely, while migration from Pacific countries had been encouraged while the economy was strong, the economic downturn led to the National government moving to deport large numbers of migrants from these communities. Such tensions reached a flashpoint in 1983, when a tour by the national rugby team of apartheid South Africa became the source of mass division within the country.

In this environment, the election of the fourth Labour government in 1984 marked one of the most significant periods of disruption in the country's history. Despite the party's centre-left origins, the David Lange-led government immediately embarked on a massive programme of market-based reform, altering almost every aspect of Aotearoa NZ's economic and social infrastructure. As one of the most prominent and extreme examples of the 'neoliberal wave' that crashed across many countries in the 1980s, the government pursued a policy programme involving mass deregulation, reduced public support for people and industries, and an emphasis on the virtues of open competition. These reforms were accelerated under the right-wing National government elected in 1990, which introduced further dramatic cutbacks to government support, privatisation and corporatisation of public services, measures to encourage de-unionisation, and market-oriented policy reforms.

Participation in apprenticeships fell significantly over the 1980s, although varying explanations have been provided for this. Some point to the government's overall reforms as prompting the decline in apprenticeships due to the breakup of large state agencies that invested in training, deregulation of the labour market, and the elimination of direct support for firms that trained (see for example Abbott &

[1] The former Wellington Technical School, for example, was divided into Wellington High School and Wellington Polytechnical School.

Doucouliagos, 2004; de Bruin et al., 2006). On the other hand, employers at the time had also come to see the apprenticeship system as cumbersome, inflexible, and increasingly poor at reflecting industry needs (Department of Labour, 1989; Green et al., 2003; Ministry of Education, n.d.). Murray (2004) also points out that the late-80s economic downturn meant that in simple terms, far fewer employers were able to support apprenticeship training.

Education was deeply affected by the radical changes of this nearly two-decade-long period of reform (Mclaughlin, 2003). At the end of the 1980s, the Picot (1988) Taskforce's *Administering for Excellence* report and the Hawke Report (1988) on Post Compulsory Education and Training each harshly criticised the education system for being unresponsive, over-regulated, and dominated by centralised bureaucracies. In response, tertiary education policies throughout the 1990s emphasised increasing participation by students and competition between education organisations. This included significant changes allowing private education providers access to public funding, the recognition of wānanga as a specific class of tertiary institution, removing caps on the total number of students who could receive publicly subsidised education places, and removing restrictions on who could offer particular types of courses.

An important element of this was the blurring of distinctions between 'higher' and 'vocational' education in favour of a notionally unified tertiary education system that theoretically treated all forms of education equally. Following the passage of the Education Act 1989, polytechnics were no longer confined to 'non-academic' subjects and gained the ability to offer degrees, but in return they faced greater competition for students. Private providers entering the system concentrated on vocational programmes and so directly competed with ITPs, but even more significant was the early 1990s replacement of the apprenticeship system with an 'industry training' system.

This new model was built around non-government Industry Training Organisations (ITOs) who oversaw vocational education for a given industry. These organisations existed as private not-for-profit entities, who applied for ministerial recognition based on demonstrated support from the industry they oversaw. This model was intended to provide industries with greater autonomy and direct control over their training arrangements by enabling them to directly set qualifications and control apprenticeship funding (Green et al., 2003). Through their ITO, an industry could theoretically control the qualifications available for workers in a sector and ensure that they accurately represent the skills needed to work in given roles. Although many expected ITOs to use funding to purchase programmes from polytechnics or private providers (Maurice-Takerei, 2016), a combination of factors – including the significantly lower per-learner funding available for industry training – soon led to ITOs becoming 'pseudo-providers' who directly managed in-work learning relationships.

The Modern VET Landscape: The Backdrop to RoVE

After 1992, Aotearoa NZ's vocational system was effectively split into two: a workplace-led system managed by industry-owned ITOs on the one hand, and a provider- or classroom-led system involving polytechnics (now known as ITPs), private providers, and arguably one wānanga (Te Wānanga o Aotearoa) on the other. At the same time, the notion of VET as a distinct sector of education began to weaken, as government policies focused on the notion of building human capital (Eagle & de Bruin, 2000) and *all* education took on a vocational tinge – though, somewhat ironically, with higher education implicitly or explicitly seen as creating more capital than vocational education. Developing strategies or settings specifically to support VET was subsumed within the strategic development of tertiary education in general.

Industry training maintained a clear identity in this environment given that it was founded on a separate funding system, policy settings, and organisation type. Importantly, it also occurred largely outside the physical boundaries of education organisations; industry training was not only conceptually separated from the world of 'educators' but materially detached as well. For provider-led VET, however, 'vocational' education simply became one strand amongst many, defined solely by its location on the National (later New Zealand) Qualifications Framework (NQF or NZQF). This in turn locked in its status as an inherently less complex and sophisticated form of learning than degree level education, arguably exacerbating the existing disparity of status between academic and non-academic learning (BCITO, 2017). Moreover, changes to the structure of apprenticeships appear to have been poorly communicated at the time, leading to a common public perception that such learning had been abolished.

The reforms of the 1990s were highly successful at increasing participation in post-school study – especially at degree level. However, they also resulted in significant problems, including a proliferation of low-quality courses, enrolments in expensive (both for individuals and the government) programmes with poor outcomes, and organisations directing large amounts of public funding towards competitive activities rather than improving education outcomes. Following the election of Helen Clark's Labour-led Coalition government, this led to the appointment and recommendations of an independent Tertiary Education Advisory Commission (TEAC) in 2000.

The Commission's recommendations, spread over four reports (TEAC, 2000, 2001a, b, c), marked the beginning of a more strategic approach to post-compulsory education. More attention was paid towards aligning tertiary education with economic and social priorities, and funding allocations became determined via investment plans negotiated with education providers (rather than tied directly to enrolments). The concept of a Tertiary Education Strategy (TES) – a ministerial document setting out a five-year strategic direction for the entire post-secondary education system – was introduced, alongside a stronger policy focus on achieving 'good quality outcomes' over simple participation, including raising completion rates, greater progression to higher study, improved employment outcomes and the

like. One of the most significant outcomes of TEAC's proposals was the establishment of a single body to take over responsibility for the funding of almost all post-compulsory education: The Tertiary Education Commission (TEC).

Following the TEAC reforms, changes continued to occur around the edges of the system. The Review of Qualifications process initiated in 2008 altered how sub-degree qualifications were developed and offered, while the 2011 Review of Industry Training by the National government led to a drastic reduction in ITO numbers as organisations were 'encouraged' to merge. But by the early 2000s the contours of the system as it would function for the next 16 years or so were in place. The 'Pre and Post RoVE Vocational Education key structures and key actors' sections on the following two pages set out the major differences.

A key theme of policy since the 1990s has been the collective role of tertiary education as a factor in economic – and thus national – productivity. The apex of this was the creation of the portfolio of Tertiary Education, Skills, and Employment in 2010 under prominent National Party figure Honourable Steven Joyce, especially given Joyce was also appointed Minister of Economic Development soon after. Under his oversight, the 2014 to 2019 TES was prepared jointly by the Ministry of Education and the Ministry of Business, Innovation, and Employment (MBIE). Moreover, it defined the first priority of the tertiary education system – not just vocational learning – as being "Delivering Skills for Industry", as well as more broadly stating that Joyce desired policy, regulation, and delivery to

> concentrate on ensuring that the tertiary education system performs well, not just as its own system, but also as a part of the wider New Zealand economy.... addressing changing skill needs so that the skills gained in tertiary education link to employment opportunities in the labour market. (Minister for Tertiary Education, Skills and Employment, 2014, p. 6)

During this period the New Zealand Productivity Commission was also directed to undertake an inquiry into tertiary education, with part of its terms of reference referring to ensuring that the system was able to respond to skill demands (NZ Productivity Commission, 2017). Its eventual report, however, largely focused on deregulating tertiary education to promote market responsiveness. It appears to have had little visible influence on policy work or thinking.

The Labour party had continued its focus on skills while in opposition, with its Future of Work programme and associated report including skills as key areas (New Zealand Labour Party, 2017). However, this work was concentrated primarily on issues of supply rather than demand or utilisation. The Party's interest in skills continued following their accession to power from 2017 and the appointment of Honourable Chris Hipkins as Minister of Education. The most recent Tertiary Education Strategy continues the focus on connections with the world of work, although this is phrased more in the language of social wellbeing and 'serving the learner' than the 'serving industry' framing common under National (Minister of Education, 2020). Reforms to the main secondary schooling qualification proposed in 2018 placed more emphasis on connecting qualifications to career pathways and progressions (Ministerial Advisory Group, 2018). And most visibly, the Reform of Vocational Education programme has an explicit goal of making the system more

responsive to the skill needs of learners, employers, and regions (Ministry of Education, 2019).

Pre-RoVE Vocational Education and Training: Key Structures

The New Zealand Qualifications Framework: A 10-level unified framework on which every formal qualification in New Zealand is listed, from foundation and school qualifications at levels 1 to 3, to Doctorates at Level 10. Degrees sit at level 7 while vocational programmes are generally classified at levels 3 to 6; most apprenticeship qualifications sit at Level 4. Competence-based Assessment Standards (mainly Unit Standards developed by ITOs, but also Achievement Standards based on the national school Curriculum) are also aligned to this Framework.

The Ministry of Education: The core government education agency, with responsibility for monitoring the overall performance of the education system, including its strategic goals and priorities. The Ministry has a direct role in the compulsory sector (paying teaching staff, developing the national curriculum, administering property etc.), but its role in the tertiary sector and VET space is primarily focused on policy advice.

The New Zealand Qualifications Authority: The primary education quality assurance agency, with oversight of qualifications, programmes, and tertiary education organisations other than universities. The Authority administers the process of listing qualifications on the NZQF, which makes associated programmes eligible to receive funding and students eligible for public financial support. It assures organisational quality through an evaluative regime known as Self Assessment and External Evaluation and Review (SA-EER).

The Tertiary Education Commission (TEC): The Commission manages funding of the tertiary system, as well as monitoring the performance of individual tertiary education organisations against the activities it contracts them to provide. It also incorporates the formerly independent Careers NZ service, which provides public advice on career options. The Commission operates at arms-length from the government to prevent ministerial influence over individual funding decisions.

The Ministry of Business, Innovation and Employment (MBIE): Although not part of the education and training system, MBIE undertakes analysis and provides advice to government on issues related to the labour market, firm performance, industry regulation, and similar functions. It also incorporates Immigration New Zealand, which administers the immigration system and advises on migration policies. In these roles it undertakes workforce forecasting, manages skills shortage lists, and similar activities relevant to VET.

Pre-RoVE Vocational Education and Training: Key Actors

Institutes of Technology and Polytechnics (ITPs or 'Polytechs'): Large, multidisciplinary providers offering programmes at sub-degree through Bachelor's level as well as a limited number of specialist postgraduate programmes.* ITPs also supported research, but of a much more applied nature and to a lesser extent than universities. Prior to the RoVE reforms there were 16 ITPs, and in 2019 28% of vocational learners enrolled with these providers.**

Wānanga: Specialist providers of education that is informed by indigenous Māori perspectives and approaches to knowledge and learning. While most learners at wānanga identify as Māori (55% in 2020) they offer education for students of all ethnicities. There are three wānanga, with one of these (Te Wānanga o Aotearoa) having a strong focus on VET programmes; in 2019 4% of VET learners were enrolled here.

Private Training Establishments (PTEs): Privately owned and operated providers that receive public funding. Although most are for-profit businesses, others are trusts or charitable organisations such as providers of religious education, community providers, and some specialist government training organisations. A PTE generally specialises in education for a particular industry, sector, or purpose (in contrast with the multidisciplinary nature of ITPs). In 2019, 13% of VET learners enrolled in this sector.

Industry Training Organisations (ITOs): Industry-based skills bodies similar to the UK's Sector Skills Councils, Canadian Sector Councils, and Australian Industry Skills Councils. Rather than being set up by the government, they were independent bodies – usually charitable entities – established with industry support that then apply for recognition as an ITO.*** Unlike most of their international counterparts, however, as well as developing qualifications, ITOs also organised training at the level of individual trainees and firms. This could include contracting providers to deliver courses, or arranging for training and assessment to happen 'on the job' within a workplace. Prior to the RoVE reforms there were 11 ITOs, and in 2019 these accounted for 57% of VET learners.

Secondary Schools: Several dedicated initiatives exist to support VET and/or raise its profile in schools. The Vocational Pathways initiative is an overlay on the main school-leaving qualifications that provides structure and a badging opportunity built around six broad industry groupings. Specific programmes such as Gateway and Trades Academies allow students to experience workplace learning while at school or a vocational provider (usually but not always an ITP). And some ITOs developed specialised offerings for schools to use, such as the BCATS suite of resources, standards, and qualifications for building pathways.

(continued)

*Along with universities and wānanga, ITPs are known as Tertiary Education Institutions (TEIs) or public providers, as the government considers itself to have a level of ownership interest in them. The extent of this interest has historically been the subject of some debate between the government and these organisations.
**Statistics in this section are taken from Education Counts (2020a, b).
***The criteria and grounds on which a Minister could grant recognition as an ITO were set up in the Industry Training Act, 1992, which was repealed as part of RoVE and ultimately replaced with the Education and Training Act, 2020.

Exploring Educational Innovation

This book's title alludes to the concept of innovation as characterising the Aotearoa NZ VET system. Innovations within educational systems may be viewed as changes made to an existing process, system, or approach, to enable it to better meet outcomes for learners and stakeholders. Serdyukov (2017) proposes that increasing the quality and scale of innovations in education may enhance educational experiences and outcomes positively and benefit the whole society. Similarly, innovation does not occur in a vacuum; it is a response to societal, economic and/or political challenges or pressures.

As shown through the preceding parts in this chapter, broader social trends in Aotearoa NZ have affected our VET system, its associated philosophies, and the approaches to learning and teaching that have ensued. Colonisation, relationships to the United Kingdom, social reform, and economic transformations have all shaped how vocational practices have evolved and innovated. The innovations described throughout the chapters in this book reflect the ways various sectors or components of Aotearoa NZ's approach to VET have worked through ongoing socio-historical-political mandates/direction.

Summary of Chapters

The book is organised into five parts. Following are brief overviews of each chapter.

The first part – History and Context – provides a descriptive grounding for the chapters that follow. The first two chapters discuss the two sectors – ITOs and ITPs – that have dominated vocational learning in Aotearoa for the past three decades. Each chapter appraises the role and contributions of each sector with

reference to present challenges and initiatives. Both these chapters have been collated by authors with long associations and relationships with their sectors and adopt an autobiographical approach that foregrounds their lived experiences of these two strands of VET.

In Chap. 2, Josh Williams discusses the ITO sector. The rationale for the formation of ITOs is summarised, and the influence of and innovations made by ITOs in workplace-based training and education over the years are presented. In Chap. 3, Jim Doyle presents a perspective on the role and evolution of ITPs through various policy and educational reforms across the last 40 years. This chapter emphasises how policy leadership and direction has impacted on the way in which ITPs have changed and adapted over time.

Across Chaps. 4 and 5, Nicholas Huntington then provides an overview of the Reform of Vocational Education (RoVE) programme. Chapter 4 focuses on the context and development of the RovE proposals, while Chap. 5 concentrates on the implications and possible outcomes of the reforms. This includes highlighting some key challenges that will face actors in the post-reform landscape.

Part II– Biculturalism and Equity – explores the social dimensions of VET. These chapters convey and detail how the vocational system in Aoteaora NZ has worked towards addressing inequities within the system itself and improving the position of groups within wider society. Kelli Te Maihāroa, Janine Kapa and Eruera Tarena opens the part with Chap. 6's presentation of a collaborative effort between an ITP and Māori to promote access and rebalance inequities in previous education experiences of iwi (tribal) leaders. The initiative they describe supports candidates to complete qualifications through recognition/assessment of prior learning (A/RPL) processes. Mātauranga Māori (Māori knowledge and epistemological frameworks) informs the way in which life experiences are celebrated and codified, thus creating positive outcomes.

In Chap. 7, Nicky Murray and Laloifi Ripley present Pacific workplace learner voices. The various initiatives introduced and developed to support Pacific workplace learners are presented with an emphasis on how these programmes have impacted on the lives of these learners, both within the workplace and beyond into their communities and whānau. The chapter introduces the importance concepts of ako (teaching and learning), mahi (the importance of workplace relationships and connections), and aiga (empowerment) as underpinning supportive workplace learning for all learners in Aotearoa NZ.

The last chapter in this part presents work undertaken to encourage and support women into trades training and occupations. In Chap. 8, Kylie Taffard and Nicky Murray detail the historical evolution and rationale for undertaking initiatives to support the entry and completion of women engaged in trades training. It is only after four decades of government and industry programmes that small increases of women are being seen across many traditional trade occupations. The chapter discusses some reasons for the challenges and provides contemporary details and critique of the present schemes to support women in the trades.

Part III introduces innovations in programmes for foundational learners and 'traditional' VET programmes. Firstly, Chap. 9 by Anne Alkema presents models of learning for supporting workplace learning. Here, models of how ITOs, ITPs, and industry have collaborated on the provision of support to workplace-based learners is presented and discussed. These models represent examples of how these sectors have worked together to enable effective learner experiences. The chapter includes some envisioning of how the collaborative models presented in the chapter may inform the post-RoVE future of VET provision.

Chapter 10 represents collaborative work between university-based linguists and ITP-based teachers/tutors to understand better 'the language of the trades'. In this chapter, Jean Parkinson, Averil Coxhead, James MacKay and Emma McLaughlin argue for the need to recognise the literacy and numeracy complexities inherent in trade occupations. The project studied the use of written and spoken language across trades including the building (carpentry), plumbing, engineering (fabrication) and electrical trades. Of particular note is the generation of a corpus of words used in each trade discipline and the beginning of work into translating these into Tongan.

Chapter 11 by Stuart Middleton focuses on transitions through secondary school/tertiary institution-based programmes. These include programmes such as Gateway, Trades Academies, and Vocational Pathways which help connect school students to the world of work and the opportunities offered by VET. The evolution and structure of these 'school and work' VET programmes is rationalised and detailed. Evidence of the impact of these programmes on students is also provisioned and discussed.

Part IV covers innovations made at degree level VET learning. As explained in the above parts and in Chap. 2, ITPs were granted the right to award degrees in 1989; in 2020 about a third of all ITP provision was in degree, graduate certificates/diplomas, honours, masters, and doctoral programmes (Education Counts, 2020b).

Chapter 12, by Selena Chan, Amitrajit Sarkar, Bernadette Muir and Karen Neill provides examples and recommendations for the implementation and support of project-based learning in ITP programmes. The chapter uses a case study methodology to detail how three programmes (Architecture, Broadcasting and Information and Computing Technology (ICT)) have structured courses to provide authentic learning through project-based learning approaches. The commonalities, challenges, and recommendations for developing and supporting project-based learning were derived through case study process tracing.

Chapter 13 by Richard Mitchell and Adrian Woodhouse (with contributions from the teaching team) narrate the evolution and development of the Bachelor in Culinary Arts (BCA). This programme is not premised on traditional curriculum structures of classical cookery training but instead founded on principles of design thinking. The chapter challenges the perceived approaches for preparing learners for employment in various sectors of the food industry. It also details the journey taken by the teaching team, to challenge long standing pedagogical approaches for the teaching and learning of cookery towards the philosophical adoption of a learning-centred curriculum.

In Chap. 14, Roger Birchmore, John Blakeley, Edward Chai, Jonathan Leaver, Wei Loo, Randall McMullan, David Phillips, Lusa Tuleasca, and Hugh Wilson

present the description, rationale and delivery mechanisms of the Bachelor in Applied Engineering (BEngTech) which is a shared qualification and delivery arrangement across six ITPs. The chapter details the drivers and rationale for the development of the BEngTech and presents details on the evolution of the collaborative 'management' and continual review and improvement of the programme.

The last chapter in this part, by James MacKay and Hanna Cadzow, covers the emergence of Degree Apprenticeships in Aotearoa NZ. As in many other countries, these are developed to provide accreditation for specialised occupations which are new or evolving due to changes in technology or industry, and/or occupations which are integrations or specific niches of traditional work roles. The authors detail the consultative and collaborative curriculum development of a degree and report on its pilot iteration and evaluate the pilot's efficacy.

The fifth part – Distance, online and digitally supported VET – includes three chapters focused on digitally-supported learning. To set the scene, in Chap. 16 Mark Nicholls delineates and defines the terms 'distance' and 'online' education. These terms are often confused, and this chapter argues for the adoption and shared understandings of clear definitions, to ensure the potential benefits of both distance and online education are maximised.

Chapter 17 by Tim Thatcher uses a case study to illustrate an 'ecological' approach to the design of learning in practice-based learning. Given the primary emphasis on practice-based learning across many VET programmes, there is a need to better understand how to design programmes of learning, and especially programmes using high levels of digital technology, that can cater to the specialised nature of practice-based learning and the needs of VET learners. The requirement to utilise holistic learning design is introduced and discussed, as a way to ensure the authenticity and effectiveness of learning design's contribution towards such learning.

Chapter 18, by Rea Daellenbach, Mary Kensington, Kathleen Maki, Michelle Prier, and Melanie Welfare summarise details of the networked distributed model of delivery to support midwifery education. The various ways midwifery students develop their skills, knowledge and professional/cultural identity are detailed. The approaches include extensive work-integrated learning supported by online learning and face to face tutorials, which include vertical integration of learner cohorts situated in proximity to their home. The application of Kaupapa Māori and Pasifika values, the deployment of eportfolio, and the introduction of virtual reality (VR) to support the initiation of novices into midwifery practice, are also detailed in this chapter.

The final part – Teacher Education – focuses on the important aspect of VET teacher professional development and education. In Chap. 19, Lisa Maurice-Takerei and Helen Anderson critique the present professional development provisions for VET educators in Aotearoa NZ and propose a way forward. They argue that the VET teaching workforce is key to the quality of learning experienced by VET learners, and requires greater attention as a policy goal. Initial and continual professional development is positioned as of importance, both in terms of the pedagogy of VET practice and regarding vocational teachers' discipline currency.

The book's concluding chapter by the editors Selena Chan and Nicholas Huntington, explores the preceding chapters and considers them with respect to how these innovative practices, models, frameworks, and approaches, may inform Te Pūkenga's development. Of note is consideration of the charter governing Te Pūkenga's aims and objectives, and the various proposed functional elements and 'service concepts' informing its operational model. The chapter matches some of the existing provisions presented through the volume and postulates how these align to Te Pūkenga's goals.

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Chapter 2
Industry Training Organisations: A Perspective on History, Evolution, and Innovation

Josh Williams

Abstract In this chapter, the author draws on his interrelationship with Industry Training Organisations (ITOs) to provide an 'insider' overview of the evolution and applied systems innovated and developed through the 30 years of their existence. The chapter is an autoethnographical account elicited through reflection on personal experience and the strong relationships built through association with the ITO and wider VET sectors; and reports on the key instances defining ITO history.

Keywords Reform of VET · VET history · VET policy · VET systems · Industry Training Organisations (ITOs)

Introduction and Overview

This chapter is about the 30-year-old industry training model in its final months of existence. As Huntington outlines in Chaps. 4 and 5 (this volume), the present Government's Reform of Vocational Education (RoVE) is unbundling the statutory roles and responsibilities of Industry Training Organisations (ITOs) and reallocating them to new and existing entities as part of a major structural reform of the VET system in Aotearoa New Zealand (NZ). The author was the Chief Executive of the Industry Training Federation (ITF) between 2015 and 2020, following a role as Senior Policy Manager and Programme Manager at the Ministry of Education. This chapter summarises his perspective from his intimate association with the work of ITOs and its contributions to Aotearoa NZ VET.

The 30-year-old legislation underpinning the ITO system was repealed in April 2020 (NZ Legislation, n.d.-a), and the eleven ITOs that existed now operate under a transitional recognition which expires at the end of 2022. The transitional ITOs

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_2

(TITOs) continue to support employers and learners in the wake of the COVID-19 pandemic, while simultaneously preparing formal transition plans outlining their intentions for transferring their roles and responsibilities. These are being transitioned across to the new Workforce Development Councils (WDCs) for standard setting, and to vocational providers for the management and support of formal workplace-based traineeships and apprenticeships.

The merits of these changes – in theory, in practice, and in magnitude – are not the subject of this chapter, and the proverbial 'jury' will be out for some time. In the meantime, events such as COVID-19 will undoubtedly alter the VET landscape in ways that confound the variables; we may never have a very clear picture of whether RoVE was a good idea or not.

However, this moment does make it important to reflect on several unique elements of the ITO approach, which has evolved and innovated over the 30 years. In this chapter, I set out some key benefits of ITOs as an example of an industry-led training model; the reasons why bundling the standard setting and training support role were seen as advantageous; and why industry ownership of the ITOs was itself a lever for ensuring quality and matching supply and demand for skills.

In traversing ITO history, I particularly want to reflect on the critical role of employers, industry training, and the broader vocational education system. The reason is twofold: firstly, employers are not changing as a result of the RoVE restructure. They will continue to demand skills, require support, and often infrastructure, to undertake training, at least with respect to the formal training system. Secondly, irrespective of how Aotearoa NZ's, or any other VET system is structured, employers are both a participant in any work-based training process, and ultimately the judge of the value of the training.

In other words, roles, structures, and responsibilities in the VET system can take any number of permutations, but unless an employer values the training, recognises the skills, and trusts any associated credentials, then the learner doesn't reap the benefit of upskilling. If there isn't an employer involved at some point, then it is not very "vocational".

I also want to make some observations on the way through about what employers in New Zealand say and do when it comes to training, and how the ITO system operated and responded in that context.

The 1992 Model

ITOs were one outcome of a set of educational reforms in the early 1990s, and their history is intertwined with those developments. The 'Learning for Life' policy reforms resulted from Professor Gary Hawke's Post-secondary education and training report in 1988 (Hawke, 1988) sparked a number of developments designed to support just that – learning for life, and as a result bequeathed a competency-based qualifications framework (one of the first examples in the world (New Zealand Qualifications Authority (NZQA), n.d.); the notion of a lifelong record of

achievement; and an appreciation that learning extended beyond schools and tertiary education institutions into workplaces – and that this learning could be formalised and connected to a national qualifications system (Hawke, 1988).

By that time, Aotearoa NZ already had a long history of apprenticeships dating back to the Master and Apprentice Act of 1865 (NZ Legal Information Institute (NZLII), n.d.), but these were not connected to the formal education system. Apprenticeships were a labour market intervention, rather than part of the formal education system. The pre-1992 system was overseen by the Department of Labour and administered via regional apprenticeship committees (Murray, 2001). These apprenticeships were also time-based rather than the post-1992 NZQA competency-based approach, with a significant proportion of the apprentices employed by government departments, via the Ministry of Works, the New Zealand Post Office, and Railways (Murray, 2001).

Meanwhile, employers and business lobbyists had been increasingly complaining about the number and quality of graduates coming from the technical colleges and polytechnics. The resourcing system at that time rewarded 'inputs' in the form of enrolments, rather than 'outputs' in the form of programme or qualification completions, let alone 'outcomes' in the form of successful transition to jobs and industries (Ministry of Education, 2012). This incentivised institutions to offer programmes of study based on what students wanted rather than industry needs or labour market requirements.

Centre-right ministers of the day agreed with the employer and business lobby and were also influenced by the levels of industry ownership and control over training in the 'dual system' countries like Switzerland and Germany (Industry Training Federation, 2016). Centre-left ministers, shortly thereafter taking power, also saw the merits of an industry-led system – where industry encompasses employees and employers, and so the new system was shepherded in with relative cross-parliamentary support.

Between industry dissatisfaction, and the proposed expansion of the reach of the formal education system into workplaces, ITOs were imagined. Their implementation was enabled by the enactment of a new piece of legislation – the Industry Training Act 1992 (NZ Legislation, n.d.-b). The new term, 'industry training', was intended to encompass apprenticeships and expand the range of industries to which the model applied.

ITOs, at their core, were industry-owned entities, formed up from enterprises, that applied to the government for recognition to (a) be formally recognised standard and qualification setters for an industry or industries, and (b) manage and support the arrangements for people working in the industry to achieve those standards and qualifications.

Three things were central to the model:

1. Industry-owned ITOs: The core policy choice was for the government to cede to the private sector the responsibility to define its own skills and qualification needs and encapsulate these in occupational standards. The winning argument was that industry was best placed to know its own needs, and best incentivised to

focus on what it needed, hence improving the match between supply and demand for skills, and the efficient delivery thereof.

It was also a brave policy choice for subsequent application of public subsidies for training in the name of those standards. NZQA developed strong quality assurance over the standards to ensure they reflected outcomes that were industry-wide in terms of demand and national interest to credentialise – not firm-specific, or too narrow in scope to warrant public funding.

2. The 'bundling' of standard setting and training arrangement functions:

   The standard setting body also supported employers and learners in the industry to undertake and complete qualifications. This made the NZ approach different from the contemporaneous 'skills councils' approaches of the UK, Australia, and Canada, which had a remit to engage industry and set occupational standards but were not responsible or funded to work with employers at the delivery level. With the shoe on the other foot, any industry employer, large or small, had the 'ear', at least theoretically, of the standard setting body and qualification developer, with zero degrees of separation. Placing both functions with the industry training organisation developed a critical feedback loop between employers and the standard setting body on emerging and obsolescing trends, and to test the demand and suitability of programmes.
3. The ability to use training subsidies to purchase training from providers: In practice, a tripartite training contract was drawn up between employer, trainee/apprentice, and the ITO outlining commitments of each party to complete a course of training that would allow the apprentice the opportunity to become qualified. This would usually involve a blend of on- and off-job and digital learning. The arrangements varied according to industry preferences and regulatory requirements. However, due to the scope of work of any individual employer, a bespoke approach to completing a full apprenticeship programme was required.

But critically, those arrangements were developed by and for the demand side: employers (and apprentices for that matter) had no incentive to repeat learning, or to be unproductive for longer than necessary. They do not wish to undertake learning unrelated to their work. ITOs, meanwhile, had no incentive to invest in poor quality training, and would direct their purchasing choices towards better quality provision. In short, giving industry this purchasing power improved the efficiency of the system, and mitigates supply capture risks associated with a provider-led administration of work-based training.

The Magic of "Apprenticeships"

Before we move on, it is necessary to contextually locate the 1992 reform from an industry perspective. In short, dropping the magic word "apprenticeships" from the legislation was a dreadful tactical error, politically speaking. Then, as now, the term

"apprenticeship" is one of the most powerful words in our vocational system. People broadly understand what an apprenticeship is, and learning on the job, under the tutelage of an employer, is a good thing for both young people and industries. Within industries that offer the model, apprenticeship retains a deep-seated cachet as a superior way to enter an industry as it develops commercial competence and employability, alongside technical competence.

The dropping of the magic word, combined with a new-fangled "unit standards" approach to assessing and qualifying apprentices, left both the incipient system and the government open to an unfair charge that apprenticeships had been scrapped when they had not (Industry Training Federation, 2016). In fact, the numbers in the system turned markedly upwards from the doldrums of the early 90s (Industry Training Federation, 2016).

For this reason, it's an interesting aside that while the history and specifics differ, country by country-, any call to "bring back apprenticeships" is met with universal agreement, not just in Aotearoa NZ, even if voters preferred to imagine that prospect for other people's children in preference to their own. As a former political operative quipped to me once, any government, of any stripe, that promises to "bring back apprenticeships" goes up 2% in the polls.

I am not aware of research to this end, but there certainly appears something of a cultural phenomenon, at least in Anglophone countries, that apprenticeships are something indisputably good that countries used to have and ought to be "restored",[1] "reinvigorated",[2] "rebooted",[3] or "revamped".[4] All these "re-"prefixes suggest an inherent societal appreciation of the benefits of learning through the workplace, that has somehow been forgotten or lost. Meanwhile, many – including the World Economic Forum (2019) – remain convinced of their potential as a solution to a number of 'future of work' and 'lifelong learning' challenges.

It's curious to reflect on how and why people feel apprenticeships came to be lost. I suspect it is partly due to the 'knowledge economy' push, heartily embraced by formal education systems, encouraging more young people to stay in institutionalised education much longer, and preferably complete degrees. This would set them up to successfully undertake "highly-skilled" knowledge work, as the vision of the working future. How utopian a vision that is, rather depends on how the individual is wired.

However, I equally suspect that changes in labour market structures and economic imperatives from the 1980s onwards, particularly for small firms, make it all too tempting to see training as a cost that can be avoided, outsourced to educational institutions or competitors, or to the migration system.

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[1] https://hansard.parliament.uk/commons/2011-12-19/debates/11121912000001/Apprenticeships

[2] https://www.researchgate.net/publication/308383258_Reinvigorate_Apprenticeships_in_America_to_Expand_Good_Jobs_and_Reduce_Inequality

[3] https://www.fenews.co.uk/featured-article/52974-it-is-time-to-reboot-apprenticeships

[4] https://www.businessnewsaustralia.com/articles/palaszczuk-urged-to-keep-construction-reforms%2D%2Drevamp-apprenticeships.html

Grow, Grow, Grow!

On paper, just two enterprises could band together and apply to the minister for ITO recognition in an industry. They had a great deal of flexibility in terms of the corporate form, governance structures, and membership. Ministers did not appoint people to ITO boards, though the legislation did require adequate employee representation in their governance as a matter of ministerial recognition of the ITO.

In practice, the first ITOs were formed as training divisions within industry associations. Starting an ITO from an industry association created a membership 'hub' that provided some immediate impetus and membership. While industries are often fragmented and can never provide a perfect mandate, the time-limited approach to ITO recognition generally meant that activity coalesced around groups with the best claim, and the most energy, or capability, to work with the bureaucracy. It's worth noting again, that the nature of industry training in Aotearoa NZ is both bottom-up and opt-in – employers must choose to be part of it, and they tend not to unless they see value in the offer.

There was an initial rush as industry seized the opportunity to have more direct influence over the 'what' and 'how' of training for their industry. That rush was also an explicit criticism of the efforts of the polytechnics, and, as if to rub salt in the wound, the first pot of money to establish ITOs was reallocated from polytechnic resourcing (Industry Training Federation, 2016). It was hardly the way to kick things off to promote productive collaboration between the ITOs and the major providers of off-job training.

As well as the initial industry engagement, stakeholders involved at the time recall the government and its ministers being very keen for the new ITO system to grow. Weekly updates to ministers were provided indicating new ITOs recognised and, later, the number of trainees and apprentices signed up. Ministerial questions about what trainees and apprentices were achieving and completing came years later, particularly because the Tertiary Education Strategy 2010–2015 developed new education performance indicators to underpin its evolving investment approach to funding post-secondary education (Office of the Minister for Tertiary Education, 2010).

At their peak, ITOs numbered 56 (Industry Training Federation, 2016), which was certainly plenty, though far short of the 100 that some politicians had predicted. This settled, for a good decade or more, to around 40 ITOs. The ITOs were diverse in terms of size, scope, scale, governance arrangements, structure, and branding. Most were 'dedicated' ITOs insofar as their statutory roles as ITOs defined the extent of their activity, or actions, in support of ITO functions. But many of the larger ITOs accreted further functions, generally in support of ITO activity. ITOs, individually and collectively, became active in the research space early, to build evidence about good practice in everything including industry engagement (Sweet Analytics, n.d.), quality assurance (NZ Council for Educational Research (Vaughan & Cameron, 2010), success for Māori and Pasifika learners (Skills Highway, 2018), and vocational pathways (Careers NZ, 2020).

ITOs undertook marketing and promotion to various scales, and all paid attention to industry engagement. In part, this was accountability to their industry owners, but ITOs also thought about skills and training issues on behalf of their busy industries and employers, who expected that of them. Many ITOs hosted forums and summits, of various sizes and formality, to both gather input, and provide analysis and intelligence, to their stakeholders.

Early on, in 1996, a group of ITOs formed an Industry Training Federation (the ITF) (ITF, 2016) primarily to support collective advocacy to government, but also to support members through research, evidence gathering, promotion, events, and member networks. The ITF grew from a Council of ITO Chief Executives to become a nationally recognised peak body that, while clearly ITO-centric, advocated more broadly for vocational education and workforce development, and supported collective advocacy, research, and promotion of the sector (ITF, 2016).

The ITF rapidly gathered, and then retained, full membership of recognised ITOs throughout its 24 years. It was wound up in April 2020 when the Industry Training and Apprenticeship Act 1992 was repealed, since this was the legislation which both gave rise to its purpose and defined its membership.

Why Employers Train

Employers train because they have to. No one walks into a new job fully formed, plug and play. From pointing out the location of the light switches to the finer points of processes, tools, and techniques, through to 'softer' cultural and situational behaviours expected in workplaces, employers must invest in their people. Skills are themselves a supply chain that must be attended to, since every skilled worker, expert practitioner, and business owner was once none of those things.

Aotearoa NZ employers have a strong training culture. The OECD's Adult Skills Surveys (PIAAC) in 2017 (see Fig. 2.1) showed NZ ranked first for the proportion of working-age adults reporting job-related training in the prior 12 months. While the level of formality in the work-based training system was relatively and encouragingly high, like most nations on the graph, the preponderance of that training activity was informal. It was related to the employee's role and supported by their employer, but not connected to formal qualifications and credentials.

The choice facing employers, therefore, is not whether or not to train their employees, but whether to train them as part of the formal system for national credentials and qualifications, for an industry beyond the firm, and/or for a career beyond their present role. For the last 30 years in Aotearoa NZ, the reality of formal or informal industry training was whether an employer was engaged with their ITO or not. This can certainly be viewed as monopolistic, though in practice competition did come from public and private providers that reached out to employers. There were employer choice provisions to allow employers to work with different ITOs than the ones in their industry coverage, and the 'monopoly' any ITO had over

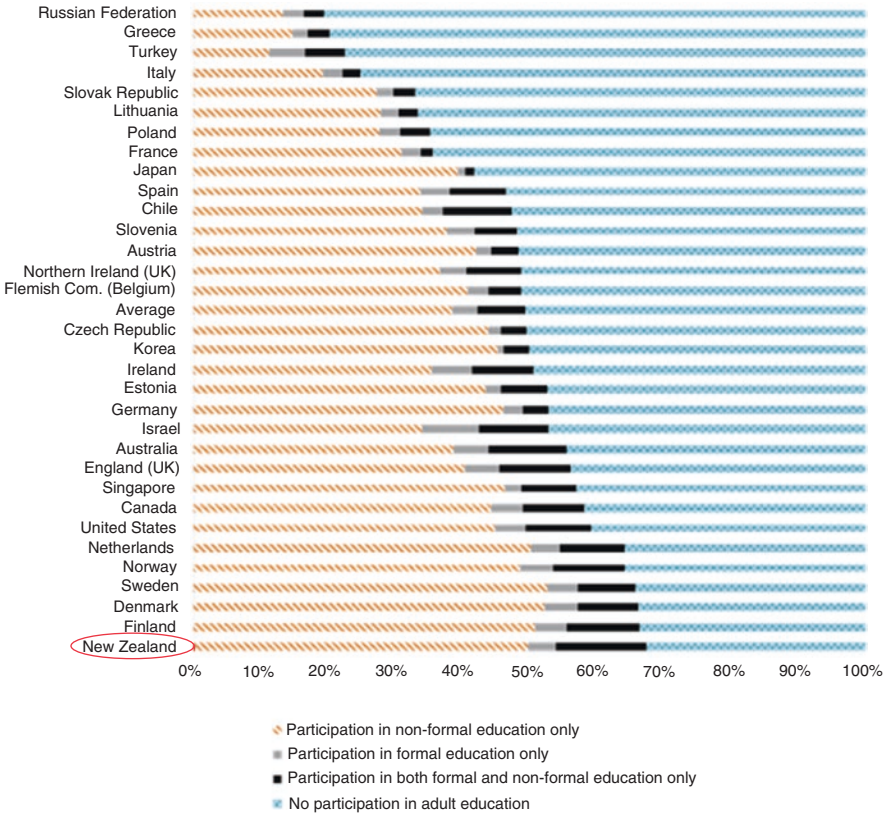

Fig. 2.1 Share of adults aged 25–64 that participated informal or non-formal adult education or training for job-related reasons, 2012 or 2015. (Adapted from OECD, 2017)

training, or a particular industry, was time limited. Were someone else to make a better claim, they could.

At the point of the most recent reform, both the former Industry Training Federation and the Ministry of Education estimated that ITOs were engaged with around 15% of Aotearoa NZ firms – or 25,000 out of the approximately 150,000 firms that are not sole traders (ITF, 2019). As the OECD result shows, the proportion of enterprises engaged in formal training is comparable with the UK, and dual training systems such as those of Finland and Denmark (OECD, 2017). In 2019, OECD's Priorities for Adult Learning Dashboard places Aotearoa NZ second in the OECD, behind Norway, in terms of the overall provision of continuing vocational education by enterprises.[5]

[5] Getting Skills Right: Future-Ready Adult Learning Systems, OECD 2019, Chapter 2.

The reasons employers said 'yes' to formal training were myriad, and the bread and butter for all ITOs was to try and grow industry participation rate, employer by employer. The winning argument was sometimes return on investment, where ITOs and the ITF commissioned a number of research efforts that showed, like similar 'return on investment' research around the world, that apprentices tend to become a net benefit to a business between 18 months and 2 years into their training, on a very rough average (Nana et al., 2011). There was also an appeal to tradition, in skilled trades and services where apprenticeship has served for generations as a classic way for people to enter and progress through an industry, sometimes all the way to the top.

I would also sometimes observe a 'pay it forward' altruism. In my experience, if you ask people if they remember the name of the person that first gave them a chance in the world of work, who set them on the path they now walk, and without whom they would not be where they are, then almost invariably people can think of a name. They remember that person because they never forget them.

There is an element of post-hoc fallacy, insofar as it is everyone's experience to "begin at the beginning" in terms of their careers and skill development. But this is also an important reminder for an employer contemplating engaging in the training and apprenticeship system. It reminds them that the common employer expectation of only employing skilled and experienced workers is unrealistic, because, at the beginning of our careers, none of us are skilled or experienced. Someone "back in the day" had provided an opportunity to them, and taken time and trouble to train them, so maybe they ought to do the same.

Ultimately, ITOs, using combinations of the above arguments, won over enough employers to represent more than half of the total vocational education learners in Aotearoa NZ (ITF, 2019). That means the primary form of VET is upskilling people already placed in the labour market; already matched with a labour market opportunity; already earning and paying tax; not accumulating student loans or relying on student allowances; learning the right skills at the right time on the right equipment, deploying skill as they were developing them, in the real economy; and achieving the same credentials with the added cachet of commercial competence, and clearly "work ready".

By the 2019 reform, the ITOs were supporting over half the VET learners in the system, working towards quality assured national credentials, and using one-third of the government subsidies going into vocational education (ITF, 2019). More than one-third of the ITO training subsidies was being used to directly purchase provision from providers (ITF, 2019).

Stepping back to look at the post-secondary system overall, ITOs were supporting as many learners as Aotearoa NZ's universities, with just 6% of total government subsidies for tertiary education, thanks to the financial, capital, time, and in-kind contributions of employers (Tertiary Education Commission, (TEC), 2020).

Skills Leadership

In 1999, a newly elected Labour government had pledged to boost apprenticeship numbers as one of its election pledges (Scoop, 1999). It then undertook the first of the major policy reviews of the ITO system and the creation of the Modern Apprenticeships Act. Effectively, modern apprenticeships were aimed at apprentices under the age of 25 and applied additional coordination and support payments to incentivise participation. The government had noticed that apprenticeships were no longer straight-from-school, as in the past, due to increasing numbers of young people staying longer in secondary and tertiary education as, for parts of the 1990s, the labour market was difficult to enter.

Through the same review, a third statutory role, skills leadership, was added to ITOs (ITF, 2016). It reflected that ITOs were well positioned as entities, between the education system and industries, to take a strategic look at emerging trends both in labour markets and in skills and training. The role was never terribly well-defined but conceptually was both industry- and government-facing. Busy and small employers lack the time and capacity to produce a strategic view and, for its part, the government's 'macro' view of the situation often lacked the 'real oil' of a narrative behind the numbers that needed to be supplied by agents of the industries.

ITOs were therefore deemed the 'skills leaders', and there followed many examples of very good work by ITOs (and sometimes through sector-based alliances), to develop workforce plans and strategies, as well as cross-sector tools, analysis, and research. But equally, not all ITOs at that time had the individual capability to perform the role well, particularly since no additional resourcing was provided to ITOs to undertake their new statutory role – it needed to be funded from existing baselines, or additional industry contributions. Ultimately, skills leadership was perceived as something of a compliance matter, as ITOs completed strategic training plans for the TEC, which frustratingly appeared to have little influence in terms of ensuing investment decisions. ITOs felt their plans were going into the proverbial 'black hole'. To be fair to the TEC, the accumulation of strategic plans from 40 ITOs, many of which were suffering from strong optimism bias in terms of the expected growth and demand in their industry, did not always add up to a realistic or useful picture from the funder's perspective.

Finally, there was something mildly pernicious in conceptualising this effort as a specific role that ITOs were solely responsible for. While ITOs could certainly analyse and anticipate trends in technology and education that had a bearing on the direction of development for standards and qualifications, they were not any better placed than, say, economists, to predict economic or labour market shocks. ITOs could then be unfairly singled out when training numbers in a sector were going in the wrong direction, and the statutory creation of an ITO responsibility for an ill-defined role sometimes created friction between an ITO and its member association(s).

Performance Problems

In the wake of the Global Financial Crisis (GFC) across the late 2000s, there was a renewed focus on skills and training issues, as tends to happen in an economic downturn. Rightly enough, people want to ensure that the in-work training system is operating well because it is keeping people working while gaining skills. However, numbers were dropping in the system, as employers took the economically rational, albeit short-term decision, that training was a 'nice to have'.

At the same time, through its relatively new system of education performance indicators, the government was hearing and seeing that all was not well. Completions in the system were weak: in 2009, just 42% of trainees were completing their programmes. But worse than the incompletion was the inactivity. More than half of trainees that year did not achieve a single credit which meant subsidies were being collected for learners who were not apparently learning (Fisher, 2011). The next question, fairly enough, was 'were they being trained?'

The TEC commissioned a series of performance audits against learner eligibility criteria – in short, they followed up with employees to confirm they had been working with that employer at the time. The process was fractious. ITOs felt that TEC had shifted the goalposts and they were being assessed against criteria that were not stipulated at the time.

The results ultimately caught media attention. The headline became that 11 trainees turned out to be deceased. Given a 200,000-strong sample of the working-age population, such a number might be expected through generalised mortality, but 'phantom trainees' (NZ Herald, 2011a, b) certainly made for a memorable headline. However, the empirical finding of half of all trainees not achieving any credits was, as the ITF's Chair said at the time, indefensible. There were no good excuses.

The Tertiary Education, Skills, and Employment Minister at the time, Steven Joyce, announced a comprehensive review of the ITO system (Office of the Minister for Tertiary Education, 2010). It was a first principles review conducted over a period of 18 months and began with a historical review of the sector prepared by the Ministry of Education. It was a careful process. All options were on the table, including disestablishing the sector. Ultimately, Steven Joyce concluded that while the performance of many of the ITOs was beyond poor, the system itself was fundamentally sound and had the right incentives in the right places. Industry stakeholders, including some of its "squeakiest wheels", ultimately lobbied in favour of retaining the system because while parts were clunky and the system was insufficiently responsive, it was industry owned.

Changes were proposed to the legislation (NZ Parliament, 2013) that would increase the competitive threat over ITOs to ensure they delivered quality. The first of these was to strengthen employer choice, to enable employers to choose to be supported by a different ITO than the one with recognised coverage for their industry, in cases of dissatisfaction.

The second was a provision to allow direct funding of employers, from the industry training fund, who demonstrated sufficient capability to undertake the training

themselves. ITO training and qualifications still had to be followed, and the subsidies in play were slightly less than ITO rates, recognising that these employers were not undertaking all ITO functions. At the implementation layer, the scheme was also limited to large employers, as a proxy for employer capability, to offer formal training.

Direct employer funding never really took off as a concept. While there were a small number of successful examples, a few companies found that when they walked a mile in their ITO's shoes, the system and operational barriers to entry were too steep to successfully manage all aspects of the training, particularly when that came to government agency compliance requirements. To be fair, the operational agencies did nothing to make their arcane systems and procedures any less obscure. At that point, some of the directly funded employers returned to the ITO fold, or even more ironically, contracted the compliance aspects back to their ITOs. Popular or not though, the direct funding policy served an important purpose as a 'sword of Damocles' in the legislation to ensure ITOs focused on the quality of their service delivery.

A third core change was the removal of skills leadership as a formal statutory role of ITOs. Minister Joyce was not convinced of the value it was adding, noting that he, as the government's representative, would hear directly from industries in terms of their skills issues and concerns. Making skills leadership the ITOs' job was both an unnecessary intermediation, and a risk that only the ITO voice was heard in agencies because of the encapsulation of the role in the statute. This was also a controversial change, and a largely ideological debate ensued about whether removing the role would lead to a glut or a vacuum of skills leadership. Ultimately, the role was never well enough defined, or consistently or coherently executed, such that stakeholders had a clear picture of the added value.

The Recovery

The sector's next chapter began with a series of mergers. In the public's mind, these were part of the review outcomes, although there was nothing explicit in the legislation change or review decisions that said there shall be fewer ITOs. But between financial viability concerns and 'soft power' emanating from officials, the pressure on ITOs to merge and reconfigure was very real (ITF, 2016). With revenue being tied much more closely to training activity, some smaller ITOs quickly looked for a new home. More broadly, however, it was a reading of the tea leaves, and leaks of TEC briefing materials, that created the energy for the mergers. For his part, the minister continued to claim that all he was interested in was good performance, and that bigger, in his view, was not always better.

It was pleasing, and some relief, that the process of 40 becoming 11 was reflective of a merger, rather than attrition. It would have been very easy for industries to have walked away from the system at that point. In particular, smaller industries with dedicated ITOs were understandably worried about the level of influence or

representation they would retain being part of much larger organisations. Anecdotally, I recall industry association representatives later saying that they were experiencing far greater levels of service from fewer, more capable ITOs.

The ITOs left standing following the Joyce review could take some comfort that the system had been tested, and their mandate somewhat reset. Operational frustrations certainly continued, and relationships with ITPs occasionally flared as a result of direct competition in the form of 'managed apprenticeships", where ITPs used full classroom-based teaching and learning subsidies to support on-the-job training for workers.

In hindsight, the increasing adoption of digital learning technology, ITOs' waning purchasing power over off-job training, operational constraints, and ITPs' retreat from more expensive vocational training was conspiring to create a greater 'split' between the work-based and provider-led parts of the system. But the results were coming, the ITOs were stable, and performance indicators were improving (ITF, 2016).

The final eleven ITOs were diverse, in terms of size, coverage, training models, and even branding. From the outside perhaps that made them look a little rag-tag, but that was the natural consequence of a bottom-up system: their size, coverage, training models, and branding spoke to demand-side dynamics and the 'revealed preferences' of industries over many years.

By 2019, numbers in the system had recovered to pre-Global Financial Crisis (GFC) levels. The difference was that 80% of learners were completing programmes, rather than 42%. Via eleven ITOs, the sector was covering the same ground in terms of training across the economy, but were twice as efficient, in terms of qualifications outcomes per standard training subsidy (ITF, 2019).

The Reform of Vocational Education (RoVE)

Hence, we arrive at the end again. Suffice it to say, the goals of the RoVE are inarguably laudable. The changes attempt to address resourcing, and structural and operational barriers, that created unfortunate and unnecessary us-and-them-ism between critical stakeholders in our skills and training system, at the operational policy level. On the ground, examples abounded of highly productive, constructive, and successful training and initiatives between ITOs and ITPs. But both sides had to work at it and come up with solutions despite system settings rather than because of them. As I hope I have described, it was a confluence of policy accidents that made them look like "sides", rather than complementary and mutually reinforcing parts of a system. It's also fair to say that changing demographics, labour market forces, and global 'future of work' discussions were identifying a set of external challenges that meant it was time to look at the overall training model, which the Labour government had gone some way to do through its Future of Work Commission (Stuff, 2016) while in opposition.

RoVE is an attempt to address many of these glitches, and to create a networked system of provision to support lifelong learning, that all systems will need, to contend with 'future of work' realities. These are all good things.

However, simply asserting that a particular set of structural changes necessarily leads to ideal system characteristics resembles magical thinking as much as policy. Between the "what" and the "why" of the RoVE is a "how". I have yet to see or hear a convincing intervention logic that explains, in a causal sense, how these structural moves address the identified problems or will achieve the articulated goals.

But being unconvinced is not the same as being dismissive: there is certainly a chance, with the right leadership and careful implementation, to develop a more connected VET system, with better support for employers, of the sort that ITOs themselves lobbied for, for the longest time. I am convinced that work-based learning offers significant benefits in terms of meeting the challenges of the 'future of work' to upskill workforces, match the supply and demand for skills, and develop the skills and capabilities of our workforce without incurring the financial and opportunity costs of training outside the workforce.

Incidentally, while once again, although "apprenticeship" has no piece of legislation named after it, I can confidently say that the end of ITOs is certainly not the scrapping of work-based learning and apprenticeships. These seem certain to increase as a consequence of demographic shifts and the fourth industrial revolution. The employers I've been talking about are not going anywhere, and they still have skills and training needs that, on their own, they will struggle to deliver. They will still need to be perennially convinced that they ought to train as part of the formal system, rather than just training within their firm, or outsource their skills training to competitors or educational institutions, or rely on migration.

The challenge ahead for the sector is change management. Aotearoa NZ's VET sector is not a blank slate in terms of its shared history. In that regard I have three main fears: a loss of genuine industry ownership over standard setting; the potential collision between industry wishes as articulated by the newly created Workforce Development Councils (WDCs), and legislative protections over institutional academic freedom; and a dilution of the notion of apprenticeship away from genuine employment arrangements.

The decision to disestablish ITOs as part of the answer to financial pressures besetting other parts of the system was a surprise to many in the ITO sector, and certainly to me. The decade prior had seen the sector significantly improve its participation and performance, double its completion rates, and stand up extremely well on international comparisons. Yes, the ITOs did seem a bit separate from the rest of the VET sector, but that reflected a deliberate policy design to create demand-side tension and influence in the system. Industry was co-funding the system, and on a price per qualification basis, the ITO system compared very favourably in terms of taxpayer investment in workforce skills.

But if I did not understand the why, then the how was even more troubling: Inadequate initial consultation, a very short formal consultation period, a single structural option with no costings, and an apparent absence of change-management thinking. For example, it was only the RoVE decisions in August 2019 that created

the two-year transition period currently underway: the original proposal had the new New Zealand Institute of Skills and Technology NZIST – now named Te Pūkenga) operational from 1 January 2020.[6] World events in the first quarter of 2020 let alone practical considerations, should make us grateful for that now.

When the news broke of the RoVE proposals, some ITO leaders reflected that part of the problem was the public at large didn't know what ITOs were and/or what they did. I think that was true, and both ITOs and the ITF bore some responsibility for that. In my view, it was not knowing about the role of ITOs as entities per se that mattered, as much as an awareness that there was a large and effective workplace learning system operating as part of our overall post-school and tertiary system. Moving into the future we need to do a great deal more to acknowledge the "invisible" learners in our communities who also look like workers. We should also direct a great deal more celebration, acknowledgement, and policy incentives to employers who do the right thing by their communities and industries by engaging in formal workplace training.

At the end of 2018, the ITF took out large advertisements across Aotearoa NZ's regional newspapers listing all the employers in that region who had graduated ITO trainees and apprentices that year, which numbered well over 10,000 businesses (Scoop, 2018). The ITF agreed it was important to publicly acknowledge their efforts, and also for consumers to know which businesses in their communities were contributing to its upskilling. I believe we should have been doing that for 27 years, not just one.

For however long it takes to rearrange ourselves in the VET system, and once that is done, employers will still be there with their unshakeable choice to participate or not. So, in the new world, in terms of how educationalists present themselves to industry, what is delivered, and how, we must constantly remember that the easiest two words employers can ever say to the VET system are "no thanks". That means we must equally celebrate, acknowledge, and support the preferences of employers who join the system and, for whatever reason, say "yes" to training.

Acknowledgments The author gratefully acknowledges Marion Hale (Ara Institute of Canterbury) for editorial assistance in the preparation of this chapter.

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Chapter 3
The Evolution of NZ Institutes of Technology and Polytechnics

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Abstract Institutes of Technology and Polytechnics (ITPs) and their precursors, Technical Institutes and Community Colleges, have contributed for over a century to vocational education and training (VET) in Aoteoroa NZ. ITPs have provided opportunities for training and educational opportunities across all levels of learning from foundation to post-graduate, to many who have not been able to access full-time programmes of learning.

In this chapter, we draw on the first author's many years of association with ITPs through his roles within engineering education, to provide an overview of the evolution of ITPs. The chapter discusses the various shifts in roles and contributions, the many challenges, and initiatives to meet these, and the possible implications that the Reform of Vocational Education (RoVE) will have on the sector.

Keywords Institutes of technology · Polytechnics · VET history · VET policy · Engineering education · Reform of VET

Introduction

In this chapter, we draw on the experiences and perspectives of the first author, who was the Executive Officer for the NZ Board of Engineering Diplomas (NZED). His narrative is based on his recollections across 26 years of working within and without the Aotearoa New Zealand (NZ) ITP sector. The first author's association with ITPs

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_3

began firstly with 6 years as registrar at the Central Institute of Technology (CIT). This was then followed by working for the Association of Institutes and Polytechnics of NZ (APNZ) (later called Institutes of Technology and Polytechnics NZ (ITPNZ)) for 17 years, before his current role with NZ Board of Engineering Diplomas (NZED) which he held for 6 years. Over the course of these years, he worked with 67 serving ITP directors or chief executives. He therefore brings a deep understanding of how socio-economic-political factors have impinged on the ITP sector across 30 years, albeit through the lenses of engineering education as pertaining to the first author's main ITP connections.

The first author's recollections were collated through written text (both in this article and drawn from several emails) and conversations between the authors. Where possible, citations to relevant references have been included to provide for further and deeper exploration. Therefore, this chapter is constructed as a form of collaborative autoethnography (Lapadat, 2017) whereby the first author used the questions posed, to recollect and reflect on experiences. The main questions we used were "How have ITPs evolved over the last fifty years?" and "What impacts have these had on the provision and delivery of VET to New Zealanders?" The second and third authors reviewed and overlaid the first author's memories and impressions, with connections to the relevant government policies and initiatives of the time.

To begin, the first author proposes the development of tertiary level technical education in Aotearoa NZ did not derive from a well-defined blueprint. Instead, it emerged and evolved from two very separate policy changes. The first was implemented in 1960 and the second in 1990 (Dougherty, 1999). Now, 30 years on from the second reform, technical education as part of vocational education and training (VET) is embarking on a third major policy change through the activation of recommendations from the Reform of Vocational Education (RoVE). What were these policy changes and how did the sector respond to them? The discussion presented in this chapter, discusses the foundations and development of the previous two reforms and summarises, from an ITP perspective, some of the origins of the current RoVE (see Chaps. 4 and 5 for more comprehensive discussion on RoVE).

The Genesis 1947–

Technical education in Aotearoa NZ has existed since the late nineteenth century as technical high schools (see Dougherty, 1999 for a summary of the histories of all the ITPs in existence at that time). By the late 1940s and early 1950s technical high schools were expanding at such a rate, officials were beginning to think a better place for such education might be at the tertiary level (Dougherty, 1999). At the forefront of such thinking was Dr. Clarence Beeby the then Director of Education (1940–1960). In his book, *The Biography of an Idea,* Beeby recalls:

> It was only when I began to think of methods of filling the gap in the labour force that I realised that this novel type of job would offer new opportunities to students who felt the need for something more intellectually demanding than the skills of the apprentice, but who lacked the ability, desire or entrance qualification to take a university degree (Beeby, 1992).

In any event, it was clear the country faced a severe skills shortage at the technician level. Beeby himself held the view the ratio between technician and professional level engineers should be two or three technicians to one professional engineer (Beeby, 1992).

Beeby's idea of a tertiary level technical institute sector first emerged in 1945 (Dougherty, 1999). In 1946 the Technical Correspondence Institute (TCI, later The Open Polytechnic of New Zealand (TOPNZ)) was established. The rationale for the TCI was to provide trades level qualifications for returned servicemen, post-World War Two, who were scattered across the country. The TCI utilised a range of educational 'delivery' mechanisms including distance learning and 'block courses' to provide for mainly technician and agricultural industry qualifications (Dougherty, 1999).

In 1947, the New Zealand Institute of Engineers approached the government requesting an investigation into the training and supply of engineers. A consultative committee with broad terms of reference was set up to consider the matters raised. This committee subsequently recommended, among other things, the initiation of a system for delivering technician-level engineering qualifications. As a result, in 1954, the New Zealand Certificate in Engineering (NZCE) was established. This was a five-year qualification involving work and campus-based study on a part-time or block course basis.

A national conference on Technical Education held in 1958, resulted in the establishment of a network of Technical Institutes (Dougherty, 1999). In 1960 a national institute was established by converting the Hutt Valley Memorial Technical College into the Central Technical College (renamed Central Institute of Technology (CIT) in 1963) (Dougherty, 1999). By 1970 there were two 'national' institutions (TCI and CIT) and five regional institutes in Auckland, Hamilton, Wellington, Christchurch, and Dunedin.

Hence, a striking and interesting feature of the genesis of the Institutes of Technology and Polytechnic (ITP) sector was the role played by engineering. By initiating the policy discussion in 1947, which was adopted and broadened by Beeby, the New Zealand Institute of Engineers (now Engineering New Zealand (ENZ)) began the process which, in 1960, resulted in the establishment of the entire sector.

The development of the VET sector from the later 1940s to the late 1980s represented a remarkable transformation. This transformative maturation of the sector can be attributed in the first instance to the outstanding leadership of Beeby. His foresight and vision, allied to his ability to persuade his political masters to make the key decisions, was critical.

By 1990 the ITP sector had grown to become a nationwide network of 25 institutions (Dougherty, 1999). That year, Aotearoa NZ's tertiary education sector was

enmeshed in the most sweeping reforms the sector had ever seen. At that time, the growing ITP sector was tightly controlled by the Continuing Education Division of the Department of Education. This control extended to every aspect of the institutions' operations, sometimes down to trivial details (Dougherty, 1999).

The Educational Reforms from 1990

As the sector grew and individual institutions matured, there was a growing call from within the ITP sector for greater autonomy (Dougherty, 1999). During the mid-1980s, the ITP sector began to realise political signals for greater autonomy might eventuate. A series of consultative mechanisms were put in place and culminated in a report in 1988 by Professor Garry Hawke called *Report on Post Compulsory Education and Training 1988 (Hawke Report),* which promised to deliver almost everything the ITP sector had been lobbying for. Most recommendations in the Hawke report were incorporated into the 1989 policy statement, *Learning for Life* with final decisions enacted into legislation in 1990 (Ministry of Education, 1989).

The legislation provided for the:

- Disestablishment of the Department of Education and replacing it with a much smaller Ministry of Education with a policy focus.
- Introduction of a single funding system to cover the three elements of the tertiary sector (Universities, ITPs, and Colleges of Education).
- Establishment of the New Zealand Qualifications Authority (NZQA). This would, among other functions, replace the Trades Certification Board (TCB) and the Authority for Advanced Vocational Awards (AAVA) which oversaw most ITP delivered qualifications.
- ITPs (subject to approval by NZQA) to offer degree programmes (Ministry of Education, 1989).

The 1990 educational reforms were welcomed by the ITP sector and the 25 institutions set out to chart their individual courses. If the years 1960–1990 were years of steady, measured, and controlled progress, the following 30 years would prove to be far more dynamic with the 2020 ITP sector being barely recognisable when compared to the 1990 version.

Polytechnic Rationalisation 1990–2020

So, how did the sector transform itself in the years 1990–2020? First, there were 25 Institutes of Technology and Polytechnics (ITPs) in 1990 (Dougherty, 1999) and only 15 in 2020 (TEC, 2018). This reduction does not mean the sector shrank by 40%, far from it. The sector continued to grow in most of those years in terms of

student enrolments, although the last five years or so have shown a decline across ITP enrolments.

The reduction in the number of institutions occurred for several reasons (See TEC, 2018 for comprehensive list of mergers). Firstly, the economics of the marketplace saw several ITPs struggle to stay solvent and led to several merging with other ITPs to maintain provision to their communities. Whanganui, Wairarapa, Tairawhiti, Aoraki, and Telford struggled to survive as stand-alone institutions mainly by virtue of their location in smaller towns. The funding system was designed to favour larger institutions. However, this did not mean the provision or access to ITPs was reduced. Whanganui and Wairarapa polytechnics were "absorbed" by the Universal College of Learning (UCOL) based in Palmerston North. Tairawhiti became part of Eastern Institute of Technology (EIT), Timaru's Aoraki was merged with Ara Institute of Canterbury in Christchurch. Telford, after spending several years as part of Lincoln University, ended up with Invercargill's Southern Institute of Technology (SIT). All main campuses of these five institutions remained open after amalgamation. Additionally, three Wellington institutions eventually became one. Hutt Valley Polytechnic absorbed the Central Institute of Technology in 2002 and became WelTec. From about 2010, both WelTec and Whitirea, edged closer together until, in 2015, they became a single institution. Finally, Bay of Plenty Polytechnic (BOPP) and Waiariki Institute of Technology (WIT) merged to become Toi-Ohomai in 2016.

Secondly, a few ITPs moved to become universities. From 1999, the largest ITP, Auckland Institute of Technology (AIT), used its new-found autonomy to begin to transform itself into a university (Auckland University of Technology, n.d.). Another ITP, Wellington Polytechnic, also harboured university status ambitions but was did not meet the necessary criteria. At that point, the Polytechnic Council decided it should be disestablished as an ITP and then "merged with" Massey University (see NZ Government, 1997 for detail).

The Learning for Life Funding System

There was hope the educational reforms would result in a wave of innovation, but this did not eventuate, at least not in the way envisioned. The main driver during the 1990–2020 period was the need to increase the number of equivalent full-time students (EFTS). Put simply, the funding system heavily penalised smaller institutions; and provided powerful incentives to grow, irrespective of size.

On the matter of innovation, there is some evidence pressures and incentives in the funding system resulted in innovative behaviour, both good and bad. This is expanded on in the section below on Innovation. The funding system had two main drivers: (1) EFTS and (2) funding rates, depending on the nature of the programme. Engineering programmes for example were funded at a higher rate than business programmes. Having said that, institutions were 'bulk funded' and there was no requirement for institutions to direct engineering funding into business for example.

The most powerful feature of this funding system was that an EFTS growth of, for example, 5% would produce an increase in funding of 5% (more or less) but would not lead to any substantial increase in costs over support and overhead services. This was especially the case with large cohorts of students. On the other hand, a decrease in the number of EFTS would result in a similar percentage decrease of funding. In that situation, reducing costs was more problematic as approximately half of running costs of institutions was on teaching and support staff salaries. Furthermore, the quest for EFTS growth led to a proliferation of new programmes, many of which failed to achieve sustainable numbers.

Two problems were specifically faced by smaller institutions. Firstly, all providers faced the same fixed costs, irrespective of size. For example, they all had to have a council, managers, an academic board, a student management system, etc. This fixed cost burden was proportionally far greater in smaller institutions than larger ones because the fixed costs could be absorbed more easily by larger institutions. Therefore, the main solution was to grow larger, but this presented another problem for smaller institutions. Government policy, for most of those years, was to restrict the annual growth in EFTS to approximately 5%. For the smaller institutions, 5% of a small number is insignificant whereas in the larger institutions 5% makes a difference. If average funding per EFTS was $12,000, an institution of 1000 EFTS would receive additional funding of $600,000 with 5% growth. On the other hand, an institution of 10,000 EFTS would receive additional funding of $6 million. Secondly, the other obvious challenge for smaller institutions was their small population base to draw from which restricted their ability to grow. This pressure on the smaller institutions, in most cases, proved too difficult to manage and, as stated earlier, five of the smaller institutions were absorbed by larger ones.

Further Developments

Polytechnic Degrees

Academically, there were two main developments. The first was the authority for ITPs to offer degree programmes and the second (discussed below) quality assurance. In 2020, about a third of all ITP provision was in degree, graduate certificates/diplomas, honours, masters, and doctorate programmes (Education Counts, 2020). The accreditation process involved panels which included university academics who were focused on the maintenance of academic rigour associated with degree programmes. There are many arguments supporting or not, the entry of degree programmes into ITPs. For example, the need to provide for degree programmes may have contributed to qualifications inflation at the expense of technician level qualifications and the diversion of resources into research to support degree delivery as required by the Education Act.

Quality Assurance

In 1993 the NZQA used its powers under the Education Act to delegate its quality assurance functions to the Association of Polytechnics in New Zealand (APNZ, later becoming ITPNZ). The Association immediately established the New Zealand Polytechnic Programmes Committee (NZPPC later called ITP Quality). The Board of the NZPPC was independent of the association and pursued its own policies and processes. Its functions included (a) approval and accreditation of programmes, (b) accreditation to assess against unit standards, and (c) an academic 'audit' system. (Dougherty, 1999). Academic 'audit' was new across the sector and the NZPPC designed the system de novo. This involved requiring each institution to produce a Quality Management System (QMS) which documented all processes contributing to quality assurance. The NZPPC periodically verified an individual provider was implementing its QMS as intended. The system was designed to be formative in the sense that it encouraged a continuous improvement approach to quality.

Interestingly NZQA subsequently adopted a similar approach. It called the system External Evaluation and Review (EER) and gave it a four-scale assessment of 1–4, one being the top and four, poor. ITPNZ ceased to exist in 2009 and ITP Quality was disestablished in 2010 with its functions transferred to NZQA, where they remain today. The APNZ exercised effective leadership in taking the initiative to seek delegated authority to manage the sector's academic quality assurance system. The resulting body, the NZPCC itself displayed effective leadership in its innovative approach to quality assurance.

Fully Funded Growth

In 1998, the government decided to remove the cap on funded growth. This decision was because participation in tertiary education had increased significantly since 1990 (TEC, 2018). The conclusion was potential for significant growth was very limited, and consequently the risk of budget blowout was low. This decision dramatically changed the equation for tertiary education providers, especially the ITPs. For the following four years, the sector experimented with a true market model, probably to a greater extent than any other country, and certainly to a greater extent than anybody in Aotearoa NZ, would have expected. During those four years there were several examples of innovative behaviour in response to the funding cap removal. It began with one institution offering free basic computing courses, which proved to be very popular. Others followed suit. The approach was to offer free, short courses, which did not necessarily lead to any qualification, thereby avoiding the required academic quality assurance regime. The idea developed quickly, and it was not long before hobby-type courses were introduced. All were funded. The practice finally reached the point where it attracted condemnation from politicians, the public, and the media.

The ultimate manifestation, of initiatives to take advantage of fully-funded growth decision, was the introduction of Cool–IT by Christchurch Polytechnic Institute of Technology (CPIT) in 2004 (NZ Herald, 22 June 2004). This involved the distribution of a CD containing a basic computing course, to members of the public, free of charge. If holders of the CD logged onto CPIT, thereby enrolling in the institution, they would receive a book voucher. CPIT claimed funding for these enrolments. The political and public reaction to this scheme was extremely critical. In December 2004, the then Minister of Tertiary Education, Steve Maharey was quoted in the NZ Herald as saying:

> Public money must be accounted for properly. That means that there needs to be an assurance that the enrolments for CPIT that were funded were funded properly and accounted for properly," he said in Parliament yesterday.
>
> To the extent that they are not, there is an obligation for that money to come back, and I am going to ensure that that is the course of action that takes place immediately (New Zealand Press Association (NZPA), 2004).

Furthermore, the Auditor-General investigated aspects of the scheme (Controller and Auditor General, 2004). There ended the experiment of lifting the funding cap. Additionally the experience, particularly the more egregious aspects, meant that successive governments and officials would much more circumspect in their dealings, particularly with the ITP sector.

Industry Training

Industry training was another major element of the reform process (see Chap. 2 for more detailed discussion on the formation and role of Industry Training Organisations (ITOs)). The 1990 Education Act provided for the establishment of the Education and Training Support Agency (ETSA) which morphed into Skill NZ in 1998. This body was to oversee the apprenticeship system and would replace the various apprenticeship committees which existed up to that time. Additionally, the newly elected government of 1990 determined there was insufficient industry involvement in industry training. Therefore, in 1992 it introduced the Industry Training Act 1992 to establish a network of Industry Training Organisations (ITOs). These organisations would be 'industry led' and perform three main functions: (1) set skill standards and develop qualifications (2) 'purchase' training, and (3) oversee assessment of trainees.

ETSA/Skill NZ was charged with managing the recognition of Industry Training Organisations. The response was enthusiastic and there were over 50 ITOs recognised within a short period. It was also responsible for funding the ITOs. This continued until 2003 when ETSA was absorbed into the newly established Tertiary Education Commission (TEC). In the following years, ITOs gradually reduced in numbers through mergers. There were 11 ITOs to transition into Te Pūkenga in 2020.

Competency-Based Qualifications

In 1990 the NZQA was established. It was led by a group with a highly ambitious agenda for reforming the country's qualification system. This agenda would have a profound effect on ITOs and ITPs. NZQA's ambition at that time was to establish a comprehensive framework which would include all qualifications. It also anticipated that most of the qualifications on the National Qualification Framework (NQF) would be based on unit standards (see next section defining unit standards). The universities' Vice Chancellors' Committee (later called Universities NZ) was unenthusiastic about the approach. ITOs, on the other hand, were strong supporters. ITPs took the approach it would be best to cooperate with NZQA towards achieving a workable model.

The reform agenda involved moving the existing education system away from individual learners being assessed, mainly by examination and norm referencing to assessment against tightly defined 'unit standards'. These standards would be competency-based with learners receiving credits for achieving them. Each standard would be assigned credits, with each credit deemed to equate to 10 h of learning, i.e., 10 h is the time expected for the average learner to achieve competency and attain the credit. It was stressed this did not mean all learners had to undergo 10 h of learning to achieve competency, it could be any length of time. It did not matter how competency was attained, or how long it took, provided learners could demonstrate competency, the credits were achieved. Additionally, each unit standard was given a 'level' on the NQF. Unit standards could be accumulated to achieve a qualification. A year of full-time learning would amount to 120 credits or a notional 1200 h of learning.

The competency-based approach was comprehensively rejected by the universities due to assessment philosophy mismatch. The Vice Chancellors' Committee was able to eschew competency as, at that stage, unit standards only applied to industry training, an area outside universities' mandate. The ITP sector also opposed the concept though less vehemently than universities. The ITP sector could not simply ignore competency-based assessments as they were part of industry training. Their main concern centred on the emphasis on assessments associated with unit standards (see James, 2000 for an example of the concerns from learners' viewpoint). There was no limit to how many times a learner could be assessed against a unit standard. In contrast, the ITOs were enthusiastic supporters of competency-based standards. This would provide them with an ideal mechanism for developing qualifications across the industries they covered, with the full support of NZQA behind them.

By the mid-1990s the nature, extent, and direction of the changes were becoming evident. At the systemic level, the changes fell into two broad parts: (1) the development of the National Qualifications Framework (NQF) and (2) the autonomy 'enjoyed' by the ITPs. The achievement of a benign relationship between these two realities was always going to be challenging. There was tension between NZQA's drive to implement competency-based assessments as widely as possible, with ITP's

new-found freedom to develop their own qualifications. To the ITP's, NZQA's direction was an intrusion to their newly won academic freedom.

At the beginning of 1992, the tertiary education sector was seen as having three distinct sectors: (1) Universities, (2) Institutes of Technology and Polytechnics (ITPs) and (3) Colleges of Education. All of these were focused on pre-employment education, with the ITP sector's ongoing contribution to delivering trades training. Workplace training, on the other hand, was viewed as external to tertiary education until the introduction of the Industry Training Act in 1992. Legislation was introduced to address concerns that trades training was not meeting industry needs. The legislation was intended to put industry at the centre of trades training. As with competency-based qualifications, ITOs would be key players of this change.

With the introduction of the Industry Training Act 1992, and industry training more integrated into to the tertiary education sector, the sector was becoming differently configured to past iterations. ITOs were strong supporters of the policy underpinning the 1992 legislation, however there was one aspect that gave rise to tensions between them and the ITPs. Unsurprisingly the problem was centred on funding. Government policy stated learners in the pre-employment sector, e.g., those studying for a qualification in an ITP, would be subsidised approximately 75%. Meaning the government would cover 75% of costs, with student fees the remaining 25%. On the other hand, industry training was to be subsidised up to 50%, leaving employers to contribute the other 50%. This meant, as far as government subsidies were concerned, those engaged in workplace training were subsidised far less (50%) than persons in a pre-employment setting (75%).

Engineering

Also noteworthy is the place of Engineering education, particularly at technician level. As mentioned above, in 1947 the NZIE (now ENZ) raised, with the then government, the issue of training and provision of sufficient numbers of engineering technicians. As prefaced above, this was advocated by Beeby and, in 1954, resulted in the introduction of the New Zealand Certificate in Engineering (NZCE). A few years later the idea of a technical education sector was raised. Engineering, therefore, was front and centre in the establishment of what is now the ITP sector. Furthermore, diploma level engineering was a key focus.

The NZCE was the primary technician-level engineering qualification in Aotearoa NZ from the 1950s to the 1990s. The 1990 reforms allowed ITPs to develop their own qualifications and they did, including the New Zealand Diploma in Engineering (NZDE). The issue was that three different engineering diplomas (civil, mechanical, and electrical) were being delivered by various ITPs, through different programmes. This proliferation of qualifications and programmes was not confined to engineering. By 2007 the government had been advised there were more

than 6000 tertiary level qualifications. In 2008 a programme, called the Targeted Review of Qualifications (TRoQ), was initiated to resolve this issue.

> The Targeted Review of Qualification (TRoQ) at levels 1–6 on New Zealand's ten-level qualifications framework commenced in 2008. The review aimed to ensure that New Zealand qualifications are useful and relevant to current and future learners, employers and other stakeholders.
>
> The Targeted Review was a key deliverable of NZQA's Statement of Intent 2009–2011. The review was initiated in response to concerns raised by employers, employees and unions about the clarity and relevance of qualifications, particularly vocational qualifications (New Zealand Qualifications Authority (NZQA), 2017).

The NZDEs were included in the TRoQ exercise. The result, which in itself was an exception as training providers could still offer a range of qualifications and programmes outside of the TRoQ remit, was to replace the existing qualifications and programmes with a single qualification delivered by a single programme.

> The development of this qualification, the New Zealand Diploma in Engineering (NZDE) has been a collaborative initiative – the Unified Diploma project that arose from the National Engineering Education Plan (NEEP).
>
> A group of developers worked collaboratively and consultatively during 2009 and 2010 to ensure that the qualifications met the needs of key stakeholders. The group comprised of representatives from the Industry Training Organisations (ITOs), tertiary providers and the Institute of Professional Engineers (IPENZ, now called Engineering New Zealand) (NZ Unified Diplomas in Engineering, 2020).

In 2009 IPENZ (now ENZ), initiated a report on the supply of engineering graduates. This was called the National Engineering Education Plan (NEEP) and was completed in 2010.

The report included the following recommendations:

- The TEC accepts the estimates for the demand of engineering graduates for an innovation-led economy (2750 per year) as the basis for future planning.
- As a consequence, the TEC commits to target funding towards increasing the number of places in tertiary institutions for students who wish to study Level 6, 7, and 8 engineering qualifications.

The TEC provides mechanisms for tertiary providers to collaborate on providing support programmes for minority groups in engineering on a sustainable basis. (Institution of Professional Engineers New Zealand (IPENZ), 2010).

In summary, the report had two main outcomes:

1. The establishment of a single body to act as qualification developer and programme owner for the NZDE and NZDEP. This became the New Zealand Board for Engineering Diplomas.

Then in 2009/2010, the National Engineering Education Plan (NEEP) project proposed there should be a 'unified' New Zealand Diploma in Engineering (NZDE) qualification in civil, electrical, and mechanical engineering at NZQF Level 6, to replace a variety of two-year Diplomas in Engineering. This proposal was

approved by NZQA and the new NZDE qualification was taught for the first time in 2011 in Year 1 and 2012 in Year 2. There are at present 15 providers, mainly ITPs, now accredited by Engineering New Zealand to teach the new 'unified' NZDE qualification. (IPENZ, 2010).

2. The establishment of Engineering e2e.

This was established to provide a mechanism to address the shortage of engineers at levels 6, 7 and 8 (i.e. Diploma, Degree and post-graduate levels).

Engineering e2e (education-to-employment) is a programme designed to increase the number of engineers in Aotearoa NZ. It was established in 2014 by the Tertiary Education Commission (TEC) in response to Government concerns about the possible economic impact of a forecasted engineer shortfall, especially for technicians and technologists (NEEP Project Governing Group, 2010). The evaluation of Engineering e2e is a high-level review of it as a "systems integrator" that "coordinates, catalyses, and monitors" education-employment activity (Barton et al., 2013). Through a review of documentation and 16 interviews with steering group members and initiative or project leaders, the evaluation asked two questions:

- In what ways has Engineering e2e acted as a model of systems integration?
- What can be learned that might apply to Engineering e2e in the future and/or to e2e projects in other fields?

The Government set the goal of 500 more engineering graduates a year from 2017 onwards and Engineering e2e took up this mission. That goal of 500 more engineering graduates has been achieved, with the TEC confirming 511 engineering graduates from courses in 2016. However, the underlying goal of more technicians and technologists, who do and will play a particular role in the economy, has not been achieved.

The NZDE did not show the same result. The Table 3.1 shows the number of Equivalent Full Time Students (EFTS) enrolments in the NZDE between 2012 and 2020.

Table 3.1 Student enrolments between 2012 and 2020

Year	Civil	Electrical	Mechanical	Total
2012	561	190	239	**990**
2013	589	223	297	**1109**
2014	651	327	303	**1281**
2015	754	461	390	**1605**
2016	702	356	374	**1432**
2017	648	356	344	**1348**
2018	579	284	285	**1149**
2019	636	327	272	**1237**
2020	612	236	252	**1100**

Over the past 3 years, the numerical focus has been useful for galvanising support. It has also initially masked, and then revealed, other issues—some of which are deep-seated in Aotearoa NZ and beyond the control of Engineering e2e.3. (Vaughan, 2018). The NZCER report, (*e2e: An evaluation)* had this to say with respect to the goal of increasing the number of engineering students:

> Steering group minutes (31 May, 2017) acknowledged achieving the goal of 500 additional engineering graduates. They also noted "we still need to address the lack of level 6 and 7 qualifications" and wrote about this to the former Minister. An information sheet was produced, spelling out the numbers of graduates needed, the role of ITPs, and profiling several level 6 and 7 graduates (Our Shortfall in Producing ITP-Educated Engineers, June 2017). Steering group interviewees saw the over-production of BE(Hons) or 4-year degree (Level 8) graduates as connected with seemingly intractable esteem issues associated with particular pathways in the form of certain institutions and qualifications. And almost every interviewee, steering group member, or project leader commented on those issues as part of discussing what they learned and any unexpected experiences and outcomes (Vaughan, 2018).

The Bachelor in Engineering Technology (BEngTech)

Around the same time as the TRoQ process was beginning, the ITP sector fragmented. Six of the larger institutions (Unitec, Manukau, Wintec, WelTec, CPIT (later Ara) and Otago broke away from the national body, ITPNZ. These ITPs (referred to as the Metro ITPs) collaborated to develop a three-year engineering degree, the Bachelor of Engineering Technology (BEngTech) (see Chap. 14 for more details on the development and delivery of the BEngTech). The design of the qualification specifically built on the NZDE, especially the NZDE Level 6 courses. For the next 10 years the two qualifications followed their separate but closely related paths. The NZDE was overseen by the NZBED and the BEngTech by a management group established by the six participating ITPs. In 2019 the process of aligning the two qualifications' programmes more closely together was begun. By 2020 this process was well advanced, and steps were then to bring the governance arrangements for both qualifications under a single body.

The Reform of Vocational Education (RoVE) 2019–

In 2019 the government announced major reforms of the vocational education sector, up to and including Level 6. The initial stages of the reform process moved quickly with legislation, giving effect to the reforms, introduced on 1 April 2020 (see Chap. 4 and 5 for the rationale and discussion on RoVE).

There are two main foci to this reform process: ITOs and ITPs.

1. ITOs will not be part of the new system. Their qualification development function will be moved to six Workplace Development Councils (WDCs) yet to be established. The WDCs will also identify industry training needs.

The other main function of ITOs, planning for industry training, will be passed to Te Pūkenga.

2. All ITPs have been disestablished and converted to limited liability companies which are currently subsidiaries of Te Pūkenga. This is a transitory arrangement, and from 2023 they will become part of Te Pūkenga. Te Pūkenga will be the country's only ITP, although it will have a network of campuses.

Funding the New System

To date there has been limited information on the new funding system. In June 2020, the TEC described the following objectives for the new funding system:

> Any funding system for the new tertiary education system will need to:

- Support integrating learning and work – so that tertiary education providers are more responsive to the needs of employers and the workforce, learners can move seamlessly between delivery options, and people who learn in a workplace have access to robust teaching and learning
- Respond to the needs of all learners – which requires funding that is tailored to different learner needs
- Support the creation of an innovative, sustainable network of public provision for all regions of New Zealand
- Fund all tertiary education organisations delivering provider-based and/or work-integrated education at certificate and diploma qualification levels 3 to 7 (excluding degree study) and all industry training (TEC, 2020).

Interested parties await with anticipation.

Innovation

The word 'innovation' is used often in reform literature. This word evokes positive connotations. What can be more worthy than developing ground-breaking ideas and applying them in practice? The problem with innovation, however, is that it is risky, requires relentless effort, usually involves much failure, and as such, calls for strong nerves and considerable resources. That does not mean an innovative approach to teaching and learning cannot be achieved, it can, but 'innovation' requires effective leadership, considerable determination and energy, specific attention, and be supported by adequate funding.

Under the previous (current) system, there was little incentive for providers to attempt to develop and support an innovative culture within their organisations. Under the RoVE reforms, however, there may be opportunity to develop pockets of innovation. The Centres of Vocational Excellence (COVES) could be key players here. As it is, innovation is a challenging exercise at the best of times. By its very nature innovation is risky and educational institutions are reluctant to experiment with uncertain processes. Perhaps the new environment will provide an opportunity to explore innovative practices without exposing students to adverse consequences.

Closing Thoughts

The most obvious outcome of the tertiary education reform, enacted by the Education Act 1990 and implemented in 1991, was the move from a previously highly centralised system to being more devolved and competitive. While competition was a key focus, a relatively tight rationing of funding before 1999 acted as a strong counterbalance to excess. Notwithstanding the moderating effect of rationing funded growth, the environment was challenging for many institutions. Three ITPs became insolvent and at least two universities experienced serious financial difficulties at one time or another (TEC, 2018).

It cannot be stressed enough, that the single most potent influential factor across the entire sector for the past 30 years, has been the funding system. It is safe to say that funding will be the primary driver in the new system as well. It is interesting that funding did not feature significantly in the rationale for the present reform of vocational education. The main rationale for RoVE is to give industry more say in the delivery of industry training, stabillise the ITP sector, replace the competitive environment with a more collaborative one, and provide a more strategic and innovative approach to vocational education and training. These are laudable objectives, but they will only be achieved with a well-designed funding system, i.e., one which provides the right incentives. This will be challenging.

Another aspect of the current reform process warrants comment. As mentioned above, The New Zealand Board for Engineering Diplomas (NZBED) was established in 2011 to create a single, national engineering diploma out of several pre-existing diplomas (See above and Chap. 14 for the development of the BEngTech for background). For this to work it required a single body, NZBED to act as the qualification developer and programme owner. This development cut across the fundamental premise of the *Learning for Life* reforms which were based on individual providers acting in their own interests within a competitive environment. Past evidence indicates a single body, working in concert with a group of providers, to oversee the development and delivery of a single national qualification, can work well.

Conclusion

Through the discussion presented in this chapter, the various socio-political policies and its effect on the Aotearoa NZ ITP sector have been presented, albeit from the perspective of the first author's relationships and associations across the sector. Hindsight provides for much reflection. As Aotearoa NZ VET sector launches into a new era, it is important going forward post-RoVE, to acknowledge the whakapapa (historical evolution or genealogy) of ITPs and how these impinge upon and inform the sector, as it moves into the future.

Postscript

The first author for this chapter, Jim Doyle, passed away in February 2022. The editors were privileged to have been able to work with Jim on this chapter, which condenses his many years of association with, and contribution to VET system innovation and support. We asked Dr Peter Coolbear (formerly Deputy Chief Executive at the Manukau Institute of Technology and founding Director of Ako Aotearoa) to provide the following postscript reflecting on Jim's involvement in our changing vocational system. Peter worked for Jim at APNZ in the late 90's.

Jim Doyle was the Executive Director of the Association of Polytechnics in New Zealand (APNZ), later ITPNZ, for 17 years through the tertiary education reforms of the 1990s through into the mid-2000s. He was an outstanding advocate for high quality VET in Aotearoa NZ in what were exciting and uncertain times.

It was a period of rapid change as the polytechnics became innovative, autonomous entities negotiating a series of pressures in an era of policy volatility. There were several areas of contested ground, not least the place of the polytechnics in relation to other parts of the tertiary sector but also their role in developing curriculum and qualifications. Overlying all this was a funding model that fostered competition between the polytechnics themselves.

From the outset, the polytechnic sector was diverse with different local expectations and aspirations. Facilitating consensus and presenting a unified voice for the sector was a hugely difficult task and Jim was the ideal person to take on this role. During his time at APNZ, Jim worked with 67 CEs and probably almost as many Chairs of Polytechnic Councils, each bringing different perspectives and priorities to the table. Clear system-wide thinking on behalf of VET and the opportunities it could bring for learners, considerable equanimity, integrity and not a little humour were essential, and Jim had all these qualities and more. It was a great pleasure and privilege to work with and learn from him.

At a time when most of us consider retiring, Jim continued to work for the best quality of VET through his work as Executive Officer of the NZ Board of Engineering

Diplomas. He was responsible for a highly collaborative model of provision of engineering technician and technologist education involving providers, industry, and the professional body.

Jim made a huge contribution to VET in Aotearoa NZ and will be greatly missed.

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Jim Doyle has worked in or with the polytechnic sector for 26 years. Most of that time his involvement was at the national level dealing with major reforms. He also has extensive knowledge of several vocational education jurisdictions overseas.

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Chapter 4
The Reform of Vocational Education 1: The Context for Change

Nicholas Huntington

Abstract In this chapter I explore the Reform of Vocational Education (RoVE) programme as a policy and system-level phenomenon. These reforms represent the most significant change in 30 years to vocational education and training (VET) in Aotearoa New Zealand (NZ). In basic structural terms, they involve the dismantling of two sectors, the creation of new national entities, and significant changes to the funding system. These changes are, however, intended by the government to create deeper changes in how VET is organised and offered.

This chapter outlines the reforms, their background, and goals. The first section contextualises RoVE by an overview of how Aotearoa NZ's VET system – and broader approach to skills policy – developed since the market reforms of the 1990s. The next section discusses the immediate factors that caused Minister Hipkins to begin a programme of reform. And the final two sections outline the initial proposals and the final decisions. Together, this provides background for the following chapter, which explores some of potential implications of the RoVE changes.

Keywords Vocational education · New Zealand · Education reform · Education policy · Reform of vocational education

The Reform of Vocational Education (RoVE) programme announced in 2019 represents a dramatic and ambitious reorganisation of the structural framework for VET in Aotearoa NZ. Alongside reviews and changes in the realm of qualifications, the schooling network, and the Ministry of Education, it demonstrates the ambition and

This chapter draws in part on ideas, concepts, and analysis developed by the author during his time working for the Building and Construction ITO (BCITO) on their policy response to the reforms. The material represents his own perspectives, rather than that of the former ITO or their current incarnation within Te Pūkenga.

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_4

willingness of Education Minister Chris Hipkins to restructure education systems in response to long-standing perceived weaknesses.

At the time of writing, the reforms are at the mid-point of implementation. A single national public provider (Te Pūkenga) has taken over control of the former network of autonomous Institutes of Technology and Polytechnics (ITPs) and is in the process of absorbing the training structures of several Industry Training Organisations (ITOs). New Workforce Development Councils (WDCs) have been established and taken over standards-setting and strategic functions. New regional skills structures have been in place for some time and are developing work programmes, and a new Māori advisory group (Te Taumata Aronui) has been appointed to enhance the tertiary education system's ability to work for and with Māori. Meanwhile, the outline of a new funding system to support this new set of structures and actors is being developed. The new landscape offers significant opportunity to enhance VET in Aotearoa NZ. But there are still clear questions to be answered and challenges to be faced.

The Policy Context and Earlier Reforms

Beginning with the 1989 Learning for Life reforms, post-secondary policy through the 1990s emphasised increasing participation by students and promoting competition between education providers. This included significant changes such as removing caps on the total number of students who could receive publicly subsidised education places, removing restrictions on who could offer particular types of courses, and eventually allowing private providers access to government funding on an equal basis to public organisations. At the same time, a system of Industry Training Organisations (ITOs) was established in 1992 to provide industries with stronger input into their qualifications and training arrangements (Green et al., 2003).

The watchword of this period was flexibility, innovation, and market-led competition, albeit with unclear effects on actual outcomes. Participation certainly increased, but much of it was in low-quality courses. Organisations were criticised for directing large amounts of public funding towards competitive activities and duplicating rather than focusing on education and research outcomes. Predicted productivity gains and increased training investment by industry largely failed to materialise (Gianella, 2021; McLaughlin, 2003; Moses & Strathdee, 2008; Smyth, 2012). This led to the appointment of an independent Tertiary Education Advisory Commission (TEAC) in 2000 to reform post-secondary education. The Commission's recommendations were broad, touching on funding, research, teaching, and other matters. A central outcome was the creation of a dedicated body – the Tertiary Education Commission (TEC) – that would oversee a more activist government approach to what would be a more coordinated and integrated tertiary education system.

Ashton (2004) establishes a tripartite classification of national VET systems: the free-market model dominant in the Anglosphere, corporatist models common in

Europe (such as the German dual system), and the developmental state model common in industrialising countries. These three forms represent an ascending role of the state and collective organisation, from a situation based primarily on individual choice, to the state facilitating cooperative negotiation between formalised social partner structures, to a state-determined and directed model. In this framework, the reforms of the 1990s moved Aotearoa NZ's VET system away from pseudo-corporatism and towards a fully market-based model; the TEAC reforms did not fundamentally alter the nature of that system (Strathdee, 2003, 2010).

Instead – in a manner characteristic of the 'third way' thinking prominent in social democratic parties at the time (Batters, 2008) – the TEAC attempted to ameliorate the perceived excesses of those changes by introducing steering tools. These included a short-lived system of profiles and charters, tertiary education strategies to set an overall direction for the sector, and capped public funding for enrolments based on plans negotiated between the TEC and individual institutions. This would allow the theoretical benefits of the market model – most notably the pressure to innovate, maintain quality, and respond to learner needs that competition created – to be balanced against the government's desire to make more 'strategic' investment, control growth in 'low-quality' courses, and constrain costs.

While recognising the intrinsic value of learning (TEAC, 2000), the Commission was also clear that governments support – and people choose to participate in – education for extrinsic motivations such as obtaining employment, ensuring the supply of labour for industry, and enhancing social and personal wellbeing. Such language was not new and had in fact been used as part of the argument for earlier reforms (Hawke, 1988). However, from TEAC's inception onwards such concepts began to be more clearly reflected in policy settings. More attention was paid to aligning tertiary education with economic and social priorities and encouraging 'good quality outcomes' over simple participation. This included greater emphasis on improving completion rates, progression to higher study, and improved employment outcomes (Smyth, 2012).

Ironically, however, this same agenda arguably diluted the identity and prominence of VET. As 'new vocationalist' (Grubb, 1996) perspectives took strong hold within the education policy community, the traditionally distinctive features of vocational education – such as connections with work and employment, a focus on applied knowledge and pedagogy and the like – were increasingly seen as desirable characteristics for all tertiary programmes. Vocational learning became defined more directly by its link to specific occupations – primarily the traditional trades – or what was considered to be the lower complexity of skill and knowledge involved compared to more academic pathways. This latter definition was effectively embedded through the structure of the National (later New Zealand) Qualifications Framework, which situated vocational programmes several steps below degree study in its hierarchy of the knowledge, skills, and attributes fostered through learning.

A key characteristic of this period was a growing focus on 'skills' as a key concern of policy makers. Not only was such language part of a broad global trend at the time, but as Keep and Mayhew (2010) point out many administrations have

found focusing on skills to be a politically attractive way of framing an exceptionally broad range of social and economic challenges. Coming after two decades of societal disruption, the Labour-led government of Helen Clark was an enthusiastic adopter of this framing. As something of a 'magic policy concept' (Pollitt & Hupe, 2011) on which different stakeholders could project their own specific meaning – and their own construction of who was responsible for addressing it – skill became a valuable rhetorical device that could be used to dampen tension and promote collaboration between different interests.

As bodies charged with education and training for industries, ITOs were a natural focus for this agenda and, following the *Skills for the Knowledge Economy* review, in the early 2000s they were provided with a statutory skills leadership function. This gave them an explicit remit to engage in addressing strategic skills-related issues for their industry, but the overall impact of it is unclear. Some ITOs became active in researching VET issues and their main representative organisation (the Industry Training Federation or ITF) became increasingly interested and active in policy areas such as enhancing productivity through skills, workforce planning, and developing career pathways into and through their industries. In the mid-2000s the ITF established Aotearoa NZ's national annual vocational research conference (the New Zealand VET Research Forum). However, it also appears many government officials had little regard for this function and even ITOs themselves were not always clear on what it involved (ITF, 2016).

In 2008, the Labour-led government began development of a national Skills Strategy, founded as a partnership with the summit organisations for employers (Business NZ), unions (the Council of Trade Unions), and industry training organisations (the ITF). This included a concentration on improving adult literacy and numeracy, reforming non-degree qualifications, understanding and prioritising different skill needs, and addressing poor management capability within firms (Skill New Zealand, 2008a, b). Such strategies were popular at the time (OECD, 2011), but this was particularly noteworthy in Aotearoa NZ given that it was a direct attempt by the government to adopt a more European-style approach to skills policy. The ITF's involvement in this process also represented a high-point for ITOs' system-level influence, with the Federation positioned as a fourth pillar of national skills policy alongside representatives of labour, capital, and the government.

The Skills Strategy proved short-lived, as Labour's loss in the November election led to it being quietly abandoned following the accession of the National-led government. The incoming regime had a more restrictive view of the legitimate ambit of skills policy, focused simply on skills supply (Batters, 2008). Elements of the Strategy did survive, however, most notably in the area of qualifications reform. The Targeted – later Mandatory – Review of Qualifications initiated by NZQA was designed in large part to reduce the proliferation of locally developed qualifications established and owned by individual education providers. This involved a conceptual split between the qualification itself – the intended capabilities represented by the award, and the education and career pathways it was intended to support – and the programme of delivery.

Following this Review, Certificate and Diploma qualifications were each created and controlled by a single 'developer' (in most cases an ITO), while the specific curriculum, learning materials, assessment processes and the like for an education programme leading to that qualification were designed by an individual provider (including, for workplace-led learning programmes, ITOs). The qualification developer was required to approve each programme and quality assure it through assessment moderation and similar processes. This division was intended to give users of the qualification confidence in the consistency of outcomes, while allowing providers the flexibility to innovate and respond to local needs. The Review proved highly successful at reducing qualification numbers, although anecdotally the robustness of the programme approval process proved questionable in practice.

The second major reform event in the VET space during this period was the 2011–2012 Industry Training Review initiated by Steven Joyce, the then-Minister of Tertiary Education, Skills, and Employment.[1] Despite suggestions that this Review came close to abolishing the entire industry training system (ITF, 2016) its ultimate impact was limited (Crawford, 2016). The most significant outcome of the Joyce Review was the conclusion that allowing industries to direct their own formation of ITOs was inefficient and led to the proliferation of small bodies with fragmented capabilities. As result, organisations were 'encouraged' by the Minister and government agencies to merge with or simply take over smaller organisations, and the number of ITOs fell from over 40 to 11 in 2014.

Additionally, the skills leadership function of ITOs was removed and the possibility of directly funding employers to conduct their own training was introduced, shifting the policy pendulum back towards a market-centric model steered by the micro-level choices of individual employers and learners. However, ITOs retained their monopoly over the development of national standards and qualifications, were still able to manage training arrangements, and in many cases appeared to be satisfied with no longer having an official strategic responsibility for skills issues in their sector beyond ensuring supply (ITF, 2016).

The Origin of the Reforms

By the time of the election of the Ardern-led Labour government in 2017 and the appointment of Chris Hipkins as Minister of Education,[2] there was a perception on the part of many stakeholders that Aotearoa NZ's approach to vocational education and training was in need of reform. Views were widespread that the overall framework of the VET system had significant problems and was no longer fit for

[1] This was essentially the former Tertiary Education portfolio, renamed when Minister Joyce took over the position. The new name provided a clear indication of his priorities and focus on work-related outcomes.

[2] Hipkins' appointment brought the entire education system under a single Minister for the first time since 2005.

purpose– even if perspectives differed on what precisely those system-level problems were and what solutions might be desirable (see for example, BCITO, 2017; New Zealand Productivity Commission, 2017). The Labour Party had drawn on this dissatisfaction while in opposition and emphasised the need for a more activist and strategically directed VET system as part of its 'future of work' policy initiative (New Zealand Labour Party, 2017).

Key issues included perceptions that the relationship between skill demand and supply was not working well, there was significant inconsistency in programme quality and poor collaboration between different players in the system, and the funding model required significant reform (Minister of Education, 2018; Ministry of Education, 2018). Officials at the time expressed significant concern to Minister Hipkins that ITPs in particular needed to "orient themselves more toward employees and employers and integrate their activities more with the labour market" (Tertiary Education Commission, 2017, p. 12). None of these issues would have been news to the Minister. Not only had he held the opposition spokesperson and associate spokesperson roles in education for the past 6 years, but his pre-Parliamentary experience included working for the ITO summit body, where he had co-authored a history of the system (Green et al., 2003).

More directly pressing, however, was an ITP sector that was increasingly financially unsustainable. This was not a new issue; ITPs had been facing funding issues since the late 1990s for a variety of reasons, including urban drift, government funding policy decisions (including the introduction of competitive tendering for foundation learning), and lack of growth in degree-level enrolments to compensate for cuts to sub-degree programmes; this had been partially offset by an increasing reliance on overseas students for income (Tertiary Education Commission, 2017, 2018a).

While a small handful of Aotearoa NZ's ITPs appeared to be in an acceptable financial state, declining enrolments had led to severe financial stress for the sector (Minister of Education, 2018). Enrolments in provider-led and workplace-led learning are broadly counter-cyclical against each other (Smyth, 2020), and as shown in Table 4.1 below the strong economy had led to learners favouring workplace-led industry training over provider-based education. Accounting for differences in course loads, while enrolments at all providers had fallen from 2010 levels (due to changes in funding eligibility rules), those at ITPs had decreased by 16% since 2011

Table 4.1 Equivalent Full-time Learner enrolments in VET programmes by sector, 2010–2017[a]

Sub-sector	2010	2011	2012	2013	2014	2015	2016	2017
ITOs	53,440	44,530	42,300	42,050	41,600	44,480	44,705	45,330
ITPs	39,010	37,255	38,485	36,540	34,900	34,000	33,285	31,480
PTEs	25,905	24,755	23,050	22,275	21,360	19,135	17,955	16,615
Wānanga	9890	14,135	13,960	14,535	15,435	14,840	16,235	16,055
Total	**128,240**	**120,670**	**117,790**	**115,400**	**113,300**	**112,460**	**112,185**	**109,475**

[a]Taken from Education Counts (n.d.). Figures are Equivalent Full Time Students for providers and Standard Training Measures for ITOs; individual entries have been rounded and the table excludes university data

while those at ITOs had increased. Meanwhile, ITP degree and postgraduate EFTS were essentially static.

As a result, two policy workstreams were established to address the operation of the VET sector: the ITP Roadmap 2020 and the VET System Review. The first of these focused on developing a new sustainable model for the ITP sector and was led by the Tertiary Education Commission (TEC), while the second was led by the Ministry of Education (the Ministry) and intended to focus on system-level framework, policy, and regulation issues. In late 2018 these were combined into a single Reform of Vocational Education (RoVE) project, on the basis that the importance of the ITP sector meant it was not possible to do one of these without the other.

It is noteworthy that all three of these VET reform strands – the Roadmap, the System Review, and the combined RoVE programme – were conducted fully in-house by officials. In contrast, two other major reviews conducted around the same time (the 2018 review of the National Certificates of Educational Achievement and the 2018–2019 review of the Tomorrow's Schools model of education governance) were overseen by bodies of appointed experts and stakeholders who made independent recommendations to Minister Hipkins. Both these reviews also involved long and relatively public deliberations and consultation. The RoVE proposals, by way of comparison, were developed with little opportunity for public input and limited independent expert analysis. The rationale for adopting an official-led approach to VET reform proposals and an expert-led approach in other education areas is unclear.

The Reform Proposals

The Minister's initial reform proposals were released for consultation in February 2019 (Minister of Education, 2019a), and involved three core elements:

- **Redefine the roles of education providers and ITOs and extend industry and employers' leadership role across all vocational education.** This involved disestablishing ITOs and their dual mandate to both 'arrange' training and develop standards. Industry training organisations would be replaced with system-level Industry Skills Bodies (ISBs) that would take over the standards-setting roles of ITOs but also have a strengthened strategic function to ensure the VET system reflected industry need. They would have a clear skills leadership function for their industry, develop curricula and approve programmes before they could be offered by providers, and advise on public funding allocations for vocational programmes. The workplace-led learning role of ITOs would be taken over by provider: PTEs, wānanga, and the new NZIST (Te Pūkenga).
- **Create a New Zealand Institute of Skills and Technology (NZIST)**. This involved disestablishing the ITP sector and replacing it with a single national provider (seemingly modelled on Singapore's Institute of Technical Education). The NZIST would take over the existing programmes, learners, staff, and assets

of the ITP sector – retaining regional campuses based on former ITPs – but given earlier reforms would be able to offer workplace-led programmes as well. The Institute would also host new 'Centres of Vocational Excellence' to advance teaching practices and applied research in particular fields. Three alternative models – a networked system of differentiated ITPs, a federated approach, and simply reducing the number of ITPs – were presented as having been considered by the government but rejected as less effective for achieving the government's intended outcomes (Minister of Education, 2019). The potential loss of regional voice in this model would be addressed through the creation of Regional Leadership Committees (later renamed Regional Skills Leadership Groups or RSLGs). These bodies would sit outside the education system itself but provide advice on the education needs of the industries and communities in their area.

- **Create a unified vocational education funding system.** This involved creating a new funding model for the VET system that would replace both the industry training fund used by ITOs and the EFTS funding system used by providers (at least for their vocational offerings). This would integrate funding for workplace-led and provider-led learning, as well as allow for more strategic investment and orientation of funding to support particular groups of marginalised learners.

These proposals immediately generated significant controversy and diverse reactions from across the VET spectrum (Education Central, 2019). Official analysis of submissions received during the consultation period showed very high levels of support for reform in principle: 74% of respondents agreed that the VET system needed to change (Ministry of Education, 2019b). However, ITOs and ITPs unsurprisingly opposed the proposal to disestablish their sectors. ITOs pointed to high numbers of students with minimal government investment as evidence for the value of what they currently provided, arguing that they were collateral damage of changes needed to the ITP sector and that funding and policy shifts would be sufficient to resolve other key issues in the sector (ITF, 2019). The ITPs meanwhile, acknowledged the need for reform to ensure the viability of their sector but opposed the concept of a unified national provider. Opposition amongst ITOs was particularly strong, with one lodging an unsuccessful application for Judicial Review and claim with the Waitangi Tribunal to prevent the process (Skills Active, 2019a, b). Ultimately, however, the ITP sector became more accepting of the reforms – possibly following guarantees that the NZIST would have a strong emphasis on regional responsiveness (Gerritsen, 2019).

Other reactions were more positive. Representatives of staff broadly welcomed the changes, albeit with concerns over the increased power of industry to steer curriculum and teaching (TEU, 2019a, b), and national student representatives responded enthusiastically to the proposal to remove competition between ITPs by integrating them under a single provider (NZUSA, 2019). However, both representative bodies had little coverage in the industry training or PTE sectors and their responses were likely dominated by the perspectives of ITP members; the views of apprentices and staff involved in designing and managing workplace learning went largely unrecorded. Māori and Pacific representatives, organisations, and

communities were generally positive, but emphasised the need for the new system to preserve current structures that worked for Māori and Pacific learners as well as ensuring a strong voice for these communities in the new regime (Ministry of Education, 2019b; MPTT, 2019).

Employer views were mixed, and often depended on whether a particular firm or industry body had good relationships with the ITO in its sector. The main representative body for employers criticised both the current industry training model and the operation of ITPs, but argued against the creation of the NZIST as presenting "too great of a risk of a single point of failure" and advocated strengthening the proposed role of ISBs as part of moving toward a more-market model that would be driven more strongly by employer choice (Business NZ, 2019). In contrast, the New Zealand Council of Trade Unions lauded the proposals for reducing competition and offering the basis for a social partnership between labour and capital in the VET arena (NZCTU, 2019). Both, however, supported the goal of removing the hard distinction between workplace- and provider-led learning present in the existing system.

The Final Decisions

Following a consultation period extended slightly in recognition of the Christchurch Mosque Attack of 15 March, the final decisions were confirmed in August 2019 (Ministry of Education, 2019c, d). These largely confirmed the initial proposals, with two key differences. Firstly, a new body called Te Taumata Aronui would be established to reflect the partnership between Crown and Māori. This group would provide independent advice on the operation of the tertiary education system – not just VET – for Māori (Ministry of Education, 2019c).

Secondly and more notably, however, were changes to the ISBs – now renamed Workforce Development Councils (WDCs). As originally proposed, these would have followed the same basic model as ITOs. An entity that could demonstrate industry support would apply to the Minister of Education for recognition as an ISB for that industry (Minister of Education, 2019a, b, c, d). Under the finalised model, however, the government would establish Councils and define their coverage; these would be initially based around six existing vocational pathways rather than being determined by industries themselves (Ministry of Education, 2019d).[3] This allowed for a theoretically more coherent approach to establishing WDCs – and ensured that all industries would in principle be covered by a Council – at the cost of reducing industries' sense of connection to their skills bodies.

The RoVE changes were enacted through the Education (Vocational Education and Training Reform) Amendment Bill, introduced in 2019 and finally passed in

[3] Vocational Pathways were pan-industry 'meta-sectors' developed by ITOs in the late 2000s and adopted by the government as part of moves to enhance school-based VET (Education Review Office, 2016; Williams, 2020).

2020. As well as reforming relevant aspects of the core education legislation (the Education Act, 1989) this also repealed the Industry Training and Apprenticeships Act 1992, symbolically integrating workplace learning into the core education system for the first time since the 1990s.[4] The Bill was introduced in 2019 and finally passed in 2020. The National Party, the main parliamentary opposition, mounted a vocal campaign against the reforms based largely on the argument that in taking over regional ITPs Te Pūkenga was effectively appropriating local community assets. However, this garnered little public traction other than in Southland, where the local community had an extensive history of support for their local ITP (the Southern Institute of Technology).

The RoVE legislation set out requirements not only around the role of the NZIST – later named Te Pūkenga – but also set key elements of its structure, operations, and approach. It established an extensive statutory Charter to guide how the NZIST should approach its work, including allowing regional autonomy while maintaining a nationally coherent network, attracting international learners, responding to Māori, empowering students and staff, partnering with employers, and more (Education and Training Act, 2020). Less detail was provided about WDCs, with most operational and governance elements being left for the Minister's determination through Orders in Council. However, the Bill did clearly establish the functions of the Councils within four areas: skills and workforce leadership, developing and setting standards, endorsing programmes and moderating assessments, and an advisory role that included guiding the TEC on funding for VET programmes (Ibid., s 366).

The process for moving to the new environment was also established through the Bill. On 1 April 2020 ITPs would be directly subsumed into the structure of the NZIST, but they would initially operate as subsidiaries of the Institute until the end of 2022. ITOs were re-recognised as 'Transitional' ITOs (TITOs) and required to develop transition plans for shifting their standards-setting functions to WDCs and their training management functions (including apprentices and trainees) to providers. This plan-based model was to allow training to be re-positioned in the way that best suited industry, although the TEC held significant power in this process both through its authority to approve and amend plans,[5] and its role in establishing the industry coverage of WDCs. Notably, however, while the Bill established the NZIST and WDCs, it omitted any references to RSLGs, Te Taumata Aronui, and CoVEs. These bodies remain non-statutory entities, with their purpose, function, and structure – and even their existence – subject to the desires of ministers and government agencies.

The emergence of COVID-19 in 2020 did little to slow the pace of reform. The initial integration of ITPs into Te Pūkenga occurred on schedule – albeit primarily as a change in governance given that these institutions continued to operate as

[4] The Education Act, 1989 was itself soon repealed and replaced with the Education and Training Act, 2020 as part of Minister Hipkins' wider programme of educational reform.

[5] The TEC was also ultimately given the power to develop its own transition plan for an ITO if the organisation refused to engage in the process.

individual providers and will do so until 2023. The development of WDCs continued through the creation of Establishment Boards to develop operational elements and inform the creation of their founding Orders, as well as a multi-layer Design process to conceptualise how they would function in practice. Two CoVEs were set up (one covering the primary sector and one covering construction), members of Te Taumata Aronui were appointed, and a network of 15 RSLGs was set up under the auspices of the Ministry of Business, Innovation, and Employment (MBIE). While the National Party had promised to reverse the reforms if it came to power, RoVE failed to become any sort of issue in the 2020 elections which were instead dominated by the government's COVID-19 response.

In 2021 several ITOs announced their decisions to move their training functions into a new Te Pūkenga subsidiary established specifically to manage workplace learning. Figure 4.1 below illustrates how this functions in relation to the three ITOs that were first to transition.[6] Importantly, each ex-ITO 'unit' within the workplace learning subsidiary has more operational independence than a given faculty within an ex-ITP subsidiary. For example, the business unit comprising the former BCITO sets and manages its own learning and assessment model, industry consultation etc. The Construction faculty in a former ITP, on the other hand, is bound more tightly to the strictures and policies of the Te Pūkenga subsidiary in which it sits.

At the time of writing, Te Pūkenga has been in existence for 2 years and is developing the business model that will operate once current subsidiaries are fully integrated at the beginning of 2023. WDCs have been operating for 6 months, and most TITOs have confirmed their transition plans (with almost all trainees and apprentices transferring to Te Pūkenga). In this sense, the RoVE changes have now reached the end of 'Phase 1'. The remainder of 2022 will see the second phase progress as

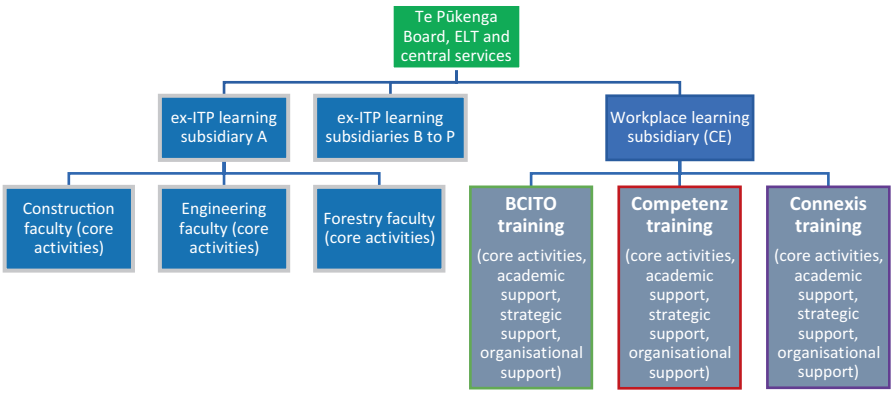

Fig. 4.1 Comparative structure of workplace and off-job subsidiaries within Te Pūkenga

[6] The initial ITOs who announced their intention to shift in this way were Competenz, BCITO, and Connexis. They had coverage for manufacturing and engineering, building and construction, and infrastructure industries respectively.

WDCs become fully operational, the remaining learners transition out of TITOs, and Te Pūkenga finalises the detail of its operating structure. This sets the stage for 2023 when Phase 3 begins, and the full post-RoVE landscape is in place.

Conclusion

The RoVE programme represents a dramatic reshaping of how VET provision will be organised and managed in Aotearoa NZ. However, while ambitious in scale it can also be seen as an essentially conservative model of reform. It is worth noting the proposals framed the 'problems' with VET in Aotearoa NZ as stemming from how individual providers and ITOs operated, rather than grappling with whether the country's overarching approach to vocational learning was fit for purpose. For example, no reflection was undertaken of how broader policy and regulatory settings, the approach of government agencies, or similar elements might have led to an environment that needed reforming. Rather than approaching VET as a system of education and learning, the reform programme effectively treated it as the output from a collection of discrete supply-side entities that were each more or less failing to deliver what the government (and other stakeholders) wanted. The changes proposed to address this state therefore focused on changing the performance of the provider sector by changing the entities within it; in many respects it is thus more accurate to refer to RoVE as the *Restructure* of Vocational Education than the *Reform*.

This focus on structures and institutions may stem in part from the pressing need to address the state of the ITP sector, leading to the priorities of the ITP Roadmap 2020 workstream taking precedence over the broader orientation of the VET System Review.[7] The reform proposals did not engage with deeper system and policy questions that had been signalled as being part of the System Review, such as the use and effectiveness of workplace-led learning, or how applied industry-linked and occupationally-focused education at degree level related to the VET system. Similarly, strategic system issues such as the current and future state of the VET workforce, the role of VET organisations in skill utilisation, parity of esteem issues, or the situation of VET within schools were excluded. The implicit assumption was that broader positive change would simply 'fall out' of the new structures created through RoVE.

The new landscape created by the reforms involves less radical and fundamental change than could have been the case. Nevertheless, it will significantly alter the way in which learners, communities, firms, and industries engage with VET. The potential implications of these changes is the subject of the next RoVE chapter.

[7] It is worth noting here that policy work leading to the RoVE proposals involved extensive consultation with ITP staff and learners (Tertiary Education Commission, 2018b), but only a small amount of engagement with other stakeholders in the VET system.

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Chapter 5
The Reform of Vocational Education 2: Looking to the Future

Nicholas Huntington

Abstract This chapter is the second of two in this volume that directly engage with the Reform of Vocational Education (RoVE) programme. Where the previous chapter outlined the historical context for RoVE and described the changes themselves, this chapter explores the potential implications of the reforms for VET in Aotearoa New Zealand (NZ).

The chapter begins by discussing how the reforms define the scope of a VET sector for Aotearoa NZ. This leads into discussing the three core aspects of the reforms: changes to training structures (especially the establishment of Te Pūkenga), changes to the strategic framework and industry voice (especially the establishment of Workforce Development Councils), and changes to the funding system. Finally, it concludes with a brief eye to the future and discussion of some key benefits and risks, including noting some persistent issues that the reforms seem unlikely to address.

Keywords Vocational education · New Zealand · Education reform · Reform of vocational education · Education funding

Introduction

The Reform of Vocational Education (RoVE) has significantly altered how vocational education is managed in Aotearoa NZ. In the place of 16 independent Institutes of Technology and Polytechnics (ITPs) and 11 industry-owned Industry Training Organisations (ITOs), we now have a single national provider in Te Pūkenga (the New Zealand Institute of Skills and Technology or NZIST) and six Workforce Development Councils (WDCs). An arguably crowded training system

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_5

involving 27 ITPs and ITOs has been reduced to one organisation – though private providers and wānanga will also compete for the attention of students and engage with employers. And all this will be underpinned by a new funding structure.

There are also significant system level changes. New Workforce Development Councils (WDCs) now have a responsibility to set a strategic direction for vocational provision in relation to the industries they cover. However, their role also intersects with the social and economic development functions of Regional Skills Leadership Groups (RSLGs), Te Taumata Aronui's role in advising how post-compulsory education should respond to the needs of Māori, and the emergent position of new Centres for Vocational Excellence (CoVEs).

Table 5.1 summarises the goals of the reform programme, and the RoVE interventions most closely linked to each of the goals. As with any initiative, how the reforms play out in practice and how successful they are at achieving those goals will be shaped by a variety of external factors. Moreover, the complexity of the education environment means these interventions will inevitably have other

Table 5.1 Reform Goals and Associated RoVE Interventions

Government reform goal	Associated interventions
Develop a more nationally consistent, nationwide system of VET provision	Disestablishment of ITPs and creation of Te Pūkenga. Creation of WDCs with new programme endorsement power. Integration of two VET systems (provider-led and workplace-led) into one unified system.
Make VET providers (former ITPs, PTEs, wānanga) more responsive to industry needs	Creation of WDCs with new programme endorsement power. Creation of WDCs with new skills leadership function. Creation of WDCs with new funding guidance function. Integration of two VET systems (provider-led and workplace-led) into one unified system.
More strategic public investment in education and training	Disestablishment of ITPs and creation of Te Pūkenga. Creation of WDCs with new funding guidance function. Creation of WDCs with new skills leadership function. Separation of 'arranging training' and 'qualifications systems' functions.
Extend use of on-job learning across the VET system	Integration of two VET systems (provider-led and workplace-led) into one unified system. Creation of WDCs with new programme endorsement power. Reform of VET funding system.
Ensure the VET system is financially sustainable	Disestablishment of ITPs & creation of Te Pūkenga. Creation of WDCs with new funding guidance function. Reform of VET funding system.
Better support systems for all VET learners	Integration of two VET systems (provider-led and workplace-led) into one unified system. Reform of VET funding system.
Lower barriers for employers to engage with VET	Disestablishment of ITPs & creation of Te Pūkenga. Integration of two VET systems (provider-led and workplace-led) into one unified system. Creation of WDCs with full and coherent industry coverage. Creation of WDCs with new skills brokerage role.
Promote VET-based careers	Creation of WDCs with new skills leadership function.

unintended effects. In this chapter I explore some potential implications of the reforms for vocational provision, the strategic operation of the VET system, and resourcing issues. To begin, however, I discuss what the reforms mean for defining a clear vocational education sector in Aotearoa NZ.

Defining the New Vocational Sector

Defining VET is a notoriously complex issue, with different definitions turning on pedagogy, epistemology, societal hierarchies and status, the labour market, and more (Education International, 2009; Cedefop, 2017; Karmel, 2011; Moodie, 2002). However, to reform VET firstly requires setting the boundaries of what precisely it is that is being reformed. This is particularly complex in Aotearoa NZ because – at least theoretically – there is no formal distinction between different types of post-secondary education. There is no separate 'vocational' education strategy, no government agency charged specifically with oversight of VET, no special policy or performance monitoring in relation to vocational education and training, and (with the exception of industry training and a few other programmes) no distinctive requirements or expectations of 'vocational' learning compared to other programmes.

This has been exacerbated by many traditional features of vocational learning being extended across the wider tertiary system, and a general blurring of distinctions between higher and further education. Recent Aotearoa NZ education policy has strongly embraced the ideals of 'new vocationalism' (Grubb, 1996), including the idea that every form of education has a role in preparing learners for the labour market. Under the last two Tertiary Education Strategies all parts of the tertiary education system have been encouraged to improve their connections to the world of work.

At the same time, the scope of what VET might encompass has broadened significantly. What are traditionally considered vocational providers can offer degree and postgraduate qualifications that are in principle the same as those offered by universities. And while connections to employment are still a key element of vocational education, this is often accompanied by an emphasis on broader transferrable skills and the same language of personal development that has traditionally characterised more 'academic' learning. The main union for post-secondary educators, for example, offers an ambitious and expansive definition of vocational education that not only explicitly reaches up into postgraduate learning, but stretches beyond the connection to work in emphasising that VET must have civic goals such as "the advancement of a strong Te Tiriti o Waitangi relationship, kaupapa Māori, and mātauranga Māori" (TEU, 2019a).

Within this broad environment, industry training traditionally retained its own distinct vocational identity due to its near-monopoly on workplace-led learning, the specific regulations governing industry training organisations, and the strong voice of employers within that system. Otherwise, however, what constitutes the VET 'sector' is somewhat fluid and determined by context. The most common two

definitions – and those on which the reforms draw – are VET as a type of institutional classification, and VET as part of an educational hierarchy.

From an institutional perspective, the sector consists of those educational organisations outside the university system. These organisations are all subject to oversight by the New Zealand Qualifications Authority (NZQA), rather than the collective self-regulation regime universities use, and are generally considered to have inherently strong connections with the world of work and 'applied' learning. The education they offer is considered to be vocational in nature even when the same qualifications are offered within the university system, and programmes have little input from industry and are taught in a traditional classroom-based manner.

The educational perspective, on the other hand, defines VET in terms of where it sits on the New Zealand Qualifications Framework (NZQF), as shown in Fig. 5.1 below. Vocational education comprises those programmes located between 'foundation' education (including school qualifications), and degree and postgraduate education (with some overlap in the form of Diplomas at Level Seven). The vocational sector thus consists of the programmes that lead toward qualifications at levels 3–6 and the organisations that specialise in offering those qualifications.

Importantly, this perspective does not represent a *qualitative* difference in vocational knowledge; as with similar frameworks in other countries, the purpose of the NZQF is to avoid such distinctions. Instead, the educational hierarchy perspective frames vocational knowledge and skills as a middle ground in terms of their inherent complexity; above basic education, but less sophisticated than higher education.[1] Unsurprisingly, this has often gone hand-in-hand with a view of vocational education as a less socially desirable pathway, and the framing of it as a 'second choice' intervention for those who are failing or less academically capable (Education Review Office, 2016; Eyre & Hipkins, 2019; Hipkins & Vaughan, 2019). In this sense, the educational hierarchy definition of VET is bound up strongly with parity

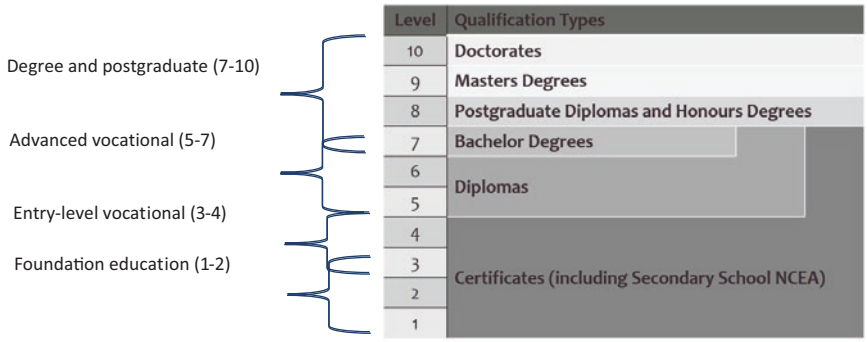

Fig. 5.1 The New Zealand qualifications framework. (Adapted from NZQA, 2016)

[1] The concept of 'higher' VET, such as Degree Apprenticeships, is obviously problematic in this definition.

of esteem issues between 'further' and 'higher' education pathways, as well as the class and status of particular occupations.

The reform programe draws on both these definitions, and in this sense the reforms have not provided a clear outline of what comprises VET in Aotearoa NZ. The changes to delivery made as a result of RoVE are based primarily on an institutional conception of VET. Reforming the vocational system has meant reforming how ITPs and ITOs operate, and changes to the environment for private training establishments and potentially some wānanga. And under its Charter, Te Pūkenga will continue to offer degree and postgraduate education as well as conduct research – this new vocational provider is still expected to be active in the 'higher' education space and engage in advancing (applied) knowledge. On the other hand, WDCs' role is founded largely on an educational hierarchy perspective. Their remit is defined in terms of diplomas, certificates, and the NZQF, to the extent that they will have approval power over university qualifications situated below degree level (NZQA, 2021).[2]

An interesting wrinkle, however, has been created by the legislation accompanying the reforms. Section 10 of the Education and Training Act 2020 now formally defines vocational education and training as "education and training that lead to the achievement of industry-developed skill standards, qualifications, or other awards". This establishes a third definition of vocational learning tied not to who offers it, the level of the qualification, or how it is taught, but rather through its connection to industry – specifically, the involvement of industry in determining what is learnt and how that learning is credentialised. In the new landscape, this essentially positions WDCs, being the vehicle whereby industry develops standards and qualifications, as the heart of the vocational system.

Implications for Vocational Provision

The most immediate and obvious of the changes introduced by RoVE is its reconfiguration of how VET will be provided. The system of individual, autonomous ITPs in existence since the 1960s has been dismantled and replaced with a single entity in Te Pūkenga. The industry training regime overseeing workplace-led learning for the past 30 years has been dismantled, with such learning in the process of transferring to providers. And while private training providers and wānanga have not been directly affected by the reforms (other than needing to respond to the role of WDCs), they will now be able to offer learning in the workplace but also be competing for learners alongside a national entity with significant critical mass of facilities, resources, and learners.

[2] The leadership role of WDCs is potentially broader still, as it is defined not in terms of the education system but rather the skill and workforce needs of industry. This would justify Councils having a role not just in relation to that part of a workforce educated through VET, but also the 'professional' or degree-based elements.

This change undoubtedly has significant potential benefits for provider-led provision. At the most basic level, the pre-reform ITP sector was essentially in an ongoing financial crisis. This could theoretically have been resolved with significant cash injections, either as direct investment from the government or through increases in EFTS subsidy rates, but these would not have resolved underlying systemic issues. The formation of Te Pūkenga is likely to resolve this sustainability issue, preserving a nation-wide network of public VET provision. It also should encourage greater sharing of the innovations and expertise developed by some high-performing ITPs (such as those outlined in this book). And a large, national entity with significantly greater resources than individual ITPs and the ability to leverage economies of scale should allow for more effective investment in some areas. Supporting applied research is one example of such an area.

A core risk, however, is whether the nationwide scale of Te Pūkenga will overwhelm its ability to adequately reflect regional needs. It will be easy for the ideal of more consistent outcomes to devolve into simple uniformity of provision. Recent drives both within the institution and by NZQA (2021) to establish single national curricula are potentially discouraging signs in this respect. But the true test will come with the role and power of regional structures within Te Pūkenga, and how well they engage with not just Regional Skills Leadership Groups, but also local communities, iwi and hapū, and regional industry.

Beyond this, the most significant change to provision introduced by RoVE is enabling providers to operate in the workplace learning space. This is a clear step forward, with benefits from a programme design point of view and for workplace learners. These include the potential development of more flexible pathways into and between workplace-based and campus-based provision, greater possible access to pastoral care and specialist learning support for workplace learners in areas such as literacy and numeracy, addressing issues of access for marginalised populations, and greater continuity of learning when a learner's employment situation is disrupted (e.g., through company/workplace closure).

This shift also deals with some perverse anomalies in the system around workplace-based VET. For example, in the industry training model, ITOs had only limited ability to arrange workplace learning at levels 5 and above of the NZQF – a policy setting criticised by many.[3] Similarly, industry training legislation permitted ITOs to only 'make arrangements for' training, rather than 'provide' it. This encouraged debates over the level of support that could be provided to apprentices and trainees – and to employers. And as legislation only allowed ITOs to arrange training for those in 'employment' there were ongoing questions over the availability of workplace learning for the self-employed and those in voluntary roles.

There remains some skepticism over how this will play out in practice, however, and specifically how well Te Pūkenga will support workplace-led learning in the future. The NZIST does have a formal, statutory obligation to support such education, and one of the Minister's stated goals in enacting the reforms was to

[3] See for example, BCITO (2017) and New Zealand Productivity Commission (2017).

promote the use of good-quality workplace learning throughout the system (Minister of Education, 2019). Moreover, the movement of ex-ITO apprentices and trainees into Te Pūkenga will considerably shift the balance of its learners from campus- to workplace-based learners. Based on 2019 numbers (and thus excluding potential distortions from the COVID-19 pandemic), the workplace learning subsidiary housing former ITO learners would enrol close to 40,000 apprentices and trainees with just its three initial ex-ITO members. In contrast, the largest ex-ITP (the distance learning-specialised Open Polytechnic) had a total of just under 25,000 students in 2019 – after that the largest was Ara Institute of Canterbury, with approximately 12,500.[4]

Nevertheless, there is a persistent concern that Te Pūkenga will not effectively support workplace learning. The basis for such concerns can be divided into two key arguments. The first of these is an economic argument that, in taking over ITPs it has been presented with a significant portfolio of property and buildings developed to support campus-based learning; the organisation will naturally want to make use of these (and staff used to working in campus-led environments) and so will naturally tend to prioritise on-campus provision. The natural counterpoint to this, however, is that such property represents a significant set of high-value assets. This is particularly the case for Auckland, where market incentives had led to almost all ITPs having some sort of presence. Moreover, campus-based provision is expensive for institutions while workplace learning is often significantly more cost-effective to provide as employers directly and indirectly subsidise learning (Williams, n.d).[5] On an economic basis, it seems just as plausible that Te Pūkenga will instead come under pressure to 'rationalise' resources and concentrate campus-based provision in specific regions, or for particular areas (e.g., pre-trade and advanced qualifications) and disciplines.

A more robust point is the difference in culture between workplace-led and campus-led learning. Workplace learning involves a distinctive approach to both pedagogy and the broader organisation and structuring of the learning experience.[6] In

[4] These differences are even more stark when degree, postgraduate, and foundation programmes are excluded from ITP provision. In 2019 Ara and the Southern Institute of Technology, the largest providers of campus-based vocational programmes, each only had 5000 VET learners. If the Open Polytechnic is excluded because of its focus on distance education, then the 45,500 vocational learners across every former ITP (and across every discipline and trade area) is only a little higher than the number of learners transitioning into Te Pūkenga's workplace learning subsidiary from the three 'first mover' ITOs alone.

[5] Although this does depend on the methodology. High touch, kanohi-ki-te-kanohi models that involve significant direct contact between the learner and organisational mentors and assessors are much more resource-incentive than less personalised 'box of books'-based models. Using the methodology developed by the ITF and the BERL consultancy (Williams, n.d.), the subsidy cost per completion at individual ITOs in 2017 ranged from $1518 to $17,712, with higher costs correlating with gretaer use of more advanced, longer, and heavily-supported 'apprenticeship' programmes rather than 'trainee' learning.

[6] Examples of Aotearoa New Zealand-specific discussions of workplace pedagogy and related concepts include Alkema and McDonald (2014), Chan (2013), Vaughan (2012), Vaughan et al. (2014, 2015).

particular, as Alkema and McDonald (2014) note, high-quality workplace learning involves an active partnership between the learner, the employer, and the education provider. This contrasts with campus-led models, where the partnership exists purely between the provider and the learner. Employers are not just involved in discussions about what someone else (i.e. providers) should be doing for them, but actively partnering with education organisations to develop the qualities they require in their workforce. This distinguishes truly workplace-led education from that which simply occurs in the work environment.

This in turn encourages firms to think more deeply about both their own skill needs, and their own role in skill formation and deployment. Essentially, it turns employers from passive consumers of an end-product to 'co-constructors', leading to a system of skill development that is much more likely to result in a capable, productive workforce. To quote Keep (2014): "The more the [education and training] system can incorporate the workplace as a site of learning, and help develop it to act as such, the more likely it is that employers will be active participants rather than grumpy customers" (p. 44). Aotearoa NZ's industry training system in particular was praised for its especially high level of engagement with employers (Sung, 2008).[7]

One example of this negotiated approach lies in programme structure. In Aotearoa NZ's pre-RoVE system, apprenticeships and traineeships begin when an employer and employee want and/or need them to start, not at a fixed time of year. Similarly, learning and assessment was – while a structured experience – personalised through individual training agreements negotiated between the advisor, the employer, and the apprentice. This contrasts with a campus-led approach which is based on annual or semesterised intakes of learner cohorts who generally proceed through a standardised curriculum and assessment programme at the same pace. In the first model it is the needs of the learner and the employer that take precedence, while in the second it is the needs of the education organisation.

Te Pūkenga, while required to promote workplace learning and meet the needs of employers, is fundamentally based on an ITP structure and a culture of campus-led provision. In this model the education relationship involves only the learner and the institution (and the learner has relatively little day-to-day power). Given this, the establishment of a workplace-learning subsidiary within Te Pūkenga has both positive and negative elements. In the short term, it allows for a 'lift and shift' approach to maintaining such training, reducing the potential for disruption to existing education and preventing disengagement by employers and current apprentices. However, it also isolates this education from that occuring within the former ITP subsidiaries, creating an explicit silo between those with experience in workplace-based education and those with experience in campus-based provision. In the longer term, retaining ex-ITO learning within a separate subsidiary thus not

[7] Though it is an open question as to how well it attemped to engage with the needs of employees. Labour's reforms of the early 2000s did require ITOs to include employee representation in their governance structures, but these were still dominated by employer representatives and in most cases employers were the core decision-makers over whether or not to 'purchase' training from the ITO.

only seems counter to the reform's goal of integrating such learning into the 'core' offering of providers, but also establishes barriers to sharing expertise across the former ITO/ITP boundary.

Implications for the Strategic Environment and Industry Voice

While changes to the provision of VET have been the most visible element of RoVE, just as significant are changes to the strategic environment or framework for vocational education and training. It is fair to say that for the past several decades, the country has had no clear strategic direction for vocational education and training. Employer choice has been the primary driver for the operation of the system, with the only attempt to introduce broader steering into the system being Labour's introduction of skills leadership functions for ITOs and the short-lived Skills Strategy. The reforms, however, have introduced three new key strategic actors into the VET framework.

The first of these is Te Taumata Aronui. This is a system-level body that sits apart from the operation of the sector itself, providing advice to the Minister of Education and officials but not otherwise engaging directly with the system (TEC, 2021). Māori participate and succeed in the vocational sector at higher rates than in many other parts of the education sector (Education Counts, n.d.a, b; Ministry of Education, 2019). However, disparities still exist and Te Taumara Aronui is part of a broader set of policy moves within the reforms intended to significantly increase the responsiveness of VET to Māori.[8] For example, Te Pūkenga has an extensive set of legislated obligations and duties designed to ensure more responsive to needs of Māori at the level of the individual, hapū, and iwi. These include the establishment of Māori advisory structures and consultation processes, Māori representation on its governing council, and explicit requirements under both its legislated functions and its Charter to improve Māori learner and community outcomes by working with Māori.

Similarly, where ITOs had few formal obligations in this respect other than those set through the Tertiary Education Strategy,[9] the Education and Training Act requires WDCs to take the needs of Māori into account when carrying out their functions. Section 7 of each Council's establishing Order sets out the need for each WDC to "contribute to an education system that honours Te Tiriti o Waitangi and supports Māori – Crown relations". This is cemented by explicit governance requirements; the governors of each WDC must include at least one representative specifically of Māori employers in their industry and appoint additional governors beyond that to

[8] Notably, the RoVE legislation and later the new Education and Training Act have been amongst the first legislation to use the term Tiriti o Waitangi rather than Treaty of Waitangi. This enshrines the Te Reo version as the relevant version for the education sector – an important distinction given differences between the two texts.

[9] It should be recognised that the Skills Active ITO operated as an explicitly bicultural organisation

enable approximately 50% representation of Māori; most are also required or able to appoint a Māori and non-Māori co-Chair. Taken together, these moves represent a significant increase for the voice and position of Māori within the VET sector. Te Taumata Aronui is intended to shape government policy settings specifically to create a more responsive system, while WDCs are required to ensure their work supports Māori and have governance elements that should support this being realised in practice. And if these represent increased voice at the macro- and meso-level of the VET system, the requirements on Te Pūkenga should ensure that the largest vocational provider is ensuring better experiences for Māori learners at the micro-level.

The second actor – or group of actors – is the Regional Skills Leadership Groups. The RSLGs are intended to act as pan-sector regional bodies who

> identify and support better ways of meeting future skills and workforce needs in our regions and cities. They are part of a joined-up approach to labour market planning which will see our workforce, education and immigration systems working together to better meet the differing skills needs across the country. (MBIE, n.d.)

Interestingly, this is not the first time Labour has seized on regional provision as a key feature of vocational reform; this was also an important element of the post-TEAC reforms of the early 2000s under the title 'regional facilitation' (Strathdee, 2011). However, where previously that was seen as part of a the 'distinctive contribution' ITPs brought to the system (albeit one overseen by the TEC), this role has now been moved out to independent bodies. This is partly a simple recognition of practicalities; even if one trusts Te Pūkenga to respond well to regional needs, a national body is not well-placed to fully understand and articulate those needs. Regional Skills Leadership Groups are composed of regional stakeholders – in some cases building on existing regional forums and organisations – and have been given a mandate to act in and advocate for the interests of their communities. Beyond that, however, it is worth noting that the reforms have explicitly situated RSLGs as outside the education sector. Their membership consists of representatives from industry, employees, local government, iwi and/or other Māori stakeholders, and the community, while their support is provided not by education agencies but by the Ministry of Business, Innovation, and Employment. Similarly, their remit focuses not just on skills supply through education, but influencing social development and immigration, and promoting local initiatives that draw on a wide range of stakeholders (MBIE, n.d.). The concept of skills ecosystems (Finegold, 1999; Buchanan et al., 2017) seems relevant here, with RSLGs seemingly designed to foster the development of such networks over time.

The most significant strategic element of RoVE, however, is the establishment of WDCs. At a very superficial glance these look similar to ITOs, and it is true that much of the conceptual DNA of ITOs is preserved within WDCs. This is most notable in the coverage areas of Councils, as shown in Table 5.2 below. Like ITOs, these are defined not in terms of jobs, trades, or skill sets, but rather in terms of industry (in other words, the types of firms in which people are employed). In this sense, WDCs represent a qualitatively different approach to their cousins who

Table 5.2 Workforce Development Councils and coverage areas

WDC	Coverage area
Hanga-Aro-Rau	Manufacturing, engineering, and logistics industries
Muka Tangata	Primary industries
Ringa Hora	Service industries, including the state sector and local government
Toi Mai	Creative, cultural, recreation, and technology industries
Toitū Te Waiora	Community, health, education, and social services
Waihanga Ara Rau	Construction and infrastructure industries

regulate professional education,[10] and whose scope is defined by the body of knowledge, skills, and attributes associated with specific occupations rather than the setting in which they work. Workforce Development Councils also directly take over the standards-setting, qualification development, and quality assurance functions (accreditation and monitoring) that ITOs possessed.

However, there are important differences that mean WDCs will – or should – be quite different to ITOs. The first of these is the shift from an 'industry-owned' to an 'industry-led' model. ITOs were fully independent organisations required to demonstrate industry support when seeking (re)recognition from the Minister and would theoretically lose recognition if they could no longer demonstrate such support (Industry Training Act, 1992). It can be argued that this principle was not always well-reflected in practice; the consolidation that occurred in the early 2010s, for example, was initiated by Minister Joyce's discontent with the system, rather than being driven primarily by industry desires. And the quality of ITO–industry relationships certainly varied between organisations, different sub-sectors and interest groups within an industry, and over time. But this model did mean that ITOs could claim a level of independent legitimacy for their role, and industry could connect with their organisations. ITOs were not just 'education' organisations, but clearly had one foot located in the world of learning and one in the world of work.

WDCs do not have the same inherent connection with industry. They are established by the Minister of Education, and their formal coverage has been driven not by industry itself but rather on the basis of apportioning out statistical codes (specifically, the Australian and New Zealand Standard Industry Classification). It is important to emphasise that in practical terms this does not represent a reduction in industry control over their skills body – though it may reduce the power of specific organisations or employers who were privileged by an ITO's constitutional arrangements. Each WDC is governed by industry representatives, Council members are not appointed by the Minister and the organisations are operationally independent from government agencies. WDCs are required to serve the needs of their industry both by the Education and Training Act and their individual Orders in Council.[11]

[10] For example, Engineering NZ, The Council of Legal Education, or the health sector's Responsible Authorities (the Nursing Council, the Medical Council, the Psychologists Board etc.).

[11] WDCs are explicitly required to address broader government priorities as well, but ITOs were also required to do this via the Tertiary Education Strategy.

However, the transition from a creature of industry to a creation of statute is a clear change with implications for the perceived relationship between employers and workers on one hand, and their skills body on the other. Councils will need to actively work on developing their legitimacy and building trust with the sectors they serve.

The second shift, and the most significant break with the industry training model, is the removal of a direct connection with the 'delivery' of education and training. While ITOs were technically barred from providing training, this was something of a semantic difference; they still enrolled learners, assessed their learning, and bestowed qualifications – it was simply direct 'teaching' activities that they were prevented from delivering in-house. WDCs, on the other hand, have no direct connection with individual apprentices or learners. Instead, they influence the skills and VET system: the qualifications people use, the programmes providers offer, and the overarching pattern of vocational, skills, and workforce investment.

The core potential flaw with this shift is the removal of the direct feedback loop the ITO model created between industry requirements and standards-setting (ITF, 2019). Because firms that trained engaged directly and regularly with the bodies who were responsible for developing standards and qualifications, there was a clear connection between micro-level (the education and training relationship) and macro-level (qualification development, workforce analysis) elements of the VET framework. When this system worked well, issues with unsuitable qualifications or inappropriate programme design would be rapidly picked up due to the close link with the 'real world' context in which that learning was intended to be applied.

However, this connection also created problems. Most notably, funding for all ITO functions – including areas such as qualification development – was tied to the volume of training they could arrange and thus the willingness of employers to support such training. Such an environment may have incentivised the development of qualifications that met the needs of what firms wanted for the moment over what might be needed in the future. Similarly, in some cases a small group of large employers could be responsible for a significant percentage of the organisation's income, creating incentives for the ITO to prioritise their desires and business models over others. Because WDC funding will not be tied directly to enrolments, they will have greater freedom to introduce new skill elements without being captured by one or two dominant employers, and to develop qualifications that anticipate possible future developments or emerging new currents in an industry.

It is also worth noting that aspects of industry training funding policy may have had an outsize impact on the VET system. For example, the policy restricting the number of level 5 and above enrolments at ITOs created a structural disincentive to develop qualifications above level 4. This may have in turn led to overall downward pressure on vocational qualifications; an ITO that set the apprenticeship qualification for a trade at NZQF level 5 or 6, for example, would essentially be cutting itself out of being able to support apprentices in that space, and the money it may need to survive. The clearer separation of system-level and learner-level functions should not reduce the need to balance one 'end' of these functions against the other through such policies.

The third key difference is the clear remit of WDCs to focus on strategic skills and workforce issues, rather than just development of qualifications and standards. In practice, many ITOs had continued to undertake skills leadership-type activities despite that being removed as a formal function during the Joyce reforms of the early 2010s. Developing an understanding of skills and workforce need in their industry was seen by many ITOs as foundational to being effective in their other roles, and some ITOs continued to undertake significant labour market forecasting and research activities. In the words of one former ITO CE prior to the reforms "the irony of the loss of skills leadership is we do more of it now than ever, and we do it better." (Cited in ITF, 2016, p. 45). Indeed, officials continued to identify ITOs as an asset for addressing systemic skills issues and positioned skills leadership activities as key contributions to be made by ITOs (Ministry of Education, 2016; Tertiary Education Commission, 2017). In this sense, skills leadership did not disappear once it was removed as a function. However, its removal did mean that it became more of a sideline activity, with its priority and the scale of investment highly dependent on decisions within each ITO. In contrast, positioning strategic skill issues as a core concern of WDCs provides such work with clear internal and external legitimacy. Notably, section 366(1)(a) of the Education and Training Act's description of this function makes its breadth clear:

> to provide skills and workforce leadership for the specified industries, including by identifying their current and future needs and advocating for those needs to be met through its work with the industries and with schools, providers, regional bodies, and the Government.

Two key elements of this definition are worth particularly highlighting. Firstly, the tying together of "skills" and "workforce" leadership provides WDCs with a platform for action that goes beyond simply developing standards and qualifications. It enables Councils to explore a range of areas such as workforce sustainability, participation and pathways for marginalised groups, extensive workforce forecasting and the like. Moreover, unlike other functions of the WDC does not confine this function to NZQF levels; read broadly, a WDC should be engaging with workforce issues across their industries *including* those parts that are not traditionally considered part of the VET system. Even though a WDC's strongest levers might relate to 'trade and technician' roles rather than professional and management occupations, it will have a mandate to consider the workforce as a unified whole.[12]

Secondly, this definition ties leadership not only to tertiary education providers, but to working with schools, regional representatives such as the RSLGs, the government, and industry (on a separate basis from the WDC's industry-led nature). Once again, the vision here is of WDCs who do not simply concentrate on the education sector, but who actively contribute to policy work, regional development, industry initiatives, and the like. They are expected to carry out their leadership

[12] This is reinforced by the Orders in Council establishing WDCs. Each Order includes as part of section 7 a requirement for the Council to "support responses to New Zealand's current and future workforce needs" and "contributes to a well-functioning labour market system", with no reference to those functions being only applicable to VET, trades, or the like.

function through working with other sectors, and actively work to promote it. Where the Industry Training Act, 1992 was clear that ITOs should focus purely on setting standards and arranging training, legislation establishing WDCs positions them as inherently outward-looking and engaged entities.

In addition to this skills leadership function, WDCs also have a strong strategic lever in their funding advisory function. Section 366(i)(J) of the Education and Training Act provides for them to advise the TEC about both its "overall investment" in VET and "the mix" of VET for their industries. Section 411 provides teeth to this function by not only explicitly requiring the TEC to have regard and give effect to this advice but requiring the Commission to clearly justify when it might not follow such advice, explain how it will work toward being able to follow it in the future, and providing a WDC with a final right of appeal to the Minister.

The combination of skills leadership and funding power provides WDCs with significant power – at least in principle – over the strategic direction of VET in Aotearoa NZ. The leadership function establishes the basis for a broad sphere of competency that covers not just VET itself, but a wide range of areas, topics related to an industry's overall workforce. Meanwhile, their advisory powers maintain TEC's position as the ultimate authority over funding matters, but theoretically provide the Councils with an unprecedented level of influence for an external entity over what programmes will be funded in the new environment.[13]

These align to a core point of contention regarding the reforms: to what extent do they fulfil Minister Hipkins' promise that the reforms will lead to industry having a stronger voice in the system (Minister of Education, 2019). A high-quality VET framework embodies the principle of vocational self-determination: that an industry, trade, or profession is best placed to establish and manage the content and nature of its education and training arrangements. The reforms seek to realise this by not only giving WDCs standards-setting powers, but statutorily requiring providers to seek approval from the relevant Council for any programme they offer.[14] Indeed, the Tertiary Education Union has claimed that the ability of WDCs to exercise authority over the content and approach of VET programmes is strong enough to threaten the academic freedom of staff in Te Pūkenga (TEU, 2019b, c).

From this perspective, industries have greater power following RoVE as they now have direct levers that affect provider-based learning and can extend their influence from the world of employment to the world of education. WDCs will be pseudo-regulators of VET provision, and all vocational learning in Aotearoa NZ must be directly approved by industry (as represented by the WDC). Moreover, Councils advise the TEC directly on what vocational learning should and should not be funded. This allows them to steer the pattern of provision for their industries not only in terms of specific areas or regions, but also potentially in terms of pedagogy

[13] There is some skepticism over how willing TEC will be to follow this advice in practice. From a cynical perspective, however, one can envisage it being tempting for the government's funding agency to have an external body to blame for unpopular resourcing decisions.

[14] Section 367 of the Education and Training Act does provide a 'wānanga opt-out'; wānanga are only required to seek approval from WDCs when a programme includes workplace-based elements.

and level (e.g., toward workplace-learning, or away from pre-trade programmes). However, while firms and sectors may have had difficulties engaging with provider-based VET prior to RoVE, the industry training system was essentially controlled by industry actors. From an ITO-centric perspective, WDCs therefore represent a decrease in the direct power of industry. Their power and legitimacy is based on statute rather than industry backing, WDCs have more explicit requirements to take account of government priorities, and removing the training dimension measn that there is no longer a direct connection between individual firms and their skills bodies.

On balance, it is best to think of the reforms as presenting industries with a trade-off between the intensity of their power and the scope of that power. The industry training system allowed industry to have full control over one form of VET in a type of vertical integration; via their ITO they developed qualifications (the production process), established the training model (the distribution process), and managed individual learning relationships (the retail process). However, they had very few levers for control over the remainder of the VET system. In the PTE and ITP sectors meaningful power rested with the education organisation in all respects other than actual qualification development (and to some extent the moderation and accreditation quality assurance processes). The reforms remove industry's direct control over training, transferring that retail power to providers. However, it also allows industry to exercise power over not only what is taught, but how and where it happens, throughout the VET system. Industry is essentially being asked to exchange deep but narrow power, for broad but somewhat shallower power.

In many respects, the WDC model can be seen as an attempt to draw on lessons from the industry training system. The skills and workforce leadership function they possess is a refinement and extension of the industry skills leadership function introduced in the 2000s. The programme approval function gives teeth to a theoretical element of the early 2010s Review of Qualifications that – at least anecdotally – seemed to never quite work as intended. And the removal of a direct role in training is an attempt to resolve the 'referees can't also be players' principle which barred industry/ ITOs from exercising greater influence over the VET system as a whole.

This represents a clear reversal of the last set of changes to skills bodies. The Joyce reforms explicitly established that ITOs should only arrange workplace training and set standards. Those decisions reinforced the position of ITOs as quasi-providers focused on individual workplaces; strategic skills issues were intended to be addressed through industry engaging directly with government agencies rather than ITOs (Cabinet Business Committee, 2013). WDCs, however, are firmly positioned as strategic bodies concerned with overseeing the overall pattern and nature of VET with an eye to longer term trends and contextual matters.

The effectiveness of these functions will, however, be reliant on a strong WDC model. Most importantly, other actors in the skills system will need to recognise the role of Councils as part of the strategic framework. Sung (2008) notes, "sectoral bodies have to be well resourced and have a clear leading role in the skills sector without 'competing agencies'. Otherwise, a genuine employer-led VET system with a strong sectoral body-employers partnership would find it hard to emerge"

(p. 10). Drawing on lessons from the ITO skills leadership experience, it will require officials to approach WDCs as more or less equals in their areas, rather than simply 'ITOs without apprentices'. The leadership function will need to be respected and resourced appropriately, and agencies must engage with WDCs on issues of skills and workforce leadership not as external stakeholders, but as authoritative experts and integral parts of the formal skills and workforce structure. As the Building and Construction ITO stated in its submission on the Education (Vocational Education and Training Reform) Amendment Bill, exercising their strategic function effectively will require WDCs to:

> not only have a strong mandate for a broad range of activities but for others – especially government agencies – to respect and support that mandate. Essentially, WDCs will need to be treated as not simply part of a workforce supply chain, but as key elements of the skills development infrastructure …. we would expect to see government agencies treating WDCs as not just stakeholders to be consulted, but core partners in their work around specific industries (BCITO, 2019, p.4).

Changes to the Funding Model

The funding model is the final element of RoVE and will be key to shaping how the system ultimately operates. At the time of writing the broad makeup of funding had been confirmed as involving three components: a funding category element, funding support for learners, and a strategic component (Tertiary Education Commission, 2022).

The Delivery Component is the core volumetric element of funding, operating in the same way as the pre-RoVE EFTS-based (for provider learning) and STM-based (for industry training) model. This will reflect cost of delivery across five different modes: provider-based (i.e., classroom- and simulation-based), extramural/ distance learning, workplace-based, transitional funding for moving from provider- to workplace-based learning, and funding of assessement and verification in employer-led learning. Funding will also be differentiated based on the relevant subject/ industry area of a programme. This reflects existing practice for provider-led funding but not for funding industry training, where a range of issues led to the introduction of a single funding rate across industry in the early 2000s (Green et al., 2003; Ministry of Education, 2010).

The Learner Component is intended to fund support structures for learners, especially those from groups marginalised in the current system. In this respect it represents a thematic continuation of current per-student 'equity top-ups', though with a performance component being phased in (Tertiary Education Commission, 2022), and in keeping with that the level of funding will be derived from enrolments of Māori and Pacific learners, learners with disabilities, and learners with lower prior

achievement.[15] However, the TEC has been clear that this funding is not intended to only support learners in these groups; "The priority learner groups serve as a proxy … Providers are expected to identify the unique needs of all their learners, make decisions about how to support them, and allocate this funding accordingly" (Ibid., p. 11).

The Strategic Component will provide additional funding for two specific purposes. Firstly, Te Pūkenga and PTEs are able to access funding to support delivery against national and regional skills priorities – in the case of Te Pūkenga that includes its statutory obligation to operate a national network of provision. Secondly, a Programme Development and Maintenance Fund will be open to Te Pūkenga, PTEs, and wānaga for supporting the inherent costs involved in managing programmes. Te Pūkenga will negotiate its funding for these elements directly with the TEC and has access to 70% of the first fund and 60% of the second, while individual PTEs will need to apply on a case-by-case basis for 30% of the first and of the second; allocation mechanisms for wānanga were under development at the time of writing (TEC, 2022).

In these divisions there are both echoes of earlier reforms and continuity with current approaches. The 'Investing in a Plan' system proposed by the TEC in the mid-2000s originally proposed a division between volumetric funding (the Student Achievement Component) and a TEO Component to support the core functions and expectations of an organisation as well as strategic development and innovation (Minister of Tertiary Education, 2006). The 2000s also introduced dedicated funding pools to support various special purposes, including innovation, partnerships with the private sector, e-learning, and responsiveness to Māori, Pacific, and disabled learners (Goedegebuure et al., 2007). Elements of the strategic fund also appear to overlap with the project funding that Ako Aotearoa (The National Centre for Tertiary Teaching Excellence) was in part established to administer.

The proposed Delivery Component funding rates set out in TEC (2022) do maintain a differential funding level between provider-based and workplace-based learning. However, this differential is significantly smaller than that which existed pre-RoVE. Provider-based funding rates have been cut by 15–20%, while workplace learning rates have been increased dramatically. As a result, the lowest funding per (full-time) learner in workplace learning ($5297) is only $300 less than the rate for provider-based learning, and $2000 higher than the 2021 STM rate for industry training. Taking into account the cost of delivery, this appears to create a clear driver for increasing the amount of workplace-based learning in the vocational system – one of the stated goals of the reforms.

Modelling by the Commission (TEC, 2022) has estimated that these will significantly increase funding to Te Pūkenga – primarily due to the transition of workplace-based learning previously arranged by ITOs. Conversely, while funding for

[15] It appears that these numbers will be calculated independently, so that a single enrolment may contribute towards funding from multiple strands of this component.

PTEs as a whole will increase the effects will vary tremendously across the sector and funding for delivery in its own right will fall; the Commission estimates that almost a third of these providers will lose over $100,000 as a result of new funding rates and will implement a transitional funding regime to account for this.[16]

Overall, it seems clear the funding system will advantage Te Pūkenga; in the new landscape PTEs – especially those operating on a for-profit model – will find it difficult to directly compete with its resources and scale. Those PTEs that survive will likely do so on the basis of a distinctive selling point that sets them apart; superior industry connections in a specialised sector or serving the needs of marginalised learners would seem to be the most obvious routes to sustainability in the teeth of Te Pūkenga's proverbial 800-pound gorilla.

One aspect of funding that remains unclear at the time of writing is the position of WDCs in the system – both in terms of how the funding advisory function of Councils will be incorporated into the funding process, and how WDCs will themselves be funded. Both these points are important for understanding the way in which funding structures will affect the post-RoVE landscape. For example, WDCs' ability to steer VET funding is enshrined in legislation, but RSLGs also have a role – albeit not a statutory one – in advising TEC on regional priorities for funding (MBIE, n.d.). Understanding how these two streams relate to each other – and how they will be reconciled when they conflict – is an important unanswered question.

Conclusion

The promise of the vocational reforms is a threefold one. Firstly, Te Pūkenga will reduce duplication of effort and allow greater sharing of good practice across a coherent national core of public vocational provision. The new strategic actors – Te Taumata Aronui, RSLGs, and WDCs – will result in a more strategic approach to VET that can better incorporate the needs of Māori, regions, and industry. The operation of these factors, plus a new funding system, will result in a more coordinated and coherent VET system that is more responsive to need while also being more financially sustainable. Assuming the reforms progress as intended, the interactions of the various new institutions will result in something akin to a national skills ecosystem.

It is a challenge to consider the implications and evaluate the likely success of a reform programme while it is still in development. However, the reforms will not in themselves resolve many of the issues and tensions facing VET in Aotearoa NZ. For example, there is no clear picture of how the reforms might address the significant parity of esteem issues facing vocational pathways compared to academic ones. The new system remains primarily focused on addressing issues of skills supply, rather than the more complex and neglected issues of skills demand and utilisation.

[16] Modelling also suggests a small funding increase for wānanga.

The new structures will also face their own tensions and challenges. For example, Te Pūkenga has been presented with a complex set of competing demands and stakeholders by its Charter and needs to demonstrate its ability to effectively integrate workplace-led and provider-led learning. WDCs will need to build their credibility and connections with the industry on one hand, and on the other ensure government agencies treat them as a genuine part of the strategic framework for VET rather than simply 'ITOs which don't train'. And for the Reform package, there is the question of how the various new actors will interact with each other effectively rather than conflict around overlapping functions.

The threefold promise of RoVE presents a bright vision of possibility for VET in Aotearoa NZ. The reforms will resolve some longstanding issues with provision and offer the opportunity of a more sophisticated, genuine system of vocational learning that operates in a more effective way than our previous relatively fragmented approach. But they also contain fishhooks and trapdoors aplenty. And ultimately, they represent a policy initiative where the implementation and operationalisation of change will have even more impact on outcomes than the nature of those changes themselves.

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Part II
Responding to Issues of Equity

Chapter 6
Unleashing Potential – Legitimising Māori Talent Through Capable Māori

Kelli Te Maihāroa, Janine Kapa, and Eruera Tarena

Abstract Capable Māori is an educational innovation at Otago Polytechnic that uses a kaupapa Māori Independent Learning Pathway to recognise the skills, knowledge, experiences, and talent of hapū and iwi members who have extensive flax-roots leadership experience, but limited opportunity or time to engage in tertiary education. Te Hōkai Nui is a partnership between between Te Rūnanga o Ngāi Tahu and Capable Māori that has graduated four cohorts of ākonga Ngāi Tahu (84 in total) since 2014 and boasts a 89% success rate.

This chapter examines the critical success factors of Te Hōkai Nui to share its strengths, the lessons learned along the way, and the transformational benefits of this unique kaupapa Māori programme. Within this iwi-centric learning space, hapū and iwi members have had their vast expertise and experience legitimised, and over a 10-month period, obtained an often life-long dream of obtaining a tertiary qualification. Capable Māori, and Te Hōkai Nui in particular, is a highly successful kaupapa Māori model of excellence that has the potential to be scaled up across the vocational education network to accelerate equitable outcomes for ākonga Māori, their whānau, hapū and iwi; thereby unleashing collective potential.

Keywords Recognition of Current Competency (RCC) · Recognition of Prior Learning (RPL) · Equitable outcomes for Māori · Kaupapa Māori models of excellence · Te Tiriti o Waitangi · Te Pae Tawhiti · Te Pūkenga · Vocational education

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_6

Introduction

In accordance with Te Tiriti o Waitangi, Te Pūkenga is focused on ensuring services work well and respond with excellence to the needs of ākonga Māori and their whānau, and to the aspirations of iwi, hapū, and Māori communities throughout Aotearoa New Zealand (NZ) and Te Waipounamu (the South Island). This objective is driven from the legislative mandate, the Charter, regulatory guidance, and from the will of the governing Council. In Te Pae Tawhiti, Te Tiriti o Waitangi Excellence Framework, Te Pūkenga acknowledges that Māori want tino rangatiratanga – agency and authority – over the education of ākonga Māori. This means there needs to be a genuine partnership approach across the education system with leaders who believe in Māori and understand te ao Māori. Te Pūkenga is undertaking work with all subsidiaries to improve how this happens across the vocational education network.

As stated in the Te Pūkenga Charter, the new national organisation has a duty for upholding and delivering on the promises made in Te Tiriti o Waitangi. These include:

1. Ensuring that the governance, management and operations of Te Pūkenga give effect to Te Tiriti o Waitangi;
2. Recognising that Māori are key actors (i.e., 'partners') in regional social, environmental, and economic development; and
3. Responding to the needs of and improving outcomes for Māori learners, whānau, hapū and iwi, and employers.

Te Pūkenga has priority outcomes which drives its business, once of which is that the organisation will have, '*A relentless focus on equity and ensuring participation – we honour and uphold Te Tiriti o Waitangi in all that we do*'.

In November 2020 Te Pūkenga released Te Pae Tawhiti, Te Tiriti o Waitangi Framework ('Te Pae Tawhiti'), to the vocational education network (Te Pūkenga, 2021). The intent was to provide internal guidance to Institutes of Technology and Polytechnics (ITPs) to achieve Te Tiriti Excellence – that is, to influence and guide planning, actions, and reporting, and to support a process of self-reflection and review. Kaitautoko were appointed in the Partnerships and Equity (PAE) team of Te Pūkenga to work alongside ITPs as they undertook their own self-reflection, resulting in the submission of 16 Te Pae Tawhiti self-reflective reports and action plans for 2021/2022 in January 2021. These reports were analysed during April/May 2021, with each ITP receiving feedback on their reports in June 2021 and a Te Pae Tawhiti overview report of insights from across the network being published in July 2021.

Te Pae Tawhiti

Te Pae Tawhiti acknowledges that it is not Māori learners or communities that need to change to fit the education system; rather, it is our responsibility as educators to ensure that our services lift and accelerate educational success for Māori (ibid, p. 5). The Charter of Te Pūkenga recognises that governance, management, and operations must give effect to Te Tiriti o Waitangi, and that Māori are key partners in effecting this change. The education system needs to respond to and improve outcomes for Māori learners, whānau, hapū, iwi, and employers. As part of the wider educational eco-system, the vocational education system has a responsibility to accelerate Māori educational success by affirming Māori learner identity through improved access, increasing Māori participation, ensuring greater relevance in its provision, developing practices that are responsive to the needs of Māori, and ultimately, ensuring more equitable outcomes for Māori occur.

In accordance with Te Titiri, the Statement of National Education and Learning Priorities (NELP) and Tertiary Education Strategy (TES, 2020) outlines the Governments strategic direction and priorities for the education sector. One of the underpinning principles of Te Pūkenga is to create an education system that enables Māori to achieve tino rangatiratanga, enables the ability for Māori to have self-determination over education and to be empowered to find Māori-led solutions. The Māori Education Strategy, Ka Hikitia – Ka Hāpaitia (2020), highlights the need for 'Māori to enjoy and achieve educational success as Māori' expressed through five guiding principles: excellent outcomes, belonging, strengths-based approach, productive partnerships, and Te Tiriti o Waitangi (Fig. 6.1).

Otago Polytechnic

A recent research report from Tokona Te Raki, the Māori Futures Collective of Ngāi Tahu, and Business and Economic Research Ltd. (BERL) has shown that inequalities in education, employment, and income for Māori are costing the Aotearoa NZ economy $2.6 billion a year (Tarena, 2019, in Victoria, 2019; BERL, Tokona te Raki, Waikato-Tainui, & The Southern Initiative, 2020). Dr. Eruera Tarena, Kaihautū of Tokona te Raki, leads an Indigenous social and economic innovation lab under the korowai of Te Rūnanga o Ngāi Tahu based in Christchurch. Dr. Eruera Tarena (2019) stated that, "*We all aspire to a future where our people have options to choose their path towards their dream career, but we need to address the inequalities and barriers facing Māori to bring that future forward*" (Tarena, cited in Victoria, 2019).

In working to achieve these outcomes, Otago Polytechnic has developed a strategic direction which includes a priority '*to be a responsive Treaty partner in meeting the educational aspirations of Māori learners and mana whenua*' (Te Rautaki Reo Māori ki Te Kura Matatini ki Otago, 2019–2020, p. 1). Key in guiding this

Fig. 6.1 Te Hōkai Nui 2019 Graduates: Kera Brown, Michelle Te Koeti & Charlaine McConachy. (Permission granted: Kera Baker, Michelle Te Koeti, Charlaine McConachy)

priority is the Polytechnic's Rautaki Māori/Māori Strategic Framework (MSF, 2022), which includes a priority to ensure '*Māori learners participate and succeed as Māori, achieving at the same or a better rate as non-Māori'* and for the institution to be a committed and agile organisation (Otago Polytechnic Te Kura Matatini ki Otago, Strategic Directions 2017–2021, p. 1: 3.4). The MSF 2022 outlines how Otago Polytechnic will achieve these goals, particularly the fourth priority, 'Kia Eke Panuku – High Quality and Culturally Relevant Programmes', which is where Capable Māori is positioned as a kaupapa Māori suite of programmes in Capable NZ, within the Polytechnic's College of Work-based Learning.

Iwi-Centric Learning Space

Capable NZ, and in particular Capable Māori provides high quality, innovative, and culturally relevant programmes to learners who are largely work-based. As the Capable NZ website states: Capable NZ is a pathway to *'turn your work and life experience into a NZQA accredited qualification without returning to the traditional tertiary classroom*'. The overarching philosophy of Capable NZ acknowledges, values, and draws on the lived experiences learners bring with them through customised independent learning pathways or postgraduate professional practice programmes. Developed in 2010, Capable NZ has had over 2000 learners graduate through its suite of programmes. Capable NZ supports learners to identify the skills, strengths, and experiences they already possess in their kete (basket) and provides a pathway to advance people in their career with renewed confidence.

In accordance with Te Tiriti o Waitangi, Te Pūkenga is responsible for ensuring vocation educational services function well and respond with excellence to the needs of Māori learners, their whānau, and to the aspirations of iwi and Māori communities (op cit, p. 5). Capable Māori is a successful model of educational innovation that aims to deliver a top quality programme that meets iwi, hapū and hāpori Maori aspirations. Initially developed out of the Capable NZ model in 2014, and gifted the name 'Capable Iwi' from local papatipu rūnaka, Capable Iwi was designed as a kaupapa Māori alternative to the mainstream programmes offered through Capable NZ.

At that time, equity advocates Emeritus Professor Khyla Russell, the late Dr. Robin Day and Richard Kerr-Bell (Capable Iwi Strategic Leader), saw an opportunity to re-design a suite of Capable NZ programmes and situate them within a kaupapa Māori framework, to provide an opportunity for Māori to gain a qualification that reflected the accumulation of their skills, experience, and knowledge already gained in their workplace, their iwi or hapū or in a wider community setting. Capable Iwi was developed to realise a kaupapa Māori approach – 'for Māori, by Māori, with Māori' – with the explicit intent to offer a suite of quality programmes designed to be culturally responsive, imbued in te ao Māori, embedded in mātauranga Māori, and providing Māori learners with qualifications that are world class and had the ability to transform their lives.

Capitalising on the entrepreneurial direction of Otago Polytechnic, Capable Iwi partnered at that time with Te Tapuae o Rehua (now Tokona Te Raki) and Te Rūnanga o Ngāi Tahu to reimagine what a customised degree programme could in fact look like if whānau were empowered to undertake an independent learning pathway. Richard Kerr-Bell and Dr. Catherine Savage (Chief Executive of Te Tapuae o Rehua at that time) then conceptualised the innovation that became Te Hōkai Nui, which provided an iwi-centric response to the key pātai: *what might it look like if whānau were acknowledged and accredited for their years of knowledge, skills, and experience gained outside of a formal learning environment, either through mahi or the marae, sporting arena or voluntary communities?*

The success of Te Hōkai Nui was highlighted in an article in Te Karaka, a Ngāi Tahu magazine (Victoria, 2019). Along with the evidence presented in this article, the data for this chapter is sourced from: i) unpublished Capable Māori learner data; ii) an unpublished learner survey of the third Te Hōkai Nui cohort in 2018, with a response rate of 46%; and iii) an interview with Dr. Eruera Tarena, by Kim Victoria (2019).

Vast Expertise and Experience Legitimised

In 2018, the Polytechnic's Deputy Chief Executive Māori Development/Kaitohutohu, Janine Kapa, re-set the kaupapa and renamed the programme Capable Māori, along with establishing its own vision and mission statements:

> VISION: unleashing the power of Te Kāhui Whetū/Capable Māori as an innovative engine for positive social change within whānau, hapū, iwi and Māori.
> MISSION: providing transformational education in, for and within whānau, hapū, iwi and Māori communities.

Capable Māori is specifically designed for Ngāi Māori who have an immense amount of knowledge, skills, and experience, and who live and breathe tikanga Māori, but who may not have the tohu to reflect this expertise. The opportunity to learn and study online from the comfort of ones' own home or workplace has made gaining a Bachelor's degree or postgraduate qualification accessible to Māori through Capable Māori, where ākonga can also be supported and mentored through a personalised programme that meets their expressed needs. To gain recognition of the vast expertise experienced whānau bring with them, Capable Māori uses an Assessment of Prior Learning tool to evaluate the skills and experiences that ākonga bring with them to the learning table.

The undergraduate degree is a 10-month programme involving a reflection of ones' early years of learning, two case studies, graduate profile skills mapping, the formation of a personalised model of practice, and which is completed with a kaupapa Māori assessment through an oral presentation of the learner's e-Portfolio. The postgraduate programmes also encompass a reflective autoethnographic component, reflecting on the learner's early years and how this has influenced ones' life to date, followed by a Learning Agreement which proposes the research to be undertaken, including Māori research consultation and ethics, and then undertaking the research to meet the graduate profile and complete the qualification. Through Capable Māori postgraduate ākonga can complete their Master of Professional Practice in 18 months and a Doctor of Professional Practice in 36 months.

The kaupapa Māori assessment tool takes into consideration and validates the years of community and/or service that whānau have undertaken as recognition of their leadership and expertise in these areas. Throughout the learning journey, ākonga are invited to draw on their knowledge and understanding of kaupapa Māori models, values, and beliefs, and develop an e-Portfolio that is reflective of where

Table 6.1 Capable Māori 10 month learner journey – copyright 2022 by Otago polytechnic

Phase	Recruitment (2 months)	Enrolment (1 month)	Initiation (up to 2 months)	Drafting (2–3 months)	Writing (3–6 months)	Assessment (8–10 months)
	Understanding the journey	Preparing the waka	Launching the waka	Building momentum	Gaining speed	Arrival
	Connecting 1:1 Group info Entry criteria Confirm place	CV + EoI Iwi scholarships Confirm dates	Wānanga Academic writing & tools Exemplars Early years	Wānanga Case studies Graduate profile	Wānanga Model of Practice Māori theories, models & tools	Kaupapa Māori Assessment e-Portfolio Māori pre-graduation ceremony

they have come from, the skills and experiences they have developed and bring with them, and the new learning gained through the programme (Table 6.1).

An Iwi Centric Learning Space

One of the clear advantages of learning alongside the support and encouragement of local iwi leaders is the opportunity to build a stronger relationship with iwi mentors and people who are champions of the wider educational kaupapa. Knowing that your iwi is providing cultural, and sometimes, financial support provides a platform to build a reciprocal relationship and in turn contribute to iwi priorities. It also opens the doors for individuals and their whānau to re-connect with their iwi if previously disconnected.

The Kaihautū for Capable Māori, Dr. Kelli Te Maihāroa, works closely with and for the iwi she connects with, to ensure that ākonga feel safe within their learning environment, that is not only conducive to Māori, but also iwi centric. This can be reflected in the ways in which te reo ā-iwi and tikanga ā-iwi is advocated for and honoured in the process, as well as encouragement for the use of iwi icons and imagery in the marketing material and other forms of communication. Ākonga are well supported by trained and qualified facilitators who have a knowledge of te reo me ōna tikanga Māori, as well as kaupapa Māori and tertiary education processes. Tertiary study can sometimes feel like a foreign environment to many people and being surrounded by the familiar faces of whānau and others whom they know can help. The opportunity to enter the Capable Māori learning journey with people who may have similar experiences, to connect through whānau-based values and hold a shared Māori worldview is both reassuring and culturally affirming.

Capable Māori is designed to provide a variety of engagement opportunities to support ākonga success, including a facilitation model, whānau learning spaces where smaller groups of ākonga work together with their facilitator and through wānanga, and where ākonga come together as a collective whānau for monthly hui.

Not only is there the opportunity to learn collectively, but ākonga can also opt in where appropriate, to take in collective presentations and assessments. On conclusion of the programme, Otago Polytechnic and iwi representatives celebrate the successful journey with ākonga and their whānau through the Otago Polytechnic Māori Pre- graduation ceremony, followed by the institution's graduation the following day.

Since 2014 when Otago Polytechnic partnered with Te Rūnanga o Ngāi Tahu to establish Te Hōkai Nui, a Ngāi Tahu-centred undergraduate programme through Capable NZ, four cohorts have graduated. Through this successful partnership, 79 scholarships have been awarded, with the addition of seven Fees Free learners joining the 2020 cohort. The scholarship entry criteria included a minimum of 5–7 years of leadership experience in their field of work, experience in management roles and cultural engagement, exampled by iwi development, hapū leadership, and involvement in community, sporting or other voluntary activities.

Highly Successful Iwi Partnership

Te Hōkai Nui as it stands today boasts a 89% success rate, with a possible fifth cohort in the immediate future. Out of a total of 86 ākonga, 75 learners have gained their degree through Te Hōkai Nui and the Capable Māori initiative (NB: three learners are yet to complete their studies; one still to be assessed and one deferred until 2022). Of the four Te Hōkai Nui cohorts since its inception in 2014, 49 out of 75 have graduated with Distinction, which enables them to undertake further postgraduate studies should they choose to do so. This success is additionally realised where over half of the graduates with Distinction, have expressed an interest in continuing their learning via the Master of Professional Practice programme offered by Capable NZ. Table 6.2 below highlights this impressive success rate to date.

Table 6.2 Te Hōkai Nui Cohorts & Capable Māori (2014–2021) – copyright 2022 by Otago polytechnic

Year	Ākonga (n=)	Pass rates	Success rate
2014	13	13 passes	13/13 passes
2015	20	14 Distinctions, 3 Merits, 2 Passes (1 DNC)	19/20 passes
2017	26	17 Distinctions, 3 Merits, 3 Passes (3 DNC)	23/26 passes
2020	27	18 Distinctions, 2 Merits, 3 yet to be assessed, 1 deferred, (4 DNC)	20/27 passes
Total	**86**	**49 Distinctions, 8 Merits, 18 Passes, 3 yet to be assessed, 1 deferred, (8 DNC)**	**76/86 total passes (4 yet to be assessed)**

Critical Factors of Success

Capable Māori has a specific focus on realising the needs and aspirations of iwi and their whānau, hapū and wider hāpori. This chapter will now turn towards the insights gained from feedback from Dr. Eruera Tarena (Victoria, 2019) and Te Hōkai Nui learner feedback (2018). Their discerning feedback reflects the importance of a supportive, culturally responsive learning environment, that contributes to ākonga Māori being able to live and learn as Māori, and which strengthens and affirms a strong sense of belonging and identity. These insights also offer a glimpse into the learner world, and the keys that helped them to unlock and realise their own potential.

(a) Rangatiratanga

Te Pūkenga recognises that the education system needs to change to fit Māori learners and communities, rather than the other way around. As previously highlighted by Dr. Eruera Tarena, there was, and continues to be a need for institutions to partner with iwi to develop iwi-based solution. Partnering with iwi provides the opportunity to contribute to wider outcomes for Māori learners. Ngāi Tahu supported an iwi-specific cohort studying towards a Bachelor of Applied Management or a Bachelor of Social Services and gifted this programme the name of Te Hōkai Nui, which means a success rate of 89%.

By having a distinctive iwi-centred approach, Māori values are embedded within both the delivery and assessment of these programmes, which grounds the kaupapa within the unique context of iwi-led development, as well as reo ā-iwi and tikanga ā-iwi. The programme is a transformational pathway for mature and experienced Ngāi Tahu whānau, professionals and community leaders, allowing them to gain formal recognition for skills that they have already acquired throughout the course of their career. Capable Māori offers a framework which provides the autonomy for Māori learners to utilise their experiences outside of formal education and draw from a collection of te ao Māori perspectives.

Dr. Eruera Tarena highlights the role of whakawhanaungatanga and the importance of shared collective visions:

> For Māori, leadership is all about relationships, because you cannot tell anyone what to do. It's about bringing people together and creating space for people to work towards shared goals for the future (Tarena, in Victoria, 2019).

He further states that Māori culture and identity, is valued and validated as a recognised and different skill set from a traditional Western approach:

> The Māori way is highly collaborative, and leaders within these organisations are highly skilled negotiators. The programme is finally recognising these leaders within our communities and giving them a pathway that brings mana to the work they have been doing for years (Tarena, ibid, 2019).

Capable Māori is also a strategic approach towards growing iwi specific leadership across the sector, nationwide and globally. Dr. Eruera Tarena emphasises the

importance and opportunity to create Māori leadership practises that reflect – in this instance – a Ngāi Tahu context. He draws on the example of other countries, such as how China and Japan operate within ways that replicate the Japanese or Chinese ways of being. Similarly, Māori organisational leadership should empower Māori to operate in a Māori way, which may not fit within a Western mould.

> In a Māori context, 99 per cent of the time people aren't necessarily motivated by money – they are there for the kaupapa. So everything needs to be about a shared vision, and shared goals. Leaders need to be skilled at influencing and inspiring people because people have to want to be there (Tarena, ibid, 2019).

(b) Whānau leadership

Many Te Hōkai Nui learners share a similar story of being raised in a home where education may have been valued, but without explicit expectations of them attending higher education. Becoming the first person in a whānau to gain a degree can be a game changer and plant the seeds for others to follow. There is great mana and honour in being the first graduate from a hard-working whānau. Creating a legacy of success and setting high expectations for tamariki and mokopuna to follow can be seen as piloting a new and exciting future pathway.

> As the eldest son and eldest grandson of a large family, I've always been put in areas of responsibility; so this was a fantastic journey to put some theory and understanding around my management style. I want to be able to lead by example (Parry Hunt, in Victoria, 2019).

Broadening and strengthening Māori participation in vocational education is beneficial to the long-term employment and career opportunities for Māori. As an iwi-centric initiative, Capable Māori aims to increase Māori participation in higher education and to help safeguard and future proof employment opportunities. Dr. Eruera Tarena (2019) reminds us of the lived experiences and realities for many of our whānau:

> Like many of our grandparents, they had to be chiefs on the weekend, and then scrubbing toilets, working in a milk bar or on the wharves during the week; because they didn't have the opportunities to do anything else, through historical inequalities and lack of access to education. Cleaners, factory workers, and meat workers were the norm, and so what you have now is people with a huge skill set gained from the school of hard knocks who are representing iwi interests in many different ways – whether on Department of Conservation boards, rūnanga holding companies, or on the marae – but who don't get the recognition they deserve (Tarena, ibid, 2019).

Leading by example, often from the back of the marae or from the kitchen or home, is a natural Māori leadership style, especially for wāhine Māori. One mother saw her role as not only planting the seeds of success for her own son, but for the wider whānau, who may see themselves as practical hard workers with unrealised potential.

> I want to be a mentor, not just for my son, but for all tauira, for all our whānau, who underestimate themselves. It hasn't always been sparkly, razzle-dazzle rainbows and sunshine for me, but I thought, 'Get in there and work myself to the bone, and just give it a go' (Kera Baker, in Victoria, 2019).

(c) Whanaungatanga

Although each Te Hōkai Nui learner had a different reason for enrolling in the programme, a common thread has been the desire to change things for the next generation and provide a pathway for whānau and mokopuna to follow. The Capable Māori programme is learner-centred, with high expectations that supports learners to plan and achieve the educational pathways that they aspire to. The cohort feedback (2018) identified that 100% of Te Hōkai Nui whānau felt a sense of whanaungatanga through this programme. Feedback from Māori learner voices identified how this programme was able to reflect a lifetime of leadership and accommodate busy whānau lives: "*It fitted in with my lifestyle and the need to make money. I have four children and a full-time job. It would be impossible for me to take 3-years off to go to Uni and if I could, I wouldn't have*." (anonymous Te Hōkai Nui learner feedback, 2018).

(d) Cultural legitimacy

The domains of language, culture and identity remain important 'mauri-stones' for Māori learners. Ākonga Māori thrive in a learning environment that is free from racism, discrimination, stereotypes, and stigma (Tokona Te Raki, 2021; Bishop & Merryman, 2006; Bishop & Glynn, 1999; Smith, 1997). The Capable Māori team is experienced in supporting, strengthening, and affirming Māori learner cultural identity. This is realised through a learning environment that upholds the mana of mātauranga Māori, and te reo me ōna tikanga Māori to strengthen culturally inclusive practices that reflect the lived experiences of ākonga. Karakia and whakatauki begin and complete each learning interaction, to ensure tikanga guides the learning and maintains a sense of balance and cultural safety through the learning process. Te reo Māori is encouraged to be incorporated into the ākonga portfolio and oral assessments is equally weighted alongside written requirements. As adult learners, a sense of ako is created through a reciprocal non-hierarchical learning-teaching relationship, which acknowledges the gifts both ākonga and kaiako bring with them to the learning environment. Cohort feedback (2018) identified that 100% of Te Hōkai Nui learners felt their Māori culture was recognised and valued through this programme.

(e) Aronui ki te ākonga/learning-centred

Adopting a holistic approach towards the learning environment through the delivery of a kaupapa Māori programme ensures the wellbeing and engagement of ākonga. The pivotal role of cultural diversity and responsivity needs to be understood within the diverse realities and lived experiences of ākonga Māori. Capable Māori staff are experienced educators who are inclusive of and responsive to Māori learner needs and they possess the cultural competencies required to support diverse learning needs to achieve equitable outcomes. One learner thought that she did not have the acumen to attend university due to her dyslexia, which made school "really hard". Instead, she honed her business management skills over 20 years, rising to a senior leadership role before taking over as Operations Manager of a local marae.

Through Capable Māori, her vast years of experience, knowledge, and expertise has now been realised and legitimised through the achievement of a degree. "*Now I can say I've got a Degree in Applied Business Management with a double major, and with distinction*" (personal communication with Michelle Te Koeti, 2019). This wahine is now an iwi cohort facilitator, nominated, backed, and supported by Ngāi Tahu to deliver 'for Ngāi Tahu, by Ngāi Tahu, with Ngāi Tahu and upholding Ngāi Tahu tikanga'.

Capable Māori makes a difference in the lives of priority learners and addresses educational inequities by ensuring the learning programme is safe and welcoming throughout the learner pathway:

> I really enjoyed the tutors' support, the assessment panel and the whole experience. If this was done with other subjects, I know that I would succeed. This would change the statistics of Māori learning in this country and turn the negative results into positive statistics for Māori. I always thought I would not be capable of fulfilling tertiary education only to find through this process and tautoko that I can learn and succeed (anonymous Te Hōkai Nui learner feedback, 2018).

Unleashing Māori Potential Across the Vocational Educational Network

The Charter of Tē Pūkenga is clear in its duty to uphold Māori-Crown partnerships and give effect to Te Tiriti o Waitangi. This will in part be achieved by engaging with iwi and hapū as Te Tiriti partners throughout all levels of the organisation and with regional leaders as the vocational education sector 'recodes' the system (Salmond, 2021) to ensure it is inclusive and equitable for Māori (Te Pūkenga Charter, 2020; Te Pae Tawhiti, (n.d.)). Capable Māori is a proven and successful example of what an iwi-partnered initiative and programme can achieve. The vision of Capable Māori is to unleash the power of this innovative engine for positive social change within whānau, hapū, iwi and hāpori Māori – the mission is to provide transformational education for and with whānau, hapū, iwi and Māori communities.

Capable Māori has the potential to be a national model of excellence, to showcase how kaupapa Māori approaches to tertiary education can be embeded through a genuine and authentic partnership model with iwi. The programme strives to uphold the strengths of Māori educational success and diminish barriers to learning through an engaging, innovative, cutting edge, culturally responsive online learning experience. Capable Māori qualifications are relevant and meaningful to Māori, with proven successful outcomes at the highest level. These programmes are also highly effective for iwi, with excellent cultural and educational outcomes that also contribute towards the realisation of whānau, hapū and iwi aspirations.

Capable Māori reflects tino rangatiratanga – the ability for Māori learners to have self-determination over their own educational pathways and to be empowered to find local solutions led by Māori, for Māori, and with Māori. This is what whānau

Māori want, as highlighted during wānanga held throughout Aotearoa NZ as part of the Kōrero Mātauranga | Education Conversations led by the Ministry of Education in 2018. Māori know what works for Māori and the resources and support required to develop and achieve their educational aspirations. Capable Māori presents the vocational educational sector with an opportunity to adopt a suite of programmes to equip Ngāi Māori with qualifications to empower iwi to continue to navigate their own local, national and global futures.

So what might this look like in reality? As thought leaders in this space, we have taken the opportunity to put forward a model that has multiple advantages for iwi, and that also enables the outcomes and goals of Te Pae Tawhiti, and firmly delivers on the duties of the Te Pūkenga Charter. As the vocational education sector prepares itself for its transition to Te Pūkenga from 1 January 2023, there is an opportunity to further strengthen and scale up Capable Māori as a transformative model to achieve educational equity for iwi, hapū, whānau and hāpori Māori. The programme already has a national reach, yet the full impact is still to be realised across the motu – Otago Polytechnic, with Te Pūkenga, is the platform to accelerate this.

The possbilities for Capable Māori are boundless. This programme would be well suited to be facilitated on marae and co-facilitated with hapū and iwi via wānanga, ensuring it reflects the hau kāinga and is co-designed in a way that reflects their realities. With the appropriate resourcing, marae could become a satellite hub to offer ongoing Capable Māori programmes, including postgraduate wānanga. The opportunity through Te Pūkenga as a national entity will enable Capable Māori to be supported by local Māori educators, who already have a relationship with iwi and hapū. These relationships will also help with localised engagement, promotion of and engagment with the Capable Māori programme, the opportunity to develop an iwi/hapū centric approach and contribute towards advancing Māori needs, visions and aspirations at whānau, hapū and iwi levels.

The challenge for the sector is to build a sustainable model that meets the growing needs of Māori to have their skills, expertise, and years of experience validated and legitimised through this programme. The Capable Māori model is adaptable and can be customised to suit the express needs of iwi and hapū. Being flexible in the locale of delivery, whether it is on the marae, kura, the workplace, on campus or fully online, the programme can be tailored to ensure it meets local needs and responds with excellent results for iwi and Ngāi Māori throughout Aotearoa NZ. As a proven model of excellence, Capable Māori – along with ākonga and iwi leaders – will be able to co-design what works for Māori and help inform, shape, and guide the workstreams of Te Pūkenga. As an intervention aimed to interrupt the status quo and advance Māori development, Capable Māori provides an opportunity to contribute to the strategic goals of iwi, through the qualification of tribal members.

There is also the opportunity to develop a nation-wide iwi alumnus for Capable Māori graduates, as an extension of whakawhanaungatanga, celebrating whānau, hapū, and iwi excellence and the broader opportunity to network and capitalise on their collective success. Further research is currently being undertaken to record, preserve, and build the evidence base of success within the suite of Capable Māori

programmes. We aim to maintain a strong ākonga-informed and Te Tiriti centered programme, committed to empowering whānau, hapū, iwi and hāpori Māori to realise their educational needs and aspirations.

Conclusion

Capable Māori is a tranformational and innovative suite of programmes that draws on a kaupapa Māori approach to Independent Learning Pathways, validating and legitimising the values, knowledge, and skill sets experienced Māori leaders hold, but who have had limited access to participate in tertiary education. Capable Māori provides an opportunity for Māori to undertake study whilst remaining with their whānau, within their own rohe, and remaining in paid employment. The suite of online programmes offers the opportunity for ākonga to undertake their studies in a flexible, personalised, and culturally responsive learning environment, empowering Māori to harness their transferable skills which can then be applied within a multitude of settings, including their workplace and iwi organisations. It also provides a mechanism for systemic shift, to adapt higher educational pathways to make higher-level learning more accessible and responsive to the diversity of lived Māori experiences. Dr. Eruera Tarena (2021) states that Capable Māori:

> *… makes a huge contribution towards equity. There is really no way to address historical inequity for Māori as you cannot retrospectively correct historical injustices. What the programme does is provide a short-cut to addressing inequities which is what makes it significant and does so in a way that reflects the realities of busy professionals.*

This chapter has highlighted the five key success factors of Te Hōkai Nui. Researching and reporting on the achievements of Te Hōkai Nui learners contributes towards building a national evidence base of kaupapa and mātauranga Māori transformational programmes. Te Hōkai Nui (2018) feedback reported 100% satisfaction in that their culture and heritage was valued and upheld through the programme. They also identified 100% satisfaction with the sense of connection achieved through whakawhanaungatanga. Another contributing indicator of Te Hōkai Nui learners' success was demonstrated through increased learner self-confidence, learner and whānau pride, higher paid career opportunitiesc, and a tohu that represents the skills, knowledge and creativity that they inherently possess. The Capable Māori and Te Rūnanga o Ngāi Tahu partnership through Te Hōkai Nui can boast 77 out of 86 graduates, an impressive 89% success rate of whānau transformation through the process of achieving a tertiary qualification.

Capable Māori has the potential to be scaled up across the vocational education network of Te Pūkenga as a model that achieves equitable outcomes for ākonga Māori, their whānau, hapū and iwi, thereby unleashing collective potential. Capable Māori is currently exploring partnership opportunities with iwi and hapū and doing likewise with Crown agencies who can support the realisation of Māori staff potential and building Māori leadership across the motu. This includes the opportunity to

Fig. 6.2 Te Hōkai Nui graduates at Māori Pre-graduation, December 2019. (Permission granted Otago Polytechnic 2020)

customise additional iwi specific programmes to meet their expressed needs and to develop a credentialled and upskilled workforce that recognises the untapped potential within Māori experiences, knowledge, and skills. Capable Māori is a nationwide movement to realise and unleash Māori capability and towards building a healthy, thriving, and prosperous nation.

Ko te pae tawhiti, whāia kia tata, ko te pae tata whakamaua kia tina.

Seek to bring distant horizons closer, to sustain and maintain those that have arrived (Fig. 6.2).

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Chapter 7
The Learners' Voice: Pacific Peoples in Industry Training

Laloifi Ripley, Nicky Murray, and Anne Alkema

Abstract In this chapter, we provide some of the educational demographics for Pacific peoples, discuss three research projects that have examined different aspects of their participation in, and outcomes from, vocational education, with a focus on workplace-based industry training. We then share several stories of Pacific people in industry training, using previously published articles as our source.

Keywords Equity of outcomes · Parity of access · Industry Training Organisations (ITOs) · Pacific peoples · Workplace learning

Introduction

'Pacific peoples' is a term used to describe a dynamic and diverse group of people living in Aotearoa New Zealand (NZ) who migrated from the Pacific islands or who identify with the Pacific islands because of ancestry or heritage.[1] Success for Pacific peoples encompasses multiple aspects that are embedded in values, customs, and

[1] This Auckland Council link provides a good overview of Pacific peoples living in Aotearoa NZ.

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_7

traditions. Although differences exist across the various Pacific cultures, there are also shared values; the most common being the sense of belonging to a group and having collective responsibility (ServiceIQ, 2017).

In this chapter, we provide some of the educational demographics for Pacific peoples, discuss three research projects that have examined different aspects of their participation in, and outcomes from, vocational education, with a focus on workplace-based industry training. We then share several stories of Pacific peoples in industry training, using previously published articles as our source. We have taken this story-telling approach as a way of honouring and sharing the work that has been done by others and in a way that allows the voices of Pacific peoples to come through. The chapter recognises that evidence for stories is gathered in different ways and then told in different ways – traditional research; personal vignettes; and personal reflections. This approach "creates a more authentic knowledge, which may lead to solutions for Pacific issues" (Vaioleti, 2006, p. 23).

Pacific peoples are a small but significant slice of industry training in Aotearoa NZ, representing between eight and 9% of industry trainees each year since 2015.[2] Previously, there had been a pattern of the majority of industry training for Pacific peoples to occur at lower levels, in part because of their concentration in industries where apprenticeship was not the norm. This trend is changing, however, and by 2019, 46% of Pacific peoples were training at Level 4 and above, compared with only 24% in 2015.[3]

The importance of the workplace as a site of learning for Pacific peoples is reinforced by significant barriers to participation in institution-based tertiary education, which are explored more fully in the research outlined in the next section. Table 7.1

Table 7.1 Percentage of Aotearoa NZers aged 25–64 by highest qualification and ethnic group

Ethnic group	Highest qualification	2000	2010	2020
Pacific peoples	No qualification	36%	39%	28%
	Any school qualification	29%	21%	31%
	Tertiary certificate or diploma	30%	31%	24%
	Bachelors degree or higher	5%	9%	15%
	Total	**100%**	**100%**	**100%**
Total	No qualification	25%	21%	13%
	Any school qualification	22%	19%	21%
	Tertiary certificate or diploma	41%	38%	28%
	Bachelors degree or higher	13%	23%	35%
	Total	**100%**	**100%**	**100%**

Source: https://www.educationcounts.govt.nz/statistics/retention_and_achievement. Sourced 22 June 2021

[2] https://www.educationcounts.govt.nz/statistics/tertiary-participation. Sourced 21 June 2021.

[3] https://www.educationcounts.govt.nz/statistics/vocational-education-and-training. Sourced 21 June 2021.

illustrates the gap in educational attainment between Pacific peoples and the total population of Aotearoa NZ. Despite improvements over the last 20 years, in 2020 nearly 60% of Pacific peoples had none or just a school qualification as their highest qualification, compared to 34% of the total population. For many of these people, learning at work may be the only viable way of gaining higher qualifications.

This is not to say that learning in the workplace setting is easy. A 2016 report investigated the reasons that 114 apprentices/trainees withdrew from their qualifications during 2014. While the reasons were largely similar across all trainees, Pacific trainees and apprentices who did not complete their qualifications mentioned in particular the need for a supportive environment and to work with others, good training resources to help overcome any language barriers, and the importance and prioritisation of family (Alkema et al., 2016).

Relevant Research

There are three research projects that have focused on Pacific peoples in workplace learning settings.

Helping Māori and Pasifika Learners Build Their Skills in the Workplace (Competenz, 2014)

This project found that while Competenz's[4] Pacific learners (those who enrolled in 2008 and 2009) completed their qualifications at the same rate as other learners, there were lower rates of enrolment in trades training (3.2%) in comparison to the participation rates in the workforce (4.9%).[5] The research suggested that to attract Pacific learners, Competenz needed to work with communities to promote the perception of trades, given the importance of families in the career decision-making process. The report also noted that some barriers for Pacific learners are higher than for Māori – including literacy levels for older Pacific learners, and family and community pressures (Competenz, 2014).

In a case study presented in the report, Aki Logovii tells of his reason for undertaking the qualification – the challenge of doing something well and to show his eight children that excellence is worth striving for. The main challenge for Aki was fitting study in around home and work life. He tells younger Pacific learners:

[4] Competenz was one of the largest Industry Training Organisations (ITOs). The organisations supported industries including engineering, manufacturing and food processing.

[5] Māori and Pasifika enrolments in Competenz trades qualifications (non-forestry) compared with representation in the Aotearoa NZ workforce (p. 11).

> I remind them why we left our countries. My home country Samoa is undeveloped and there are no opportunities for young people to prosper. In NZ, I challenge young people to grab the opportunities offered to them. I tell them that if they have a chance to be an apprentice, to learn on-the-job, do it now because it's harder to learn and retrain when you're older. They should make the most of their chance, and do it well (Competenz, 2014, p. 6).

Pacific Learner Success in Workplace Settings (Ako Aotearoa, 2017)

This project, a National project funded by Ako Aotearoa – the NZ Centre for Tertiary Teaching Excellence, focused on learners, learning facilitators and Industry Training Organisation (ITO) staff engaged in improving Pacific learners' achievement in industry training. It brought a Pacific learner perspective to factors that influence participation, achievement, and continuance of Pacific learners in ITO-facilitated qualifications. Four ITOs, who between them accounted for 75% of Pacific learners in industry training, designed and implemented training pilots that focused on Pacific learners. The ITOs involved were: The Skills Organisation, Careerforce, ServiceIQ and Competenz.

The research found several barriers to learning for Pacific peoples:

- Pacific workers are often unaware of the range of opportunities available for learning.
- Pacific learners have to prioritise learning, work, and family. Family is also a key factor for success.
- There are cost (economic) barriers to workplace learning for Pacific people. These include competing time demands outside of work hours.
- Pacific learners' self-perception of capability can be low – lack of confidence and language barriers based on earlier experience of education and training need to be overcome.

The factors that contribute to success for Pacific peoples include:

- The workplace context, which is important and requires a supportive employer to create the motivating learning support and learning contexts.
- Relationships with facilitators of learning support are important catalysts for participation and achievement, continuance, and completion.
- Small learner support groups have worked well for Pacific learners, particularly where barriers impede learning.
- Personal motivations, which need to be explored/facilitated to establish and develop positive, future-focused goals.

The research also sets out the importance of facilitators who share their industry and work experience ensuring work context underpins learners' experience. These facilitators understand learners' lived reality – the broad context of experiences and circumstances that impact learning and the values and drivers important to learners.

They are able to address diverse barriers to engaging in learning and develop strategies to overcome these, building learners' confidence, and incorporate practical learning and supportive learning environments (Ako Aotearoa, 2017).

Hīnātore: Empowering Māori and Pacific People Through Workplace Learning (Ako Aotearoa, 2019)

Echoing the findings described above, this national research project also funded by Ako Aotearoa, investigated the development of employees who undertook literacy and numeracy programmes in their workplaces, during work time. While this chapter focuses on industry training, rather than literacy and numeracy programmes, the framework developed in the research project is equally applicable.

Workplace learning often affords employees a chance they would not otherwise have, given the access, time, and cost implications of attending programmes outside of work. Workplaces provide comfortable learning contexts for Māori and Pacific peoples as they build on existing relationships. Here there is a work whānau / aiga, which provides the opportunity and conditions for joint endeavours, where there is a sense of collective rather than individual strength. Learning together in small groups for work and developing skills that can be transferred to their wider lives, transforms these people personally, along with bringing changes to workplaces. Taking a strengths-based approach, the research identified three factors that contribute to successful outcomes for Māori and Pacific people: ako, mahi, and whānau/aiga.

Ako – Teaching and Learning

From an ako perspective, successful workplace learning requires a skilled educator workforce with the teaching/facilitation skills to deliver learning programmes in a culturally competent way. This means moving away from eurocentric and/or technocratic models of teaching and using culturally appropriate pedagogies incorporating the context in which the employees live and work. Here facilitators are not merely 'deliverers of content', rather they work in a co-constructed way that empowers employees to be active participants in the learning and acknowledges the expertise employees have in relation to their workplace content.

However, it is not just content that is important, it is the people. Here skilled facilitators operate in a holistic way that acknowledges employees' culture, their way of thinking, and their values. Space is provided for employees to bring their culture into the training room and allows for recognition that learning is about the cognitive, affective, and emotional domains – ako, manaakitanga, and wairuatanga. Facilitators' cultural competence grows over time as they start by acknowledging they may not be cultural experts but are prepared to learn along with and from the

employees in the spirit of ako. Showing their vulnerability opens the space for employees to step in as the experts and the concept of tuakana-teina is seen in a new light. Building collaborative relationships, setting high expectations, and delivering relevant content with empathy leads employees to develop a sense of self efficacy and confidence. They know they can learn and are valued in their workplaces. These learning opportunities can be seen as restorative, transformational, and empowering.

Mahi – The Workplace and Connections to Work

Learning in a workplace context is empowering in its own right. Here the authentic and concrete context for learning builds on employees' existing knowledge and expertise and they develop as individual workers and collectively as a workforce. Employees spoke of their work whānau/aiga and how the workplace was a whānau-like environment which fostered learning that was collaborative, reciprocal, and authentic. They spoke of being motivated to support and help inspire their teammates, as well as the depth of learning facilitated through peer to peer (tuakana-teina, whānau to whānau) interactions. The sense of empowerment that grows during the course of programmes starts with employees feeling valued by employers who either select them or provide time for them to attend. It grows as they realise the contribution they have to make at work and as they begin to recognise their own knowledge and skills.

While employers expected employees' knowledge and skills to grow for work, they were also open to the idea that learning should not be limited to the functional and narrow requirements of workplace content. They were keen for programmes to develop transferable skills so that benefits accrue to communities and whānau / agia. Employers also recognise they themselves are part of a wider community to which they have a responsibility.

Whānau/Aiga Empowerment

When knowledge and skills are transferred to employees' lives outside of work the flow-on effects for whānau and aiga of having family members who are more confident and feel better about themselves are transformational. Increased confidence and positive attitudes lead to stronger engagement with family, positive role-modelling to other whānau/aiga members and a renewed commitment to ongoing learning and upskilling. What also comes through from whānau and aiga is the sense of pride they have in their family member's learning. The idea that whānau and aiga members still want to learn, and/or have the courage to learn is inspiring for them. The transfer of learning to home and family lives comes about through the conversations facilitators have with employees about the relevance of skills generally, because of the sense of pride employees develop around their achievement, and

the tools they now have to, for example, communicate better, use computers, and talk with their children about learning.

Learning in workplace settings provides the context for the weaving together of ako, mahi, and whānau/aiga. It provides the opportunity for expansive learning that empowers individual Māori and Pacific employees and transforms the way they work and the way they operate in their personal lives. This happens through their employer's offer of the learning opportunity and the individual employees who have the courage to take this up. It is enabled by facilitators who deliver relevant content in a culturally competent and co-constructed way and workplaces that, in turn, provide the opportunity for new learning to be used. Finally, it is supported by whānau and aiga who are proud of the employees' achievements and supportive of their current and future learning endeavours (Ako Aotearoa, 2019).

The Voice of the Learner: Industry Trainees Tell Their Stories

While the research is important and the numbers are interesting, the real story is in the richness and diversity of the Pacific peoples who participate in industry training. Two industry training organisations Careerforce (13.4%) and ServiceIQ (10.6%) have higher than average numbers of Pacific peoples in training.[6] The BCITO's main focus is apprenticeship-level qualifications, which provide a route to self-employment and pathways into the burgeoning construction industry for its Pacific apprentices. We thank these three ITOs and their learners for allowing us to share some stories from Pacific learners and employers, sourced from their already published material.

Careerforce

Careerforce is the transitional industry training organisation (TITO) for the health, wellbeing, social and community sectors. Careerforce has an employer-led training model, with training embedded in everyday workplace activities. Employers support trainees to learn on-the-job and assessment is carried out by assessors within the workplace. The training respects the existing skills and knowledge of staff, using where possible evidence of competence that occurs in the natural flow of work.

Utilising an online learning platform, Aka Toi, the training plan focuses on filling the gaps in trainees' skills.

Careerforce has a very active team of Pacific staff who support Pacific apprentices and industry trainees. This support includes a regular Pacific Connect newsletter and an Auckland-based Talanoa Network providing regular breakfast catch-ups

[6] https://www.educationcounts.govt.nz/statistics/tertiary-participation. Sourced 21 June 2021.

for trainees. The following are stories from Pacific Connect that showcase the achievement of Pacific trainees, and bring to life the research findings discussed above.

Samoan Diversional Therapist Brings Culture to Work (Pacific Connect, May 2019)

In Pakuranga Park Village, residents hear her voice and they get up to follow. Vaelupe (Lupe) Hill is the rest home's Activities Assistant, a role she is passionate about. "What I do is I organise events according to the needs of the residents and organise activities to stimulate their brains. I want them to have a better life and enjoy life," shares Lupe. "I organise outings, bowls, games, events, and people to come to entertain too."

Lupe's passion is rooted deeply from growing up in Samoa where she looked after her grandparents. In her role, she treats the residents as she would her own grandparents. Bringing her cultural flair into work has been very well received. She says, "I'm loud and I always come with a big smile, so maybe that's why they all come to join in."

Now in her fifties, she is very happy to finally get a certificate. She recently completed an Apprenticeship in Community Facilitation, specialising in Diversional Therapy, through Careerforce. This achievement means a lot to Lupe and her family.

"My daughter cried! Because I always told my children I didn't have an education. That my self-esteem was low when it comes to learning new things." The family celebrated her graduation with dinner and flowers. She is also now a registered Diversional Therapist with the NZ Society of Diversional Therapists.

Lupe said that she learnt so much from the apprenticeship programme. "I learnt about the resources that are out there, I know where to go for help, I know my rights and the residents' rights." She adds that with her new knowledge and the connections she has made, she can help the residents and their families better.

She admits that initially she thought language could be a barrier, but with hard work and the support from the people around her, including her Careerforce Apprenticeship Advisor, she managed to complete the programme. She now encourages other Pacific people to do the apprenticeship programme.

In her own time, she supported an apprentice that she met through the Careerforce-organised Pacific Talanoa Network in Auckland. Lupe helped her navigate her own apprenticeship journey by sharing her experiences. Lupe thinks Pacific people are made for this caring industry. She says, "I hope the Pacific Island people come forward because they've got that natural outgoing attitude, they have a big heart for their parents and respect for elderly people." "You just walk in with a big smile and it speaks a fountain of languages."

Our Language, Our Knowledge (Pacific Connect, March 2020)

Grace Tuala-Tamalelagi is an apprentice on the Brain Injury Rehabilitation programme. She works as a Senior Support Worker at the St John of God Hospital in Christchurch. Originally from Samoa she credits her parents with encouraging her to speak English from an early age. This has really helped her with Careerforce study.

She said that one of the hardest aspects for Pacifica trainees is the English language. However, she would like to encourage all Pacifica trainees to continue with this study because, as she said "*You have to do the study to get the rewards at the end, whether that is a pay rise or another job, or a better job, it is worth it*."

When Grace is not working she spends her time in many church activities and also on the rugby field or rugby training. These help her unwind from the stresses of work and study. She hopes to get rid of one of these stresses this year when she finishes her study and gets her NZ Certificate in Health and Wellbeing (Rehabilitation Assistance).

A Better Life Through Training and Education (Pacific Connect, June 2020)

My name is Malia Afuha'amango Foliaki (Tapueluelu) and I work at Nelson-Marlborough District Health Board Physical Disability Support Services as a Team Leader. I am from Tonga and I arrived with my son who was 1 year old at that time 16 years ago. My husband Puletau Tapueluelu remained in Tonga. When I first came here, I saw NZ as a great opportunity to improve myself and do some studies. I come from a family of ten and to me, a better life comes through training and education. I saw education as the only door for me and my family to live here in NZ permanently. We had to make sacrifices. At that time, I worked double shifts and did extra hours to pay for my studies and to maintain my current work visa to live legally here.

After a year of working, I completed my first qualification, National Certificate in Supporting the Elderly People with Dementia in Level 4. I was then able to bring my husband here after 3 years of living apart. I extended my studies by doing correspondence Home Care courses. After I graduated, I started to search immigration policy for a path for us to apply for our Residency. I found that Diversional Therapy is on the list for Skilled Migrants. So, I applied to do my Diversional Therapy and graduated in 2011.

Around October 2012, I resigned from my first job and worked for Springlands Lifestyle Village. I started as a Health Care Assistant and after 6 months I was promoted to be a Diversional Therapist in their Hospital level of care. This workplace gave my family and I a life and made our dreams come true by giving us the chance to live as permanent residents here in NZ and I would like to acknowledge their kindness.

Not only did they support us by giving us the chance to live here in NZ they also supported me in completing my National Certificate in Health, Disability and Aged Support (Senior Support) Level 4 and supported me in completing all NZ Diversional and Recreational Therapy Society requirements to become a Registered Diversional Therapist. I am currently working for the Nelson Marlborough District Health Board Physical Disability Support Services as a Team Leader. I am enrolled in the NZ Diploma in Health and Wellbeing Level 5.

Encouraging Pacific Youth into Healthcare (Pacific Connect, May 2021)

Auckland-based Health Care Assistant (HCA), Calvin Fuimaono Aiesi Naoia, encourages young Pacific youth to join the health workforce. "They need a lot of muscle there," he says. The 23-year old got his foot in the door after completing a Gateway programme while in high school and eventually joining the Auckland DHB's Health Care Assistant Cadetship Programme. This was delivered in partnership with industry training organisation, Careerforce in a work-based learning environment, embedded with Pacific pedagogy.

Calvin feels there is a perception issue that deters young people from considering a career as an HCA. "They see it as a dirty job because it's cleaning up after people. Yes, that is part of the job but that's not the only thing there is to look at. You look at the relationship you build with the patients and their family. When you go to work, it feels like working with your family. When I go to work in the hospital, it's my other home, my co-workers are my family."

He thinks there is a need for diversity and young male staff in particular are needed. "Sometimes you get male patients, who just prefer male staff. Not only can you help them with their bedside matters, but psychologically, you can often connect better as a male to male." He encourages young people to consider joining the profession and be open to on-the-job training. "They not only get the experience, but also get to work and get paid. It's a really good way to get your foot in the door."

His eyes are set on becoming a nurse one day. He was already a semester into doing a Bachelor's degree in Nursing when his father got diagnosed with cancer. "I had to drop out and stayed home to look after him. He passed away a few years ago of lung cancer. I tried to get back to study but my head wasn't in it. So I'm glad the ADHB cadetship programme came along." He has since re-enrolled to do nursing after getting inspiration from his colleagues. He shares, "you see the nurses and you're working alongside them and the feeling comes back to me. You're helping make a difference in someone's life who is in the process of getting better."

The completion of the cadetship programme led to the achievement of a nationally recognised qualification, the NZ Certificate in Health and Wellbeing (Level 3) Health Care Assistance. Calvin says the programme was really good and with the

support of his employer, he managed to achieve balance as he worked, studied, and had time for church and family responsibilities.

Calvin admits to having bad shifts but holds on to the feeling of having good shifts. "A good shift is when I get to break out my dance moves to make patients laugh. A good shift is when everyone is happy, the day is running smoothly, and patients are getting better." "The best part actually is seeing the patients progress until they get discharged, either walking or going in a wheelchair, and family picking them up. That's the best part."

He encourages young people to bring their culture in and join this essential workforce. "I think there's not enough Pacific Islander in there. There's a lot of Pacific Island patients but not enough Pacific Island HCA's and nurses. I think it's really good for our youth to get in amongst it, especially through this ADHB/Careerforce programme."

ServiceIQ

ServiceIQ is the transitional industry training organisation (TITO) for the aviation, hospitality, retail, travel, tourism, and museums sectors. Their focus is on-job training, working with customers to develop the right resources, trainers, systems and procedures, and the right amount of in-depth training and follow-up to help them get ahead and stay on top. They offer a range of on-job programmes from short up-skill online courses right through to national qualifications.

Pacific peoples make a significant contribution to the service sector workforce, and ServiceIQ is committed to encouraging and celebrating their success. ServiceIQ's industries have a strong, and growing, participation of Pacific peoples in schools programmes and on-job training. ServiceIQ's work in this space is guided by the Pasifika Action Plan, which was released in May 2017 after consultation and engagement with Pacific communities, businesses, and learners. The Action Plan focuses on:

- exploring and enhancing opportunities for Pacific peoples in the service sector
- helping to build a confident and competent Pacific workforce in the service sector
- celebrating Pacific people's success in the service sector (ServiceIQ, 2017).

For the Joy of Cooking[7]

When Eliesa Sime was a student at Mt. Roskill Grammar in Auckland, his goal was to become a chef. Back at school, his passion for cookery served him proud: he passed NCEA Cookery with merit, which, on leaving college, helped him gain the

[7] Adapted from an article published on ServiceIQ's website, 22.2.2019.

classic entrée to a chef's career, a role as a kitchenhand, at the Sofitel Hotel in downtown Auckland. For the last 5 years, he has been part of the team preparing delicious dishes for travellers at Auckland Airport's luxury Novotel hotel. In late 2017, he successfully completed ServiceIQ's premiere Cookery Apprenticeship achieving the NZ Certificate in Cookery Level 4 qualification and was promoted to demi chef.

His inspiration to become a chef came from watching his Tongan-born relatives create traditional island dishes for big family and community occasions like birthdays and church events where cooks cater to hundreds of guests. "My auntie was always cooking and my uncle showed me how to cook my first spit roast when I was 10 years old," he says.

His mother is from Vaini and his father is from Haalalo, both on Tonga's largest island Tongatapu. They emigrated to Aotearoa NZ in the 1980s. Eliesa went to Tonga as a teenager on holiday. He recalls how he and his family would go down to the beach in the evenings with a small portable barbeque. They might have lamb on the menu and if they'd forgotten to bring the salt, they'd simply dip the meat in the sea to add salt and pop it on the grill. It confirmed to the young chef that fresh ingredients and a simple approach can create the most memorable meals.

Eliesa, who has won a couple of medals at national cookery competitions, gained his Level 3 Cookery qualification at a chef training college years before he started at Novotel. However, training on the job in a real workplace with proper guidance and mentoring from expert professionals including well-known Novotel Executive Chef Nancye Pirini, has proved the perfect way for him to upskill. He also had a young family to support so earning while he learned was a must.

"Nancye was a really big support to me. She and the other senior chefs gave me a lot of advice, taught me right from wrong and showed me how to do things properly. The apprenticeship is really full-on and you just have to stay on top of your theory and paperwork." ServiceIQ Hospitality Sector Advisor Clayton Kipling-Anderson was always on-hand to answer any questions about the qualification programme and challenged Eliesa to achieve even more than he imagined he was capable of.

"Clayton liked to push me and give me tough deadlines to increase my motivation," laughs Eliesa. "He was a really good co-ordinator who would always come and check on my progress and give me a hand."

Now the 26-year-old, who relishes his new role at Novotel is on the threshold of a great career. What's his secret recipe for success?

"Put your head down, focus on the work and don't take your chances for granted," says Eliesa who made a point of asking his employer for more and more opportunities to learn while he earned.

"I love the passion you put into creating dishes for guests. When you put your mind to it you can really succeed. It's not an easy job but it's very satisfying and I work for the joy of it."

Building and Construction ITO (BCITO)

BCITO is the transitional industry training organisation (TITO) for the building and construction industry. Carpentry apprenticeships form the bulk of BCITO's training, with over a dozen allied trades also catered for. BCITO has experienced significant levels of growth since 2019, finishing 2020 with a record 16,905 apprentices (32% increase), and some 8025 active employers (21% increase) (BCITO, 2021). BCITO has an internal Pasifika Engagement Strategy that outlines the actions that are being taken to deliver to Pasifika people. It focuses on what BCITO can do to attract Pasifika into the sector and to undertake apprenticeships, and to encourage progression to higher-level qualifications.[8]

Training a Win-Win for Forward-Thinking Company[9]

Asi and Tania Tufau of Turtle Tile Contracting Ltd. say that putting their team through BCITO's tiling qualification is a real win-win for their business and their team.

"The team are very keen to earn their qualifications. We want our company to be different, forward-thinking, and to stand out, especially during the uncertainty in the COVID-19 environment. BCITO qualifications help us do that. Our company's philosophy is not to only see ourselves as just a trade, but true craftsmen. In order to be craftspeople, we need to have skill bases in our team that are constantly being worked on," says Asi.

Asi is of Tongan and Cook Island Māori heritage and was born and raised in Rarotonga. He describes his beginnings as very humble. Asi left school when he was 14 with no qualifications and minimal English skills. He started working as a labourer for a retired Australian tiler who was living in Rarotonga. Asi explains, "Tiling in the Cook Islands is quite different to NZ … we had very limited equipment, tools, materials, and transport. My boss and I went to work on scooters."

Asi and Tania returned to Aotearoa NZ in 2001 and settled in Tania's hometown of Christchurch. Asi proved his skills and built a good reputation in the industry by tiling some high-profile local jobs. After growing in confidence and experience, the pair then started their own company, Turtle Tile Contracting Ltd., in 2017. They have a total of seven staff, five of whom are actively engaged in their tiling apprenticeship. "A couple of our team are fairly new to tiling, having less than a year's experience. The others have five years plus experience but have never had the opportunity to get qualified." BCITO's tiling qualifications are designed to fit all levels of experience and skills.

[8] BCITO Pasifika Engagement Strategy (internal BCITO document, 2020).

[9] Article first published on BCITO's website, 12 May 2021.

BCITO is also working together with Asi on the different ways the team members learn. “We have different levels of formal education within our team, and everyone learns differently. Someone might find that studying from their books works best for learning a particular skill, while another might it pick up quicker practically. BCITO recognise this and work with each of the team to find out what works best for them. We also encourage the team to support each other’s learning through quizzes at our toolbox meeting.”

Asi explained that Turtle Tile Contracting Ltd. aren’t your average tiling team. “Our crew are almost completely made up of NZ Māori, except one Brazilian, and is led by a Cook Islander. We are helping to break the stereotypes of what people expect tilers to be. We like our team to know what they are working for, to create a future for their family and feel good about themselves and what they do.”

It was an absolute pleasure getting to know Asi and Tania. They both want to pass on their thanks to their local BCITO Training Advisor, Kyle Wills, who continues to support them and their team through their training.

Reflections

In this section, Careerforce staff who work with Pacific industry trainees share their thoughts on the importance of industry training for Pacific people.

What’s Different About Industry Training for Pacific People?

I don’t think a lot of them would do something like this if they were asked to go to a Polytech or a University, but we’re hearing a lot more stories about how people are moving into that regulated workforce and actually looking at ‘how do I become a nurse’ or ‘how do I become a physio’, and that’s a really awesome story.

The academic environment can be really hard to navigate; the language, the tools, the skills that you need to succeed in a tertiary environment. Many Pacific learners have demands for family and whānau. Industry training provides a great opportunity for them, because it works around validating your learner skills and prior experiences, which a lot of these learners have because they’ve been working in the industry for so many years.

But at the same time, we’ve got younger people, younger generation Pacific that are NZ born, that have gone to university, done degrees, working in service manager roles, for example, and they’re doing level 5 business qualifications, and they’re saying how it’s been beneficial even though they’ve got degrees coming to do a qualification that’s related to their work – that the learning is all about what they’re doing on a day to day basis.

What Does the Opportunity to Gain a Qualification Through Industry Training Mean to Pacific Learners?

The certificate means a lot to them, it improves their livelihood and their family's livelihood. It can be a stepping-stone for them to enter the regulated (health and disability) sectors as well. Some of them may carry on to university and get a professional registration as well, or step into different sectors.

A certificate is not only like a certificate and getting a job; it improves everything! It's a holistic thing around their whole lives.

What Is the Role of the Workplace in Supporting Pacific Industry Trainees?

Another thing that comes out, they get this job, they become a support worker or a caregiver, without the realisation that they have this opportunity to gain a qualification and it's not until they're in the workplace and they're encouraged to do a qualification or to do some study, and because they feel safe in that workplace environment, then they'll be willing to take on doing some learning and gaining a qualification because it's within the whole work environment.

Industry training to them is that their organisation works in a culturally sensitive way, allows them to use their own models of practice and traditional ways of practice as well.

We work with learners and workplaces like a family – it takes the whole family to help somebody achieve the qualification, we work together as one!

What Is the Role of the ITO in Supporting Pacific Learners?

Thinking about learning in the workplace, that whole safety thing, feeling comfortable, in that workplace environment, feeling supported by the workplace, and then Careerforce, with our Apprenticeship Advisors, and the graduations, celebrating, bringing the families in, that whole big picture of how it comes together, it's huge for our Pacific people!

One of the main focuses should be about engagement and retention, we've got people who drop out for various reasons and we need to explore more good models on how to work with Māori and Pacific learners.

The whole Hīnātore thing, the Ako: Mahi: Whānau/aiga idea, it's a real key thing for our Pacific learners. Careerforce is now looking at this for all our learners not just our Māori and Pacific learners, we're rolling it out and gathering evidence on how it can work for all our learners.

Pacific learners at Careerforce are at parity of achievement, which is amazing!

What Difference Does the Apprenticeship Programme Make?

I think a lot of them would not have thought about doing Level 4 and I know even when we had our advanced support worker option there was an uptake but it wasn't much of an uptake. But now with the apprenticeships, which involve youth work, community services, teacher aiding, mental health – we're seeing an uptake with our Pacific people doing those Level 4 programmes, which is really awesome.

The confidence goes up, and their livelihoods improve as well, especially once they have that Level 4, so they have extra 5 or 6 dollars an hour on top of what they used to earn, that filters down to families having a bit more as well.

What Difference Is the Training Making in the Wider Community?

The stories I'm hearing from graduates is them taking a more active role in the community, especially around certain health conditions, they become health coaches who have completed the qualification, supporting a more preventative approach.

Also in terms of housing, there's a lot a Pacific families that are left homeless in South Auckland so with this trained workforce, they know how to network and liaise with other community organisations. Some of the assessments are around connecting with different sectors so they utilise those and connect the different agencies in order to find temporary accommodation, which leads to sustainable long- term accommodation. They are more confident in the navigation role, with approaching different agencies.

Conclusion

As with the Pacific learners' stories, the key themes described in the research resonate through the reflections of ITO staff: ako – the importance of learners feeling culturally validated and safe, and the centrality of good facilitation; mahi – the safety that the workplace environment provides and the valuing of existing knowledge and skills; and whānau/aiga – the benefits of training that extend to families and wider community and which deepen the value of the training. These interwoven components all contribute to the successful workplace learning journey that many Pacific people undertake, summarised in the following words:

'O le aso ma le filiga, o le aso fo'i ma le mata'igatila'

We weave the sinnet to tie parts of a va'a (traditional boat) and it is a time consuming and tedious task. However, when completed, all come to witness the hoisting of the mast and celebrate the christening of the boat. It's a group effort. When the boat sails off, it symbolises an ongoing journey, a celebration of the past, present, and future.

Warm Pacific Greetings!

Talofa lava (Samoan)	Ni sa bula vinaka (Fijian)
Halo olgeta (Solomon Islands)	Ko na Maui (Kiribati)
Kia orana (Cook Islands)	Ia orana (Tahiti)
Taloha ni (Tokelauan)	Malo e lelei (Tongan)
Fakaalofa lahi atu (Niuean)	Talofa (Tuvaluan)

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Chapter 8
Women in Trades: Industry Training Organisations' (ITOs) Initiatives to Increase Participation

Kylie Taffard and Nicky Murray

Abstract Despite long-standing attempts to lessen gender-based occupational segregation in Aotearoa New Zealand (NZ), women remain under-represented in traditional 'trade' areas and this is reflected in their participation in industry training. In this chapter, we briefly examine the history of women in trades in Aotearoa NZ, before considering several initiatives attempting to break down gender stereotypes and to encourage women's participation in the trades. These range from a multi-year project across several ITOs, to actions taken by government agencies, to micro initiatives at schools or individual ITOs. We also reflect on the potential impact on traditional occupational stereotypes that may result from COVID-19.

Keywords Women in trade occupations · Equity of access · Gender parity · VET history · Industry Training Organisations (ITOs)

Introduction and History[1]

Beginnings

Apprenticeship in Aotearoa NZ was the 'traditional preserve of young Pākehā[2] men' and was not a common experience for women (Horsfield, 1988, p. 165). For those women who did serve an apprenticeship, the system was often open to

[1] This section draws on Murray, *A history of apprenticeship in New Zealand* (2001).

[2] A New Zealander of European descent.

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_8

exploitation by employers (Street, 1993). Resistance was strong to apprenticing women and, more particularly, to acknowledging their skills through fair payment. In 1923, the 'modernised' apprenticeship legislation excluded women unless a case was made to the Arbitration Court for an order for a specific industry. The first female apprenticeships, those in ladies' hairdressing, were recognised in 1926 (Martin, 1996). In 1927, women working in the chemistry trade were included in the apprenticeship order covering that trade (Appendices to the Journal of the House of Representatives (AJHR), H-11, 1928). Also in 1927, the Bakers and Pastry-cooks award permitted women to be apprenticed to the trade, ostensibly under the same conditions as male apprentices. The modifications and conditions for women apprentices, however, were clearly designed to restrict them to less 'skilled' work than their male counterparts performed.

Although women were rarely directly excluded from an occupation, apprenticeship regulations were one means used to restrict their employment, along with the insistence by some unions on equal pay for women workers. In some awards, the number of women who could be employed in proportion to the number of men was restricted, and in others the type of work women were permitted to carry out was limited. In some cases, these restrictions were based upon protecting women from heavy work but usually the restrictions focused on the skill involved in the job: 'awards restricted women to repetitive work on highly subdivided tasks, to "unskilled work"' (Robertson, 1991, p. 35). Thus, the arbitration system 'systematized, structured and sustained the segmentation of the labour force', allowing male workers to protect their jobs, their skilled status, and their pay rates from the threat of cheaper female labour (Robertson, 1991, p. 33).

The War Years

The proportion of women in paid employment steadily increased throughout the 1930s and 1940s. The nature of that work also changed as the number of women in domestic service decreased rapidly, while those employed in the industrial and commercial sectors increased (Nolan, 1993). Many women entered the paid workforce during the Second World War. This work, however, did little to break down barriers to women's involvement in skilled occupations or to increase the status of what was classed as 'women's work'. The recognition of the temporary nature of the work, and the clearly held expectations that the jobs would be 'returned' to men at the end of the war, limited the inroads that women were able (or chose) to make: 'the war redistributed women within female-dominated areas of employment; it did not break down the sex segregation of the workforce' (Montgomerie, 1989, p. 74).

Post-War Issues

The war years did accelerate the growing trend of women's involvement in paid work, making working women more conspicuous, and bringing issues of women's employment, especially equal pay, to the fore (Macdonald, 1993). Post-war apprenticeship legislation permitted an increase in the number of industries with women apprentices but the total numbers of women in formal apprenticeships remained miniscule and they were restricted to very few trades. In the decade after 1945, the overriding activity for many women was childbearing and raising. The level of participation in the workforce of married women aged 16–29 years barely increased during this time, although the number of older married women returning to the workforce did increase steadily (Dunstall, 1996).

The 'Second Wave' Begins

Throughout the 1960s some women began to question the stereotypes that held them in the home and, by the early 1970s, conditions were ripe for the re-emergence of active feminism. Within this more ambitious framework for women's empowerment, it became clear that equal pay legislation alone was insufficient to address the disadvantages and discrimination that women faced in the workplace. Thus, the emphasis shifted to broadening the participation of women in the labour force (Martin, 1996). The legislative impediment to greater numbers of women apprentices was removed with the *Apprentices Amendment Act* 1972. Despite this new legislation, there were few immediate changes in the numbers or types of female apprenticeships. The reality was that most employers remained resistant to the idea of taking on a woman apprentice; numbers were small and most were concentrated in women's hairdressing.

Positive Action

In 1975, in response to continuing concerns about the disadvantages that women faced in the workforce, the Women's Advisory Committee of the Vocational Training Council (VTC) was established. This committee was instrumental in setting up 'positive action' programmes in the late 1970s and early 1980s. The Department of Labour also began a number of local initiatives, notably the 'Positive Action' campaign that was launched in late 1982. This programme was designed to move women out of the small number of occupational groups to which they were largely confined (Martin, 1996). During 1983, a public education programme, 'Women across the Workforce', encouraged women to expand their vocational horizons. In the early 1980s, the Christchurch branch of the Society for Research on Women (SROW)

carried out a study of women in non- traditional jobs. This led to the production of the Personal Viewpoint pamphlets, which profiled a selection of those women. That these initiatives were needed was confirmed by the low numbers of women apprentices in the 10 years up to 1982.

The Apprenticeship Act 1983

Pressure for reform of the apprenticeship system throughout the 1970s and early 1980s resulted in the *Apprenticeship Act* 1983, which, although an essentially conservative measure, incorporated growing social awareness of the systemic disadvantage that women faced in the labour market. The Act charged local apprenticeship committees with promoting apprenticeship to under-represented groups. This was reinforced in 1984 by the introduction of the Female Apprentice Incentive for Recruitment (FAIR) scheme, where employers of female apprentices, other than those in the hairdressing trade, would receive a $20 per week subsidy during the first year of training (Catherwood, 1985). The reason behind these initiatives was the 'tiny' percentage of women apprentices, reflecting the concentration of women into narrow occupational groupings.

At the end of 1984, the Labour Department established a Positive Action Programme for Women, with the catchphrase: 'Girls Can Do Anything' (Positive action programme appointments, 1985). In early 1985, four Senior Employment Officers (Positive Action for Women) were appointed in each of the main centres. One of the roles of the Women's Employment Officers was to promote women into apprenticeship. There were some successes; for example, of the 82 supplementary apprentices taken on by New Zealand Railways in 1985, fifteen were women, and seven of these women were hired as a direct result of initiatives from the Women's Employment Officers. Three hundred and sixteen women began apprenticeships in non-traditional jobs in the year ended September 1985. For some of those women, however, the reality of the apprenticeship experience was at times harrowing. A carpentry apprentice at Addington railway workshops, for example, had to work in an area where the 30-foot-high walls and doors were plastered with Playboy centrefolds. One of the officers recollected visiting a diesel mechanic apprentice who had resigned from her apprenticeship:

> Basically she left because they called her 'Cunt', they didn't use her name, it was like 'hand me the spanner, Cunt'. And they had absolutely no idea, I think genuinely, that that was really why she'd left, that it was inappropriate behaviour. The union guy said they would take action on her behalf against their members if she wanted to, but she just wanted to get out…

Neo-Liberal Changes

By 1987, 'positive action' programmes began to fall victim to economic and political changes. Deregulation of the economy and pressure to reduce government spending from 1984 resulted in a re-evaluation of the role of government. Employment patterns were altered by economic restructuring and new technologies (AJHR, 1988, G-1). The Department of Labour changed the emphasis of its Positive Action programme in 1987, integrating the features and activities of the programme 'into normal and routine operations within employment centres' (AJHR, 1987, G-1, p. 50). Many feminists began to question the validity of putting so much energy into encouraging women into apprenticeships in the traditional trades. It was felt that the limited success rates during the mid-1980s, coupled with the downturn in many of those trades, suggested that effort was better placed in encouraging women into new occupational areas.

Industry Training Strategy

Post-compulsory education was reviewed extensively during the 1980s and many of the reforms suggested were enacted by the 1990 National government, with the Industry Skills Training Strategy announced in the 1991 budget. The new training system was to be industry-led, with Industry Training Organisations (ITOs) to be set up for each industry or group of industries. The development and monitoring of training standards became the function of the New Zealand Qualifications Authority through a system of unit standards. Industry training was administered by the Education and Training Support Agency (renamed Skill New Zealand in 1998) under the *Industry Training Act* 1992. Apprenticeship contracts were replaced by a Training Agreement between each employer and apprentice, with wages and conditions determined according to the *Employment Contracts Act* 1991. ITOs were gradually established from 1991 for both traditional apprenticeship industries, and other industries that could see the advantage of systematic training.

A 1994 National Advisory Council on the Employment of Women (NACEW) report, *Women's Access to Industry Training,* aimed to assess the success of the government's industry skills training strategy in improving the quantity and quality of training opportunities for women. The report began with a discussion of women's position in the labour market, based on the 1991 census. These figures showed that women continued to work in a narrow range of occupations, with four out of five employed women working in the service sector, and 46% of employed women working as clerical, service, or sales workers. Women continued to be poorly represented in the senior levels of all occupations, were more likely to work part-time, and on average earned less than men (NACEW, 1994, pp. 3–4).

With regards to apprenticeship, while by 1992 the incidence of female apprenticeship contracts had risen to 17% of the total, 80% of all female apprenticeship

contracts were still in women's hairdressing. Very few women were represented in the administration of apprenticeship, and the FAIR recruitment scheme had met with only limited success, due to the low level of the subsidy, and entrenched attitudes (ibid., p. 5). These statistics seem grim indeed, 20 years after the introduction of equal pay, and in light of two and half decades of positive action.

As industry training bedded in throughout the 1990s, formal training was extended to a broader range of industries. Of the 51 ITOs in place as at December 1997, 31 had little or no formal structured industry training before the *Industry Training Act* 1992. Women represented 120,400 (or 47.8%) of all those participating in national qualifications, however, the figures for structured industry training were less encouraging. Of the 42,799 industry trainees as at March 1998, only 16% were women (Skill New Zealand, 1998).

The 'Return' of Apprenticeships

Perceived weaknesses and gaps in industry training were identified by a revitalised Labour party in the build-up to the 1999 election. The main thrust of their new strategy was a revamped Industry Training Act, with a rationalisation of the number of ITOs, mechanisms for industry levies to finance the function of ITOs, and a partnership role for workers and their representatives. The flagship policy was the Modern Apprenticeships Programme, enacted in the *Modern Apprenticeship Training Act* 2000. The 'reintroduction' of apprenticeships found firm favour with the electorate and they have indeed been 'reintroduced' several times since, generally with higher funding rates and more stringent pastoral care requirements than for other industry training.

The proportion of female apprentices,[3] however, has remained insignificant, peaking in 2020 at 14.4% (Ministry of Education, 2021). Trades training using the apprenticeship model is usually predicated on a Level 4 qualification. Women industry trainees tend to train at lower qualification levels (just 37% were training at Level 4 and above in 2019, compared with 68% of their male counterparts). And, using the same definition of apprentices, in 2020 the six ITOs with the lowest proportions of female apprentices together had only 2345 women from their combined total of 48,000 apprentices – an average of just under 5%.

[3] Industry training apprentices are trainees whose main programme meets or exceed the NZ Apprenticeships level and credit criteria, that is, consisting of 120 or more credits and set at Level 4 or higher of the New Zealand Qualifications Framework.

Research Initiatives

Recognising this continuing and seemly entrenched disparity, since 2010 there have been four significant research initiatives designed to understand the barriers and promote women into trades.

Ultimit

Women in Infrastructure began as a 2010 research project called Women in Power – led by Chair Frances Hague of the then Electricity Supply ITO (ESITO) Board (Connexis, 2021). It was recognised that the electricity supply industry was missing out on an opportunity during a time of significant skills shortage, and when the industry was constantly on the Immigration New Zealand Skilled Shortage list. While women made up 50% of the population they were significantly underrepresented in trade and technical roles within the electricity sector, making up only 2% of the workforce.

The research set out to better understand the attitudes and perceptions of operational people in the sector in terms of employing females. The Ministry of Women's Affairs (MWA) partnered with ESITO on the Women in Power project. The results highlighted the entrenched view; that this was not an industry for women. It was clear where the focus needed to be; on changing the minds and perceptions of those making the decisions. A significant change was required in recruitment, workplace practices and culture, resulting in the development of the Ultimit initiative, launched in 2011.

To support this work, the ESITO Board committed $150,000 from reserves to undertake further research. Two cohort groups of female electricity supply trainees were recruited and employed by Northpower and Electrix. Heathrose Research were contracted to track this cohort of nine female trainees as they completed their apprenticeships as line mechanics or cable jointers. The features of the job that attracted women included working outside, work that was more interesting than that generally available to the applicants, the chance to learn new skills, and the reputation of the companies as good employers.

From following the females and companies on this journey the research showed women:

- enhanced the teams of which they were part
- brought new approaches to their roles
- were perceived by managers as more health and safety conscious, with better attention to detail, less likely to take shortcuts and more likely to adhere to standard procedures
- found new techniques and tools for completing physically demanding tasks. This benefited all employees with improved techniques, reducing the risk of accidents and injury from fatigue and undertaking heavy work (ESITO, 2013).

With industry support, work continued on Ultimit, with a project manager employed to support the brand to gain profile and increase visibility within the industry. By 2015, Ultimit was no longer trying to change the perception of the electricity industry in terms of employing females. The industry was on-board and keen to recruit females. The new challenge was now finding females keen to join. The Ultimit brand was rebranded to be *Ultimit: Women in Infrastructure*, incorporating all the infrastructure industries serviced by Connexis[4] – Civil, Energy, Telecommunications and Water. It was recognised that often the women already working in the industry had been introduced by a family member or friend. So under the Ultimit umbrella a new initiative was launched – Girls with Hi-Vis®. The concept was to invite companies to open their door for the day and have their employees invite their sisters, daughters, cousins along with school students to their workplace and get a taste for the industry. The outcomes of this initiative are discussed in more detail in the case study section.

Ministry for Women Research

The Ministry of Women commissioned research to better understand the in- and under-employed women in Canterbury after the 2011 Christchurch earthquakes. In the years following the 2011 Christchurch earthquakes, women's employment did not recover in the same way as their male counterparts. The first report, '*Building Back Better*', completed in 2013, used a discovery research design to identify the under-utilised and 'hidden' female labour supply. Through two survey methods, 500 women participated in the research.

The initial research found that women wanted to work, were available to work, and were not opposed to working in rebuild positions. However, the women were not sure how to gain employment within the rebuild and were wary of construction jobs on site. This was because they saw them as 'jobs for men', due to job advertisements being directed at men, and/or the women's beliefs about their ability to physically meet the demands of a construction job. Better utilising the female labour supply was seen as opportunity to support the rebuild and recovery of the Canterbury region; however, it required employers to change their practice to better include women (Ministry of Women's Affairs, 2013).

In 2015, a second report, '*Getting it Done*', was released to identify five actions undertaken to increase women's work choices in the Canterbury region. The report also discusses the lessons learnt from these actions to support others to influence change. The five actions undertaken were:

[4] Connexis – The Infrastructure Industry Training Organisation was formed in 2013 as a merger between the Electricity Supply ITO and the Civil Infrastructure ITO. Telecommunications and the Three Waters (drinking water, wastewater and stormwater) then joined Connexis to cover the full infrastructure sector.

- Communicating the business case and opportunity
- Collaboration: collective agreement on the vision and the actions everyone takes
- Visibility – creating a new normal
- Treasure what you measure
- Leading from where you are (Ministry for Women, 2015).

Women in Trades

Beginning in 2018, this was a 3-year project, jointly commissioned by the Manatū Wāhine Ministry for Women and Ako Aotearoa, which aimed to increase the participation and success of women in construction and engineering related trades where they are traditionally under-represented. The primary aims of the project were to:

- identify the characteristics of an effective learning journey for women entering trades
- use that information to increase the participation and achievement of women in construction and engineering-related trades
- increase equity in the workplace (Ako Aotearoa, 2018).

A foundation group of organisations was involved in the research project, led by the Building and Construction Industry Training Organisation (BCITO); Competenz; Connexis and the Motor Industry Training Organisation (MITO); The Skills Organisation (Skills Org); Auckland Māori and Pasifika Trades Training (MPTT); the Manukau Institute of Technology (MIT); The Southern Initiative Māori and Pasifika Trades Training; Kelston Girls' College; and the National Association of Women in Construction (NAWIC).

There have been three main outputs from the research:

- A ***qualitative study*** of 35 women who have succeeded in the trades. The key elements contributing to successful outcomes were identified as:
  - Workplace environment: positive, supportive, focus on learning and progression
  - Work tasks: customer focus, working with a product they enjoyed
  - Nature of the job: physical opportunities, problem solving, collaboration
  - Personality: ability to manage negativity, lifelong learning, attitude towards working in a male dominated environment.
- A ***survey*** of 565 employers regarding their views on employing women in the trades. The key findings from the survey were:
  - employers describing the greatest strengths women brought to the trades as being attention to detail, being easier on tools/machinery and softening workplace behaviours

  - Companies with female employers or women in decision making roles were twice as likely to employ women in trades
  - Companies with over 20 staff were three times more likely to employ women in trades.

- ***Personas*** depicting collective characteristics of successful women in the trades grouped into seven personas of women and two employer personas.

A range of support resources has also been developed. These include resource handbooks containing tools, resources and ideas for decision-makers, employers and education providers to support the participation and success of women in trades where they have historically been under-represented. More recently, Manatū Wāhine has produced additional resources aimed at promoting to young women the benefits of trades occupations in the post-COVID-19 environment and providing information to employers of the benefits of diversifying their workforce (Manatū Wāhine Ministry for Women, 2021).

Trade Careers

In 2021, BCITO, Skills Org, Connexis, and Competenz formed the Women in Trades Collective. Although the four ITOs have different employer and workforce contexts, they all recognised the challenge to attract women to their trades roles. As all four ITOs shared a commitment to addressing the gender imbalance, the collective gained funding from the Tertiary Education Commission for a project focused on the 22,000 women who were unemployed or underemployed due to COVID-19, with special attention to Māori and Pasifika. The project, named *Trade Careers*, built on the Women in Trades research conducted previously to develop a multi-pronged strategy and implementation plan to increase the number of women entering the trades.

The focus of the project was to boost the numbers of women working in the trades by ensuring women interested in a trades career felt they could enter the industry feeling confident, well-supported, and well-connected. This project also focused on the employers and sought to understand why they may not be employing women into trade roles. To understand how to design a programme to support women being able to enter the industry feeling confident, well-supported, and well-connected, this project sought to understand the people for whom they were designing. Alongside understanding how to better support women, the *Trade Careers* project sought to understanding employers' beliefs and barriers to employing females into trades positions.

After the initial phase of research to develop the scope of the project, literature review, and project plan, the discovery phase started. The discovery phase focused on best understanding the women the project wished to support. In the discovery phase the project team launched a nationwide survey to identify the women and their needs, as well as a nationwide survey for employers. After receiving over 2200

survey results from women, including 476 wāhine Māori and 107 Pasifika women, the team set up focus groups in four cities in Aotearoa NZ to gain further insight. The employer survey was completed by 207 employers.

The themes identified from the focus groups for the women and employers are indicated below.

What makes a job in the trades appealing to women:

- Being outdoors, not in an office
- Pushing stereotypes about appropriate roles for women
- Refuting the perception that tradespeople have to be physically strong
- Being a role model for others
- Having good physical and mental health
- Being self-sufficient, not needing to rely on others to fix things
- Creating something tangible
- Stability of employment
- Being able to transfer their skills.

What makes the trades unappealing to women:

- Being on a lower rate of pay
- Length of time for training
- Knowing where to start. How do women get their foot in the door?
- Lack of flexibility, childcare issues
- Discrimination, bullying and harassment in the workplace.

What appeals to employers about hiring women:

- A good attitude is the main attribute employers are looking for; skills can be taught
- Women are lighter on the tools
- Women are better at completing tasks and have more attention to detail
- Women are more dedicated, with something to prove
- Women are good at customer service and better at time management
- Women ask questions and suggest new ways of doing things that are often better
- Having women in the workplace changes the workplace for the better.

What would need to change in the workplace to hire women:

- Some employers believed physical strength can be an issue
- Concerns about having to support women employees with harassment/bullying
- Women are considered to require a certain personality type to succeed
- It would be difficult to offer flexibility – many women have families. Although it was recognized that men are increasingly requiring flexibility as well.
- Employers are finding it hard to attract women into the trades
- Concerns about remuneration expectations
- Concerns about women becoming pregnant and how to accommodate this in the workplace.

After bringing the research from the "women" and "employers" together the researchers identified the following areas for the project to focus on to make the pathway to employment in the trades more accessible:

- Communication and information about what skills trades employers need
- Recruitment pathways
- Remuneration (especially when first entering the industry)
- Workplace environment and culture (how to support employers to provide this)
- Flexible working
- Safe cultural practices.

The identified focus areas were taken to a series of co-design sprints in three locations in Aotearoa NZ to develop solutions to the problems identified. The sprints used actors to portray the personas identified of women potentially interested in trade careers and employers potentially interested in hiring women. The use of actors to develop the personas provided an interactive experience which allowed the participants to question the barriers and concerns. Participants of the co-design sprint were then asked to work in small groups and develop a "blue sky" solution to mitigate the barriers and concerns raised.

One key finding from the research was that employers and women are keen to connect with each other, but unaware of how to make that connection. Using this key finding and the ideas from the successful co-design sessions, the third phase of *Trades Careers* focused on bridging the gap between female career seekers and employers to increase the number of women in the trades. The third phase involved developing a pilot programme that focused on connection, community, and communications. The pilot programme developed two specialised toolkits, for employers and tradeswomen (communication), an online hub (community), and to host a personalised 'matching' event (connection). Once complete the pilot will be evaluated to measure the success of the project. The project is due to be completed prior to the transition from each ITO to the relevant Workforce Development Council and a report is under preparation for the Women in Trades Collective (Domeet & Coker, 2021).

Women in Trades: Case Studies

In this section we profile three recent initiatives that are designed to increase the number of women in trades.

Girls with High Viz®

As discussed in the previous section, as part of their commitment to raising the number of women in the infrastructure industry, Connexis developed Girls with Hi-Vis®, an Ultimit Initiative. Girls with Hi-Vis® is a nationwide, 1-day event to provide female students with the opportunity to gain hands-on experience and hear from women already working in the industry. The events were organized to help girls understand the many career opportunities, including trade careers, available to them in the infrastructure industries. Promoting these opportunities has become even more important in the post-COVID-19 environment, as the industry predicts a shortage of around 44,000 skilled workers over the next 5 years (Wynn, 2021).

Girls with High Vis® was launched in 2015 as the Ultimit journey had moved from getting companies in the Energy sector prepared to employ females to the challenge of finding women interested in joining the sector. Connexis looked to their customer companies, who saw the benefit of employing females, to open their doors to provide an honest experience for women, including employee's female family members. Initially, there were seven Girls with High-Vis® events, hosting a total of 48 attendees. In 2016, Girls with High-Vis® was expanded to include Civil and Water industries.

In 2018 the *Ultimit: Women in Infrastructure Ambassador* programme was launched. The programme formalised agreements with female trainees and their companies to be the voice of the industry at key functions and media. Connexis reports that in 2019 Girls with Hi-Vis® hosted 22 events with over 450 attendees, with this increasing to 25 events in 2021. Companies are actively targeting women to recruit into teams because of the positive benefits gender diversity brings to the teams and company and female representation in the industry has been raised from 2% to 8%.

Girls with High Vis® is hosted by customer infrastructure companies with the support of Connexis. Connexis provides the framework for the day, logistical and marketing support, and support on the day. As these days are focused on exposing women to careers in the infrastructure industries, Connexis provides strategies and practical support for the host companies to keep the momentum going. Ideas range from using the school connections made to host a class for a site visit, hosting a student for Gateway (Work Experience), through to using the event to identify potential talent for apprenticeships or cadet programmes the host company may have on offer.

Role Modelling

Got a Trade? Got it made! is a national campaign developed in 2015 through a collaboration between seven ITOs. The aim of the campaign is to promote and celebrate the careers available in Aotearoa NZ's trades and service industries and the

benefits of learning on-the job. While not a campaign specifically focused on increasing female participation in the trades, many of the ITOs involved used the campaign to increase the profile of tradeswomen. Through utilizing trade ambassadors and campaign images, tradeswomen were highly visible, providing role models for women potentially interested in the trades.

The focus on marketing material, social media stories, and other opportunities to highlight women in the trades can be seen throughout the marketing of many ITOs. For example, a representative from MITO mentioned when they hear about other females doing well in a non-traditional trade, they will engage with them to develop social media profiles. When Competenz developed new standards for their schools programme, they ensured the workbooks photos had equal representation of males and females.

Skills Org Facebook Page

In 2016, The Skills Organisation group set up a Facebook group for Aotearoa NZ based tradeswomen. The *Skills Women in Trades* Facebook group was initially set up due to the low numbers of apprentices within the trades serviced by Skills Org. The female apprentices had discussed with their account managers that they felt like they could not "vent" (i.e. share frustrations and challenges) or were treated differently onsite by the boys. Skills Org sought to create a safe space where their tradeswomen could network and connect with others in similar jobs and make connections that could support their career progression.

Although initially created as a Skills Org apprentice group, it was expanded to include tradeswomen from other industries to be able to connect with each other. Tradeswomen are encouraged to ask questions, vent about their day, etc., and the group discussion is enriched by a range of conversations from those wanting to enter the trades requesting advice, to those who have been in or around the trades for years. These women are proving to be an invaluable source of information, with many of the more experienced tradeswomen taking an active role in mentoring and supporting the female apprentices new to the industry.

The Facebook page provides an opportunity for women to have discussions on where to source appropriate and well-fitting Personal Protective Equipment (PPE) gear, as well as to vent about negative experiences when working in a non-traditional trade. The page is also a place to celebrate the successes and provide the encouragement and support to seek industry recognition, such as awards or trade competitions. Most posts are met with snippets of advice and (as one member stated) a feeling that the tradeswomen are not alone, even if they are the only tradeswomen in their workplace. The page allows tradeswomen to see that their experiences of being in the trades, positive and negative, are not isolated to their context.

Reflections

It is evident that there has been a significant amount of effort expended across the industry training system to support the increased participation of women in trades where they are traditionally under-represented. These (often evidence-based) initiatives have focused on raising awareness of the trades as a viable option for women; brokering and extending the options and routes for women to enter trades training; and providing enhanced support for those women who begin their trades training journey. Yet, the number of women in non-traditional trades training remains (apparently) intractably small, despite over 60 years of action.

This matters for three main reasons. Aotearoa NZ's skills shortages in the trades areas are deep-seated, impacting on productivity, and unlikely to improve given an aging workforce and the likely changes to immigration settings post-COVID-19. Industries must look to the entire recruitment pool, not just 50% of it, and work to improve workplace cultures that can sometimes be challenging for workers of any gender. Secondly, the Aotearoa NZ apprenticeship system is well-funded, with a significant premium attached to those undertaking New Zealand Apprenticeships, rather than lower-level industry training. Less than 15% of this higher level of funding is being consumed by women, a significant imbalance. Further, there are well-established links between higher level vocational qualifications and earning potential, again penalising women who tend to train at lower levels. Finally, and following from the last point, the trades are often a route to career pathways, self-employment, business ownership and enhanced economic independence, opportunities that are limited for women because of low levels of participation.

We applaud the research that has been carried out over the years and the work done by businesses, government agencies, and individual ITOs to increase the appeal of the trades to women. We acknowledge that societal, family, and cultural views may constrain individual women's choices and participation, as may the image and culture of some workplaces. But there is much more that could be done to ensure equity of opportunity for women to take their place as tradespeople in Aotearoa. As examples, at the micro level, it behoves us all to encourage the young women in our lives to imagine the full gambit of occupational choices available to them, and to ask the question of any trades businesses that we engage with: 'how many women apprentices do you employ?'. At the meso level, there is much more scope for employers and industry associations to be proactive in encouraging women into the trades and supporting them once they are qualified. The development of a central entity for VET in Aotearoa NZ provides an excellent opportunity for a centralised and significant 'push' towards increased participation by women in the trades areas. At the macro level, the policy window for gender equity in trades training needs to be opened again – perhaps the 'jolt' provided by COVID-19 will be the circuit breaker that will help propel policy and funding agencies to (re)consider levers available to them.

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Part III
Foundation and 'Traditional' Vocational Education and Training

Chapter 9
Vocational Workplace Learning: Who Is in the Driver's Seat?

Anne Alkema

Abstract This article is based on research undertaken for the Commonwealth of Learning on the combination of open and distance learning and vocational workplace-based learning in Aotearoa New Zealand (NZ) (Alkema and Neal, ODL and workplace learning TVET programmes in New Zealand. Commonwealth of Learning, Burnaby, 2020). Drawing on this research, my article describes workplace learning, considers three models of delivery, and assesses the value of these approaches to learners/trainees/apprentices, employers, and tertiary education providers.

Keywords Vocational education and training (VET) · Workplace-based learning · Industry Training Organisations (ITOs) · Distance learning · Equity of access · System change

Introduction

The findings and opinions expressed in this article are offered to inform views of on-job learning that the New Zealand Institute of Skills and Technology (NZIST) might consider as it broadens its scope of work to incorporate more vocational workplace-based learning. As the system proposed under the Reform of Vocational Education (Ministry of Education, n.d.) grows to incorporate its new

This article was written for and published in Otago Polytechnic's Journal, Scope in 2020. It is reprinted here with the permission of the publisher. An addendum to the original article has been added to include commentary on the additional changes that have been made in the vocational education sector since the time the article was written.

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_9

acronyms – Workforce Development Councils (WDCs), Te Taumata Aronui, Regional Skills Leaderships Groups (RSLGs) and Centres of Vocational Excellence (CoVES) – it is imperative, not only that there is understanding of how this system functions at the strategic level, but also how it operates at the tactical, operational level. This means having a common understanding of vocational workplace learning, the models of operation that suit industry and employers, and approaches to learning (theoretical and practical) that suit trainees and apprentices.

Research Approach

The research, conducted in the first half of 2019, started with a rapid literature review followed by three explanatory case studies (Yin, 2014): the Open Polytechnic of New Zealand (OPNZ); Careerforce; and the Building and Construction Industry Training Organisation (BCITO).[1] Given the Commonwealth of Learning's knowledge needs, a purposive sampling approach (Cohen et al., 2000; Bamberger et al., 2006) was used in order to obtain three different approaches to workplace learning. Seventeen interviews were conducted, which included programme development managers, resource developers, workplace advisors, employers, and learners/apprentices. In relation to the 10-Level New Zealand Qualifications Framework, the programmes of study investigated included a Level 5 qualification in adult tertiary teaching; a Level 4 qualification in carpentry; and Level 2 and 3 qualifications in health and wellbeing.

What Is Workplace Learning?

Formal workplace learning for qualifications is learning employees undertake on the job while working. It is formal and deliberate (Billett, 2004); "moment-by-moment learning … occurring through everyday engagement at work is shaped by the activities individuals engage in, the direct guidance they access and the indirect contributions provided by the physical and social environment of the workplace" (Billett, 2001, p. 210).

In this context, theoretical aspects are generally covered off through learning materials from education providers, then transferred and integrated into practice through activities at work. Workplace learning is experiential and participatory (Billett, 2004; Vaughan et al., 2011). This process happens through what Ako Aotearoa (2014) call a three-way partnership; what Alkema and McDonald (2014)

[1] For further information, see (for OPNZ) https://www.openpolytechnic.ac.nz/; (for Careerforce) https://www.careerforce.org.nz/; and (for BCITO) https://www.bcito.org.nz

refer to as collaboration and a structured partnership between the learner, the education provider, and the workplace; and what the Workplace-based Learning Working Group (2020) call a tripartite approach. "Work-based learning describes learning that takes place at work, through work, for the purpose of work. It comprises varying proportions of on and off-job learning developed via a tripartite employer-learner-provider partnership" (Workplace-based Learning Working Group, 2020, p. 5).

Each of the players has a role in the system. Alkema and McDonald (2014) point out that learners bring their potential to the job – their aspirations, motivations, persistence and sense of self-efficacy, qualities that grow and develop as they acquire new knowledge and skills. Education providers develop and deliver learning materials and assessment opportunities along with organising, planning, and supporting learners and employers. Workplaces afford opportunities (Billett, 2015) for learning and practice that enable learners to become and be, for example, care-givers, builders, teachers (Chan, 2011). When everything comes together, the learning, transfer and practice align with experiential learning (Kolb, 1984), situated learning (Lave & Wenger, 1991) and transformative learning (Mezirow, 1997).

Notable in these various descriptions of workplace-based learning is the sense of equity in the system. However, it is probably fair to say that this has not always been the case with provider-based education. Here, in a provider-led model, education organisations have put themselves in the driving seat by determining what is taught and assessed, along with where, when, and how this is done. While course material has been developed in consultation with the industry, including employers, the latter have been left pretty much at the receiving end of delivery in what has historically been a low-touch and, sometimes, low-engagement model. But in the new vocational education environment there is acknowledgement of the need to change this situation:

> We must move the employer from being seen as simply a 'player' in work-based learning to that of an equal partner with the learner at the heart of work-based learning. With a business to run, the employer also wears the hats of teacher, mentor, counsellor and assessor, often with little or no formal skills in these areas, and little support. Success requires we understand the needs of and provide tangible support for the employer (technical; educational; financial) from day 1 of the new NZIST. (Workplace-based Learning Working Group, 2020, p. 7)

Putting others in the driver's seat requires direct interface and engagement with employers. Models for these approaches exist in Aotearoa NZ – Transitional Industry Training Organisations (TITOs), previously Industry Training Organisations (ITOs), have engaged directly with employers around programme content and delivery, and actively worked in workplaces to support employers and trainees/apprentices. These models are included in the descriptions below.

Models of Delivery

Institutes of Technology and Polytechnics (ITPs) utilise a range of approaches to workplace learning, including fully-integrated learning, practicums, work-integrated learning and simulated learning (Alkema & McDonald, 2014) (Fig. 9.1).

In 2019 OPNZ engaged with over 26,000 learners. It works from the premise that its teaching and learning approach provides flexible learning opportunities and access to learning that people might not otherwise have. Seventy-three percent of its learners are in employment (OPNZ, n.d.). In the OPNZ case study of a Level 5 qualification in adult teaching, the ITP uses a distance learning approach whereby learners use materials and assessments for qualifications.

The OPNZ approach is a form of fully integrated, workplace-based learning. This form of provision is significant as it offers access to those who may not be able to get to a physical campus, allows people to undertake study in their own time, to study while they work, and to study what is relevant for their current or future work. The learner at the centre of the polytechnic case study found considerable value in the opportunity provided through distance learning and the subsequent outcomes for her. "Study is relevant and timely. I can prepare myself ahead of time for possible other jobs – preparing myself for the future. There are always new courses. The cool thing is that [while] my manager doesn't support PD on the [work] website as there is no money for it, I can do what I want to do. (Learner)" (Alkema & Neal, 2020, p. 36).

The provider-led approach is also of value to employers who gain from having more knowledgeable and skilled employees whose practice is theory-informed. The qualifications offered are sector-informed and the provider is in the driver's seat in terms of determining the programme that is delivered and the assessment timing and mechanisms. Learners choose to enrol and have a range of motivations for this but have little say over the direction of learning. The extent to which employers are involved varies, but in this case study the employer was only required to sign off on observations of teaching practice and had no connection with OPNZ (Fig. 9.2).

The employer-led model is also a fully integrated approach. It is used by Careerforce, which arranges training for around 19,000 trainees in the health and

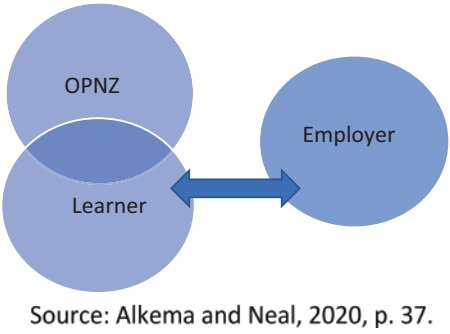
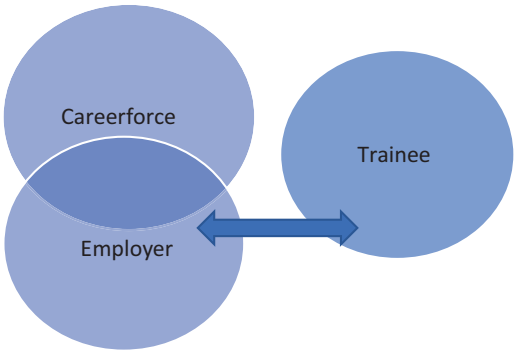


Fig. 9.1 Provider-led learning. (Source: Alkema & Neal, 2020, p. 37)



Source: Alkema and Neal, 2020, p. 27

Fig. 9.2 Employer-led learning. (Source: Alkema & Neal, 2020, p. 27)

wellbeing sector (Careerforce, 2019). The organisation takes both a top-down and bottom-up approach to programme development. Sector engagement happens at the industry level and day-to-day engagement happens with employers who are directly supported by Careerforce front-line staff who are workplace advisors.

With Level 2 and 3 qualifications there is no interaction between Careerforce staff and trainees. Instead, Careerforce provides learning and assessment resources and supports employers to run what is essentially an employer-led model of learning and development. Here, employers are responsible for the training infrastructure and the mechanisms that support and enable trainees to learn and complete qualifications. Learning resources are provided online, with larger healthcare providers contextualising these to the needs of their workplaces and ways of working. "We look to make the qualification align to work. [Level 2] is aligned to our induction programme – put it into our own language, documents, policies, and procedures" (Employer) (Alkema & Neal, 2020, p. 31).

Employers are also responsible for deciding the model of support that helps trainees through the learning and the qualification. Alkema and Neal (2020) show two ways this is done – through learning mentors and nurse educators. Both employers in this case study – a community-based home care provider and an aged-care facility – provide trainees time to meet in groups, usually during paid work time.

The learning mentor in the community-based sector and the nurse-educator in the aged care facility both operate what can be deemed communities of practice. Here they run sessions with trainee practitioners – community support workers and care-givers – and help them make connections between the learning materials and their work. "There is real value in the face-to-face sessions with trainees every two weeks. … I try to keep everyone on the same page so we can have discussions, but they have different learning needs … the advantages of the approach are that you can check in with people and they are kept up to pace … (Nurse educator)" (Alkema & Neal, 2020, p. 30).

This socio-constructivist approach enables trainees to make connections between theory and practice. It also supports them to develop as reflective practitioners as they think about what they are doing with their clients on a daily basis. This and other research show that operating with a community of practice model and using reflective practice are a real strength in the work of health practitioners (Eyre, 2011; Murray, 2015).

> [I'm] Constantly checking in with trainees and getting examples of what they are doing. It helps them not to get complacent and keeps them fresh. It's a good way of having conversations and analysing what could be done better (Learning Mentor) (Alkema & Neal, 2020, p. 35).
>
> Matt and Wendy … support the idea that ODL is not an individual journey, rather it is a collective and constructivist journey that enables staff to complete qualifications and become practitioners who are able to support clients to develop to their full potential. (Alkema & Neal, 2020, p. 36)

While the learning mentor and the nurse educator are dedicated support roles, the everyday responsibility for supporting trainees sits with their supervisors, who guide them through the practical learning at work – the application of the theory to practice. These supervisors determine when trainees are ready for their practical assessments and they, or another expert observer, verify the trainees' practice while an in-house assessor marks the theoretical aspects of the qualifications. Combined, this real-world assessment undertaken by employers means that they are in the driver's seat when it comes to determining decisions about the capability of practitioners.

The value for employers being in the driver's seat in the healthcare sector derives from the provision of theory from Careerforce; the underpinning this then provides for the practice of their staff; the ability they have to contextualise it for their workplace; and the ownership they have of the assessment processes. Having a national organisation provide the qualifications also means consistency of training across the country. For the trainees, value derives from being credentialled for what they are doing at work and while working. However, this model is reliant on workplaces having a training infrastructure in place that supports trainees through their qualifications. "The overall benefit is that the approach creates consistency in and across workplaces in New Zealand. We get industry feedback so can adapt. We can make things happen really quickly. It gives mobility [for trainees] between workplaces – and the same level of service to all (Workplace Advisor)" (Alkema & Neal, 2020, p. 33) (Fig. 9.3).

The third model, based on partnership, is also a fully integrated one. The BCITO arranges training for around 12,000 apprentices across 15 building sectors and does this by engaging with over 6000 employers (BCITO, 2019). The BCITO uses sector engagement and also takes a research-informed approach to its work. In the carpentry sector, research has been used to inform the delivery and assessment model (Vaughan et al., 2012). While the usual process of industry setting standards and programme design take place, the coal-face delivery sees the driving being shared.

While the theoretical aspects are covered off in the learning materials, it is not compulsory for apprentices to use them and there is no bookwork or written assessment for the Level 4 carpentry qualification. Nevertheless, there is strong sense of

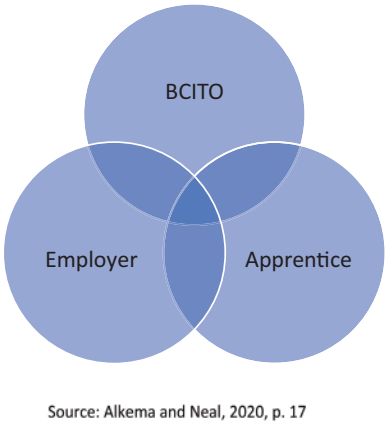


Fig. 9.3 A partnership approach. (Source: Alkema & Neal, 2020, p. 17)

the need to engage with these materials, and this usually happens in apprentices' own time (Alkema & McDonald, 2016; Alkema & Neal, 2020).

Showing knowledge of theory is covered through professional conversations that apprentices have with their training advisors during site visits. Theoretical requirements are also covered off in conversations that training advisors have with employers around what apprentices need to know for their current and future work. Here, BCITO training advisors need to walk the fine line between provider provision, in relation to the need for theory to underpin practice, and what employers and apprentices see as being needed for the real world. "Employers think that it is about getting practice on the job, and in terms of specific theories, 'haven't used that s*** in years.' In relation to problem-solving and calculations around, for example, areas, volumes, quantities, the newly qualified builder talked about, 'There are apps [on my phone] that can do that for you.'" (Alkema & Neal, 2020, p. 17).

Each training advisor works with round 90 apprentices whom they visit, on site, every 3 months. It is a high-touch model that allows them to guide and support the apprentice's learning and directly engage with employers about progress and the 'where to next' for the apprentice's learning. These visits with apprentices are professional conversations (formative or summative) that tease out what apprentices know and have done. As the high-energy comment below shows, this process allows information to pour out of apprentices and puts them in the driver's seat in terms of determining what it is they are reporting on.

> In response to a general question about what he had done since the last visit, building apprentice T responded that he had "done heaps," before going into further detail. "Done heap of straps – but the plywood came braced. Did the ecoply, taped joins, nails every 150. Used an old coil gun. I was on the nails … then I moved on to cladding. Did it with colorside [coloured steel cladding]. Had to get the vermin strips level. The first time I've done palisading [weatherboard cladding]. Measured off the line [level line set by employer], two nails on each cavity baton as it was a high wind zone. Then flashings, clad up to the window. I helped chuck the window in – I just held them up. … Cut the packers for the windows. Cut the flashings". (Alkema & McDonald, 2016, p. 12)

The conversation is supported by evidence gathered from a walk around the site, photos of work that has been done, the apprentice's diary entries and a conversation with the employer. Here the employer not only confirms what has been done and the standard to which it has been done, but also sets the direction for learning on the basis of the work that is coming on stream.

This model, with its shared driving approach, is of considerable value to all those involved. It is built off interaction and engagement that acts as partnership. BCITO training advisors have direct and frequent interaction with employers to ascertain industry demands and employers' needs. Employers are exposed to conversations around learning and development and set the direction for learning based on their requirements. For apprentices, being central to the partnership means that their direction for learning is set on a needs basis and in a timely way.

Discussion

In light of the structures imposed as a result of the government's Reform of Vocational Education or RoVE (Ministry of Education, n.d.), there is an opportunity for discussion, a rethink and reworking of how workplace-based learning operates. RoVE envisages "[a] new future for work skills training in New Zealand" (Hipkins, 2019). The new system is seeking to impose a sense of order on the things that were seen to be problematic in the 'old' system – a skills shortage, a dual vocational education system, challenges faced by the ITPs, and the lack of input into off-job learning by industry (Ministry of Education, n.d.). However, what a difference a year makes, as COVID-19 brings new challenges into the teaching and employment environments. As a consequence, enrolments are increasing in provider-based settings (Gerritsen, 2020) and the hoped-for increase in the numbers of apprentices in work through the Apprenticeship Boost and extension to Mana in Mahi schemes is eventuating (Hipkins et al., 2020).

A restructure of the vocational education system through the establishment of NZIST, along with the introduction of Te Taumata Aronui, WDCs, RSLGs and CoVEs, does not ensure that delivery and operating models for workplace-based training will change. The latter groups have roles that commit them to ensure the reforms reflect the government's commitment to Māori–Crown partnerships (Te Taumata Aronui); to give industry a stronger leadership role (WDCs); to provide advice about regional skills needs (RSLGs); and to inform good practice (CoVEs).

While these goals are all important at the system level, it is at the ground level – the interface between the learner/trainee/apprentice, the employer and NZIST – that the real work happens. The three models described in this article all have a place in supporting workforce development. Here it is not just a question of structure and roles, it is also about the practice within the models and who is allowed to own and drive what is done.

The importance of workplace-based learning is not in doubt. New Zealand's Productivity Commission (2019) acknowledges the need for a flexible training

system that can accommodate both provider-led and workplace-led approaches and has identified a need to widen access to work-based education and training. So, if learners/trainees/apprentices are getting the knowledge, skills, and qualifications they need; if industry and employers see these as the 'right' skills; and if Aotearoa NZ has an efficient and productive workforce, does it matter who is in the driver's seat? If we argue according to this premise, then it doesn't matter, as this approach takes the view that education is a product – skills delivered for individuals, employers, and industry.

But education is a process, not merely a product, and it is this process that needs to provide the opportunity for everyone to have a turn at driving. There will always be a place for education providers to bring their knowledge and expertise to the teaching and learning process. But with workplace-based, on-job learning, education providers should recognise the expertise of employers, the role they have in teaching and learning, and the affordances they offer for practice, reflection, and assessment.

This may be a big ask for some employers. They can be the first to admit that education is not their prime purpose, that they are there to make things or deliver services, but they will also say that they are willing to partner in the learning process and take responsibility for it. They also want qualifications to be integral to the work they do, reflect the work they do. They want to take a role in determining the readiness of trainees and apprentices for assessment and the awarding of qualifications and subsequent entry into a vocation or profession. "It wasn't just about our staff receiving a certificate and hanging it on the wall; it was about real time learning that could be applied right away in the workplace. This was an exciting development for us. It opened up several opportunities for our staff and great outcomes for the business" (Alkema & McDonald, 2016, p. 8).

Vocational workplace-based learning is not straightforward. Trainees and apprentices do not come through an education provider's gate on a daily basis. They are dispersed across thousands of workplaces and are reliant on the capability and capacity of thousands of employers to support them and provide them with opportunities to learn and practise. The traditional model of open and distance learning in provider-based settings sees providers in the driver's seat. This is not a negative factor and has the advantage of reach and opportunity for learners who wish to undertake this form of learning and have the capability and capacity to do so.

However, the Careerforce and BCITO models show that workplace-based learning provides the scope for trainees/apprentices and employers to play a direct and authentic role when they are given ownership of and responsibility for what is learnt and assessed. Direction-setting by employers means that they get the skills they need when they need them, and that they are developed in the way that suits workplaces.

The NZIST Establishment Board's working group recognises the need for employers to be partners in the process. This implies a sense of equality and working together, but the question remains – how willing are education providers to allow employers to steer, while they sit in the passenger seat? Over the next few years as WDCs, in addition to their other roles, "set standards, develop

qualifications and help shape the curriculum" (Tertiary Education Commission, 2020), NZIST will need to negotiate flexible and empowering delivery models in which the driving responsibilities can be shared.

Addendum: Challenges for the Future – September 2021

What has been proposed through the Reform of Vocational Education (RoVE) process is considerable system change in vocational education. The old world of industry training, its approaches and models, have come under the purview of several organisations that are separate, yet connected in the work they do to support learners/trainees/apprentices and employers.

Since the original article was written, the New Zealand Institute of Skills and Technology (NZIST) has been given its formal name of Te Pūkenga and considerable work has been undertaken in setting up the structures that will support workplace-based learning. Work on the operating model was announced on March 29, 2021. Essentially this will provide the blueprint for how Te Pūkenga will operate.[2] On April 7, 2021, Te Pūkenga announced it was to establish a work-based learning subsidiary – Te Pūkenga Work-Based Learning Limited (WBL).[3] This provides hope that the work undertaken over several years in the industry training sector will not be lost given the expectation that former ITOs will be transitioning into the WBL.[4]

In June 2021 the Tertiary Education Commission (TEC) announced the formation of the six Workforce Development Councils (WDCs) referred to in the article.[5] These have a number of roles including, looking at future skills needs, setting standards, developing qualifications, and determining the mix of skills and training required for their industries. In July 2021, the TEC further announced that WDCs would work with industries and employers and contribute to improved outcomes for industry, employers, learners, and providers.[6] For employers this means ensuring that the vocational training meets their needs and increasing the numbers of employers who engage with industry training.

Along with a role for employers in the WDCs, there is also a role for industry in the Centres of Vocational Excellence (CoVEs) with their focus on teaching,

[2] See Te Pūkenga, (March 29, 2021) https://xn%2D%2Dtepkenga-szb.ac.nz/news/category/News/what-is-the-operating-model

[3] See Te Pūkenga. (April 7, 2021) https://xn%2D%2Dtepkenga-szb.ac.nz/news/category/News/te-pukenga-establishing-work-based-learning-subsidiary

[4] See Te Pūkenga. (August 12, 2021). https://xn%2D%2Dtepkenga-szb.ac.nz/news/category/News/work-based-learning-chief-executive-appointed

[5] See Tertiary Education Commission (June 21, 2021) https://www.tec.govt.nz/rove/workforce-development-councils/

[6] See Tertiary Education Commission (July 19, 2021) https://www.tec.govt.nz/rove/workforce-development-councils/what-wdcs-will-do/

learning, and research.[7] The first two CoVEs to be established – ConCOVE in the construction industry and the Food and Fibre CoVE in primary industries, appear to have had input from industry and it will be interesting in the future to watch the extent to which employers are enabled to participate in and contribute to the work of the CoVEs.

A conduit for employers may well be the Regional Skills Leadership Groups (RSLGs) and their work with employers.[8] Operating regionally their tasks include interfacing with employers to determine skills needs with the information being collated into *Insight Reports*.[9] These reports are the 'what so' about what is happening in the regions and the challenge is to turn this into 'so what' gets done about it. How do the opportunities and challenges get turned into regional workforce plans with actions that solve skills' issues?

To date, given its early days, RoVE has started the system change process at a structural level and has some work underway. So, what will it take to bring about the change envisioned with the 'new order'? In an ideal world the education system would operate in a relational way. For example, the TEC talks about the CoVEs being "learner focused, industry led, government enabled". This suggests people and organisations interacting with each other in ways that allow the complex problem of how to deliver vocational education to meet the needs of industry, employers, and learners/trainees/apprentices.

The TEC's thinking around learners, industry and government brings a systems lens and given that RoVE brought about system change, consideration is given here to the conditions required for system change. Working from Kania et al. (2018, p. 4), this means thinking about -structural change: policies, practices and resources flows that are explicit; relational change: relationships and power dynamics that are semi-explicit; and transformative change: mental models that are implicit.

The structural change has come about as noted above. This has been explicit and transparent. We can see the structures, talk about them, and understand (on paper) how they are intended to operate and what they will do. However, the practices of the new organisations are not yet clear and will need to be worked on. Hence the need to look at the models outlined in article above and the extent to which the structures will act in an enabling way to deliver the outcomes that are expected from the system change for employers and for learners/trainees/apprentices.

At the heart of the models in the article sit relationship and connections as, "transforming a system is really about transforming the relationships between people who make up the system" (Kania et al., 2018, p. 7). For example, the Careerforce model highlights the importance of relationships and supporting employers to deliver training. The BCITO partnership model shows the importance of the

[7] See Tertiary Education Commission (September 3, 2020) https://www.tec.govt.nz/rove/coves/

[8] See Tertiary Education Commission (January 28, 2021) https://www.tec.govt.nz/rove/regional-skills-leadership-groups/

[9] See Ministry of Business, Innovation & Employment. (n.d.) https://www.mbie.govt.nz/business-and-employment/employment-and-skills/regional-skills-leadership-groups/#most-recent-local-insights-reports

relationship between the employer, apprentice, and training provider so that each of the parties has a role in determining the education pathway. This is in keeping with the OECD's latest skills report (OECD, 2021) that talks about the need to work with and support employers in a way that enables them to provide learning opportunities for employees.

The models used by Careerforce and the BCITO discussed in the article are underpinned by resources and people. Resources are the learning and assessment materials for trainees and apprentices and also materials for employers that help them to understand the training process. However, it is people who are the most important factor. These people have the role of 'go-betweens' and form relationships with employers that enable and support training to happen. In the BCITO model they also form relationships with trainees and apprentices.

The model of vocational training that engages directly with employers is essential because one of the challenges for employers is the extent to which they recognise and know about skill needs in their workplaces and how training can support this (OECD, 2019). Employers are often the first to say that training is not their business, and they need the support from education providers on how to do this.

An example of this comes from a small study of 12 companies, (Alkema, 2021) where employers found it challenging to deliver skills' training without the support of education providers given not all of the 12 companies had a training culture. Some companies, for example, those in manufacturing, retail, and hospitality, found it difficult to go beyond compliance and health and safety training given their low margins and their inability to allow people off the shop floor for training.

In terms of what might be called a, "culture of training", employers in this small study are in two camps. Those who have a training culture and career pathways, "Training and development is embedded in our DNA", with this being one of the reasons for engaging in workplace training that goes beyond compliance. In the other camp are those who have compliance training and recognise the scope for more, "We're developing a culture – it wasn't there in past."

> The training culture is a work in progress and we're just turning the corner. We're just moving from compliance, tick box, to thinking about training as not just a reward for people who are doing their jobs really well, but to training as a development process – it's a right you have at work. … We have compliance requirements and H & S but we're also looking to do more than that. We're changing the mentality. If they do the work, they deserve the qualification so that something comes out of it. If you work, you deserve to have a qualification and they are hungry for it. … (Employer, Manufacturing)

One of the challenges for getting workplace learning underway is how to promote it so that employers see the value in it – to move it from a "nice to have" to a "must have". However, employers need support with this (OECD, 2019) and picking up from the article above is the idea of relationships and partnerships that are critical for supporting employers in the training. The notion of partnership outlined in the models brings a sense of equity to the training process. This is not about the training provider coming in with the answers, the training materials and the training models.

For the employers in the 12 companies (Alkema, 2021) this was the most important factor given they do not see themselves being able to deliver training on their own.

> We've partnered with [provider] and have a pipeline now for supervisors. For the front line- we have a level one to four training framework so people can progress. … We now focus on CI [continuous improvement] so people can progress. And we also have personal PD and supervisor level training. … (Employer, Manufacturing)

The advantage of the relational model and working alongside employers is the opportunity to build training cultures in companies and training/career pathways for employees. The partnership approach in the 12 companies in the study worked as employers see themselves in the driver's seat whereby they are in charge of decisions around programmes and direct, in a collaborative, relational way, what happens in terms of the content of programmes, "They are tailored to what we do and [the provider] works out how to cover literacy and numeracy with our business resources".

> [The provider tries to] influence us in terms of what they think is a better approach. I have to find a balance [between what the business wants and what they want]. I don't shoot them down, but I work as a partner. … But it is not just my view, I get other people in the company's perspective. (Employer, Manufacturing)

At the heart of the approach described by the employers above and the Careerforce and BCITO models, are the relationships and connections and the power dynamics that Kania et al. (2018) describe. But the practicalities of the approach are more resource intensive than the vocational education model that sits within education organisations where learners attend in face-to-face or online environments.

Here education providers deliver a learning product that, while it generally meets industry needs, is done in a way that does not require direct engagement with employers. This is not to say there is not a place for or value in this model. As the article shows, the model used by OPNZ has considerable value for learners (and likely their employers). It affords learners the opportunity to develop the knowledge and skills they need for qualifications and supports them in their career pathways.

A relational model at the ground level is easy to see with individual education providers and employers and it was one that ITOs worked hard to establish. How this will work at the macro level of Te Pūkenga is unclear. But, the establishment of the WBL subsidiary suggests there will be a 'lift and shift' of ITOs and their approaches into this organisation. The extent to which the models operated by the various ITOs will remain is unknown.

However, what is important is the need to build from existing relationships that former ITOs had with industry and employer groups and be mindful not to "embody traditional power dynamics" given that "scaling effective practices may be thwarted by poor relationships between players in the system" (Kania et al., 2018, p. 5). The models of delivery have been built to suit the needs of employers and industry and these approaches need to be taken forward and adapted to meet future skills demands identified by employers, industry and the RSLGs.

In addition to relationships with employers to support them to deliver training, there is also a case for connections to potential learners in workplaces to enable them to see the value of training and the role it plays in upskilling for current and future roles. The OECD (2021, p. 3) notes that,

> Thriving lifelong learning systems place learners at the centre. They combine a plethora of learning methods and learning providers … Not only does diversified provision of learning ensure quality, it also helps inform individuals choices.

This point goes back to the argument made in the article about the role of learners in the system. In vocational education it will be particularly important to promote education that is of value to all learners, but particularly to those with lower levels of education given they are less likely to participate in adult learning than those with tertiary education. It will also be important to promote education to those in the 41–65 age group given the potential need these people will have to upskill or reskill to cope with the technological changes required in their workplaces (OECD, 2021, p. 132).

Another reason for putting learners at the centre of thinking is to support higher completion rates. While the ages of trainees and apprentices is continuing to rise it seems that completion of qualifications for both groups is trending down. Sixty percent of trainees completed qualifications in 2020, down from 63% in 2019; and around 55% of apprentices completed qualifications in 2020, down from around 58% in 2019 (Ministry of Education, n.d.).

Bringing vocational education under one organisation, Te Pūkenga, provides opportunities for seamless transitions for learners should they wish to move between learning with education providers or learning while working and has the potential to improve completion rates. What this looks like at a practical level is yet to be determined.

Ultimately the system change intended by RoVE comes down to embracing all the mental models (Kania et al., 2018) about vocational education, how it can be delivered and who the key players are. It is not about one-size-fits all. Approaches that suit industry and employers as shown by the Careerforce and BCITO models need the opportunity to flourish. This means being mindful about the narrative and practice of how vocational education works, so that in the mix of provider settings and workplace-based settings, employers and learners/trainees/apprentices can be in the driver's seat.

This is not just about a language change – it is about a practice change and will perhaps be the most difficult for Te Pūkenga to bring about given the role education providers have played in the past in terms of delivery. As Kania et al. (2018, pp. 10–11) note, "How do you shift a narrative with a long history of legitimacy … Changing mental models often means challenging power structures that have defined, influenced, and shaped those models historically and in the present."

The restructure of the vocational education system with its various organisations and their mandate to work with employers and industry means there may be scope to hold on to models that work for employers and actively engage them in the education and training process. This then takes us back to the end of the original article

which notes the need to negotiate flexible and empowering delivery models in which the driving responsibilities can be shared. To do this will require Te Pūkenga, the WDCs and the CoVEs "… to be in the mix with stakeholders, exploring shifting relationships, power dynamics, and mental models" (Kania et al., 2018, p. 17).

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Chapter 10
Investigating the Complexity of Language Use in Trades Education in the Aotearoa New Zealand Context

Jean Parkinson, Averil Coxhead, James Mackay, and Emma McLaughlin

Abstract Language use in vocational education is a little studied area. The Language in Trades Education project investigated the complexity of this language using a multi-pronged approach. It involved an examination of written and spoken texts in four trades at the Wellington Institute of Technology (WelTec), an Aotearoa New Zealand (NZ) Polytechnic (ITP). The study centred firstly on gathering written texts used in two construction trades (carpentry and plumbing) and two engineering trades (automotive technology and fabrication). Secondly, the spoken language of tutors and learners in these trades from classroom, building sites, and workshops was also collected. In this chapter, we share our findings related to the writing and talk in this context, the multimodal texts that students read and write, and the vocabulary used in these texts. We also discuss the translation of technical vocabulary in each trade from English to Tongan, a language of the Pacific, using a Pacific research methodology called Talanoa. Taken together, the findings from the project illustrate the complexities of language use in vocational education and have practical applications for teaching and learning.

Keywords Vocational education and training (VET) · Language in the trades · Institute of technology or polytechnic (ITP) · Tongan language · Practice-based learning

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_10

Introduction

Much research on learning a language for occupational purposes has focused on the specific needs of students studying to go into the professions. For example, researchers have focused on legal English (e.g., Northcott, 2013), nursing (Bosher & Smalkoski, 2002), and engineering English (e.g., Mudraya, 2006). Indeed, in the last three decades there has been a great deal of research on English for academic purposes, with a number of specialist journals in this field (e.g., *English for Specific Purposes* and the *Journal of English for Academic Purposes*). In stark contrast, research into the language needs of students learning a trade and their teachers (for example, in carpentry, plumbing, and automotive engineering) is extremely limited, and there has been little description of the language of the trades. Indeed, the study was motivated by the experience of the fourth author working as a learning adviser with trades students and trades tutors in the vocational sector. She found that there were few language support materials available for trades tutors and ESOL teachers in the vocational sector. In addition, in interviews with trades tutors by the third author, trades tutors reported the heavy learning burden of technical vocabulary in the trades (Parkinson & Mackay, 2016).

Yet the trades are important to industry and the economy, so research on trades language is valuable both within Aotearoa NZ and internationally. Ivanič et al. (2009) show that trades-based literacy involves a wide range of very demanding tasks. However, little of their work focuses on the lexical, discoursal and visual elements of the language of the trades. Yet these elements are important in acquiring the literacy of language for an occupation. In focusing specifically on the lexical, discoursal and visual elements of trades language, our study builds on the work of Ivanic et al. (2009) and is complementary to it. This language focus is particularly necessary, because the New Zealand Qualifications Authority (NZQA) includes elements such as vocabulary, how texts are structured, and strategies for meaning making, in their definition of the literacy which learners need (Ministry of Education, 2010):

> Literacy learners need to learn to make meaning of texts. This learning includes the use of background knowledge (including knowledge relating to their culture, language, and identity), vocabulary knowledge, knowledge of how language is structured, knowledge about literacy, and strategies to get or convey meaning.

The vocabulary-related elements of this research were guided by two theoretical constructs. The first is Gamble's (2016) conceptualisation of knowledge in the trades as being 'situated' (that is, procedural or 'how to' knowledge and craft knowledge) and formal (codified and scientific knowledge). The second is and the concept of 'vocational thresholds' (Vaughan et al., 2015; Vaughan, 2017), which are shifts in learners' knowledge and identity as their capability in their trade develops. Because trades-based education in Aotearoa NZ includes speakers of English as a first, second and foreign language, our research has relevance for learners from different language backgrounds. All students learning a trade are learning a new

register of the language, in which technical vocabulary is an important part. Although the language used in teaching and learning the trades is complex and demanding, as Ivanič et al. (2009) report, no research has studied this language in depth. This chapter will outline a research project, the Language in Trades Education project, that investigated the vocabulary, the textual organisation, and the grammatical and visual features (e.g. graphs and diagrams) of the written texts and the spoken language used in trades classrooms at the Wellington Institute of Technology (WelTec). Our findings on the language used in the trades is a valuable resource for trades tutors and their students.

Data Collection and Method

Participants in the Study

Ethics approval was given by the Victoria University of Wellington Human Ethics Committee (reference number 19989). Twenty-two trades tutors at WelTec generously supported the project by wearing digital recorders to record their teaching. Students were aware that recording was taking place and gave consent. Students and tutors also participated in interviews, providing invaluable insights into learning and teaching in the trades. Students were taught in groups of about 16, each group with a dedicated tutor. Teaching took place in the classroom, and in the workshop where students learned to use tools, repair engines or manufacture items, (automotive technology and fabrication), and on the building site (carpentry), where students collaborated to build a house over the 34 weeks of their course.

Building the Corpus

Three corpora were collected over the period 2014–2015. They included the written course materials that students read in the four trades included in the study. In all, 120 course booklets were collected totalling 1.6-million words (see Table 10.1). All booklets were at levels 3 or 4 on the New Zealand Qualifications Framework (NQF).

Table 10.1 Written and spoken corpora

	Written corpus	Spoken corpus
Automotive technology	559,000	115,000
Carpentry	300,500	108,000
Fabrication	185,500	99,000
Plumbing	565,500	133,000
Total	1,610,500	455,000

The second corpus was a 455,000-word corpus of talk that was recorded in trades classrooms, workshops, and building site (Table 10.1). In total 117 recordings were made and transcribed, totalling 143 hours. To collect this corpus, the 22 participating trades tutors wore digital recorders. The third corpus was a small corpus of student writing, collected from carpentry students only. This writing was the builders diary, a daily diary that students keep during the 34 weeks of their course. Fifty-five diaries were collected, totalling 229,000 words.

Vocabulary-Focused Analysis of Data

The corpus analysis for vocabulary involved both quantitative and qualitative methods. For the development of technical word lists using frequency analysis, the Range program (Heatley et al., 2002) and Nation's BNC/COCA (2012) word lists were adapted. The BNC/COCA lists are made up of frequency-based word families (from the most frequent first 1000 to 25th 1000) and supplementary word lists (proper nouns, marginal words such as *oh* and swear words, abbreviations, and transparent compounds) which Nation compiled from the British National Corpus and Corpus of Contemporary American English. Concordances were used to help with the meaning-based analysis of texts and vocabulary, along with expert judgement from WelTec tutors, and careful checking of the corpora, technical dictionaries, and reference materials. The interview and questionnaire data were primarily analysed using thematic frameworks.

Analysis of Discourse Features

The written corpus was quantitatively and qualitatively analysed for use of visual images (see section "Multimodality in trades texts"). The corpus of student writing was analysed for visual images, for language features and for how the writers expressed and organised their meaning in their diaries. Eighty-eight thousand words were included in our analysis: 2000 from each of 44 diaries. This ensured that each diary made the same contribution to the data. Eleven of the diaries were written by apprentices (who were already in paid employment) and 33 by students in their initial on-campus training.

The spoken corpus was analysed firstly to see how vocabulary is learned by carpentry students interacting with their tutors. The spoken corpus was searched for language-related episodes: episodes in which students and tutors focus specifically on use of vocabulary or grammar. Secondly, to investigate the interactional roles of tutors and students, and student opportunities to participate in talk, the spoken corpus was analysed for participation frameworks (Goffman, 1981) employed in the classroom context compared with the workshop or on-site context.

Findings: Vocabulary

Technical Vocabulary in Trades Education

The main research question addressed in this part of the research was 'What lexical items meet the selection criteria for a technical word list in each of the four trades?' The aim was to identify technical vocabulary in each of the trades under investigation, in both spoken and written text. This work is important because vocabulary is an essential element in language and technical lexis can make up around 30% of written texts in the case of anatomy (see Nation, 2013). The proportion of technical vocabulary in spoken specialist settings had not been researched before the Language in Trades Education project. Learning technical vocabulary takes time, effort, guidance, and perseverance. It cannot be left to chance for first or second language speakers of English. Therefore, we identified technical vocabulary and developed word lists for learners, teachers, and materials designers.

There are several important features of technical vocabulary which research needs to take into account. Firstly, it is vital that the needs of learners are paramount in the development of technical word lists (Nation, 2016). In the Language in Trades Education project, we gathered written texts that were used in the classroom and tutor talk. Secondly, identifying technical vocabulary needs to be guided by principles. In our studies, the frequency (how often words occurred in the written and spoken texts) was a core principle. That is, we selected only lexical items which occurred over a threshold of frequency in the written corpus and a slightly lower frequency threshold in the spoken corpus. The meaning of words was also important, which is why tutors were asked to comment on the technicality of words. We also consulted technical dictionaries and checked the context of words in the written and spoken corpus to verify the meanings of words. This step was particularly important when categorising words which are used in general English and in technical texts. In carpentry, for example, *line* and *pile* are technical terms as are *earth* and *clutch* in automotive technology. Finally, technical vocabulary in trades education involves a range of words. We focused on single words for our plumbing (Coxhead & Demecheleer, 2018), fabrication (Coxhead et al., 2019), carpentry (Coxhead et al., 2016) and automotive technology (Coxhead, 2021a) lists. We also identified technical abbreviations and proper nouns that met the frequency and meaning-based selection principles. Table 10.2 provides an overview of the word lists. Note that

Table 10.2 Overview of the technical word lists

Word list	Total number of words	Number of abbreviations	Number of proper nouns
Plumbing	1465	77	9
Carpentry	1424	104	28
Automotive	1265	104	26
Fabrication	1079	57	9

large number of items in each trade list, with the Plumbing and Carpentry Word Lists being particularly sizeable.

Appendix 1 contains the first ten most frequent items from these word lists for each of the four trades. The first four items in the Fabrication Word List (Coxhead, et al., 2019) are: *welding /weld(−s/−ed/−er/−ability)*; *work(−ing/−er(s))*; *figure(s)*; and *cutting/cutter(s)/cut(s)*. If we take work(−ing/−er(s)) as an example, then each of these words are technical and meet the criteria for inclusion in the word list: *work*, *working*, *worker*, and *workers*. Examples of technical abbreviations, again from fabrication, include DTI – Dial Test Indicator; GMAW – Gas metal arc welding; GTAW – Gas tungsten arc welding; HAZ – heat affected zone (Coxhead et al., 2019). Technical proper nouns, this time from plumbing, include Aqualine, Braceline, Ecoply and Flexibrace (Coxhead & Demecheleer, 2018). This research process was complex and iterative, as we moved from the written and spoken corpora to the experts and back to the corpora multiple times.

Vocabulary in Pedagogical Written Texts in Trades Education

There are two main findings to be discussed in this section. The first research question in this section focuses on the percentage or coverage of the technical word lists over each written corpus in our study. The second research question asks how many word families learners need to know to be able to cope with reading or understanding these written texts.

The first main finding was that the technical trades lists covered between 30% to just over 38% of the written pedagogical trades texts in our study. Table 10.3 provides the coverage over each trade. Note that the Carpentry Word List (Coxhead et al., 2016) is one of the largest lists and has the largest coverage. Fabrication (Coxhead et al., 2019) is the smallest list and has the smallest coverage (but still sizeable at more than one word in three being technical). See Coxhead and Demecheleer (2018) for the Plumbing Word List and Coxhead (2021a) for the Automotive Technology Word List. These word lists are an important innovation in

Table 10.3 Coverage (%) of the four technical word lists, abbreviations and proper nouns over written texts

Technical word list, abbreviations and proper nouns	Written trades corpora (%)
Carpentry	38.35
Automotive engineering	37.44
Plumbing	34.48
Fabrication	30.47

Adapted from Coxhead et al. (2020)

Table 10.4 Vocabulary loads of written texts in the four trades at 95% and 98% including proper nouns, compounds and abbreviations

	Carpentry	Plumbing	Automotive	Fabrication
95%	4000-5000	5000	5000	6000
98%	9000-10,000	9000-10,000	9000	23,000

Adapted from Coxhead et al. (2020)

trades education because they help us understand the size of the ball park (Nation, 2016) in terms of technical vocabulary in these trades and fit well with the existing literature on the amount of technical vocabulary in written texts at roughly one word in three.

The vocabulary load of a text is usually calculated by measuring the coverage of a corpus using Nation's BNC/COCA frequency and supplementary word family lists in English (2012). At 95% coverage, learners may need some help with vocabulary to support comprehension but at 98%, learners should be able to cope with any unknown words in the text (see Nation, 2006, 2013). Nation (2006) found that newspapers and novels require 4000 word families plus proper nouns to reach 95% and 8000 word families to reach 98% for newspapers but 9000 for novels. Using Range (Heatley et al., 2002), Table 10.4 Vocabulary loads of written texts in the four trades at 95% and 98% including proper nouns, compounds and abbreviations (adapted from Coxhead et al., 2020) provides the vocabulary loads for each of the four trades over the pedagogical texts in the corpus. Note that 95% is reached for three trades at around 5000 word families, but for fabrication it is reached at 6000 word families. This contrast holds for the 98% threshold as well. While the first three trades reach 98% at around 9000–10,000 word families, this figure is much higher for fabrication.

In all cases, the vocabulary size needed to read these texts was equal to or more than the vocabulary needed to read university-level academic texts (Coxhead, 2021b). Our findings indicate that a large vocabulary size is needed to read the texts which were used in each of the four trades that we investigated. While it may seem obvious to some readers that these technical texts would require a large vocabulary for comprehension, this is the first study, to the best of our knowledge, which quantifies the amount and highlights the lexis in any way. Our findings illustrate how important technical vocabulary is to the texts which learners in the trades are asked to read in the course of their studies.

Vocabulary in Tutor Talk in Trades Education

The research questions in this aspect of our study concerned the vocabulary load and amount of technical vocabulary in spoken trades education language. We were interested in the technical vocabulary used in classrooms and onsite as tutors and learners performed tasks such as diagnosing faults in automotive technology, asking

and answering questions about processes in plumbing, or explaining how things work, such as a water-cooling system. A key concern of tutors was ensuring that the students used the correct terminology when speaking. This learning often involved modelling, using glossaries of technical terms, and insisting on the use of technical terms in speaking (Coxhead et al., 2020). The counterpart of speaking, of course, is listening, and learning in the trades also involves watching and doing (Chan, 2013). Students reported challenges in listening to tutors and focusing on many different aspects of tasks (Coxhead et al., 2016, p. 45). Students noted in interviews that they often encountered difficulties with spelling technical terms that they had only encountered in speaking. A good example of this problem is *soffit* /ˈsɒfɪt/.

Spoken general English has a lower vocabulary load than written general English (Nation, 2006) and we can see this in academic speaking in lectures and seminars. Dang and Webb (2014) found that 95% was reached with 4000 word families and 98% was reached with 8000 word families in academic lectures and seminars. Coxhead et al. (2017a) found that laboratory sessions and tutorials at university required 3000 word families to reach 95% and but 4000 word families for tutorials at 98% and 7000 word families for laboratory sessions. We found that the tutor talk in the trades had a lower vocabulary load of 2000–3000 word families plus supplementary lists (proper nouns, marginal words such as *um* and *ah*, compounds and abbreviations) and 5000 word families across all trades at 98% (Coxhead et al., 2020). These findings suggest that learners would be able to cope with listening and speaking in trades educational contexts if they know high frequency words in English (at 95%) and that trades talk has a lower vocabulary load than university speaking events at 98%. This work is important because it establishes how much vocabulary learners need to know to cope with listening.

The coverage of the technical word lists over the spoken corpora in each trade was much lower than the coverage over the written trades texts. We can see this difference clearly if we compare spoken and written coverage results shown in Table 10.5. The spoken texts have a much lower amount of technical vocabulary from the word lists (between just over 9% to nearly 13%) than the written texts (between one word in three and one word in four).

Table 10.5 Coverage results for all four technical word lists over the spoken and written trades corpora, abbreviations and proper nouns (%)

Technical word list, abbreviations and proper nouns	Spoken trades corpora (%)	Written trades corpora (%)
Carpentry	10.69	38.35
Plumbing	11.59	34.48
Fabrication	9.18	30.47
Automotive Engineering	12.75	37.44

This research sheds light on vocabulary knowledge needed to be able to participate in classroom-based trades education. While first language speakers of English have more than enough vocabulary knowledge to cope with listening in the trades (Nation & Coxhead, 2021), there are many trades students at WelTec or in Aotearoa NZ who use English as a second or third language, which is why we went on to investigate technical vocabulary (based on our technical word lists) in Tongan, a language of the Pacific.

The Development of English-Tongan Wordlists

The research question for this investigation looked at the characteristics of technical vocabulary in Tongan. The technical word lists were translated into Tongan using Talanoa, a qualitative research methodology developed for the Pasifika context (Coxhead et al., 2020). This research involved bilingual experts in trades in Wellington and trades education specialists in Tonga, who worked alongside a project researcher – Kiko Tu'amoheloa. The aim was to develop bilingual word lists to be used with Tongan learners in trades education in Tonga and English language speaking contexts. The translation process brought to light interesting categories in the translation. One of the most important is that many of the high frequency English technical words have equivalents in Tongan (e.g., *drill/vili*) or have been Tonganised, for example *sewer/sua*. Sometimes, the English word is used without any translation, for example, *clutch* but with Tongan pronunciation. We also found that some items required glossing because there was no single word equivalent (e.g. acceleration/langa'i ke vave ange/increase speed) and that in some cases, one word in Tongan was used in the place of two or three words in English (e.g. heavy and hard = *mamafa*). Appendix 2 has the implications for learning technical vocabulary for Tongan students related to each of these categories. The bilingual word lists are available through Vic Books (Coxhead & Tu'amoheloa, 2019a, b, c, d). This research has helped us clarify what knowledge of technical vocabulary in a trade that Tongan speakers might bring to their learning of this lexis in English and what support might enhance this learning. This research was innovative because it involved skilled bilingual Tongan trades people, trades educators in Tonga, a former trades high school teacher from Tonga, and applied linguists in collaboration.

Learning Vocabulary Through Interaction with Trades Instructors

Learners attending trades programmes acquire the language of the trades despite there being no explicit language-focused instruction. When asked how they do this, learners stated that 'we learn as we go' (McLaughlin & Parkinson, 2018). We were

interested in examining what 'learn as we go' means by exploring how language acquisition is supported in the trades training context. Moments when tutors or learners draw attention to the language in 'language related episodes' (Basturkmen & Shackleford, 2015, p.86) were used as the unit of analysis to analyse 990 minutes of interactions across both theory and practical teaching sessions. Semi-structured interviews were conducted with tutors and learners and classroom observations were carried out. We found that attention was drawn to language 123 times, with tutors being responsible for 79% of these, initiating 97 of these episodes and learners initiating 26 of these, 21%. Both tutors and learners drew attention to form mainly pre-emptively, indicating that they were aware of language issues before those issues arose, with tutors giving explicit information about meaning and learners asking explicit questions to link meaning to form. In follow-up interviews, when tutors were asked how they taught these words, they all emphasised learners needing to 'use' the words and 'experience' the words. This approach was echoed by the learners who described 'doing the jobs around the words' and 'it wasn't until I performed the task that I learnt the word.' These findings and comments reflect the practical nature of acquiring language in the trades and that both tutors and learners are aware of the challenge of this, articulating a range of strategies they use to support this acquisition, aligning learning the language with learning the trade (McLaughlin & Parkinson, 2018).

Findings: Discourse Features of Talk and Writing

Spoken Discourse: The Classroom Compared with the Workshop and Building Site

Our spoken corpus of vocational teaching is a valuable resource for research, because to date, although discourse studies exist of the apprenticeship experience (e.g., Holmes & Woodhams 2012; Filliettaz, 2010; Vaughan et al., 2015; Chan, 2013), there are few discourse studies of institutional vocational teaching, either in the classroom or workshop. Our research in this study is situated within and contributes to recent work on classroom discourse (e.g. Cobelas Cartagena & G. Prego-Vázquez, 2019; Petitjean 2014; Waring 2011).

Drawing on our spoken corpus, a key focus of research was to compare classroom teaching to teaching in the workshop or on the building site, which is an understudied distinction. Teaching in these two contexts involves two different participation frameworks (Goffman, 1981), which take account of the different interactional roles played by participants in interactions. About half of the teaching in the vocational context we studied took place in the classroom. In this interaction framework, the tutor interacts with a class of students. The tutor does most of the talking, which allows them to achieve their purpose of passing on knowledge to the students. The interactional roles in classroom teaching have been explored in many studies of

classroom discourse in primary, secondary and tertiary contexts. In the classroom teaching in our spoken corpus, tutors included short monologues (see turn 1 in Example 1, which has been shortened). These monologues were interspersed with more interactive episodes (see turns 3–7 in Example 1). These interactive episodes reflect the well-known Initiation-Response-Evaluation (IRE) classroom discourse structure in which the tutor asks a question (turns 3 and 5 in Example 1), a student responds with an answer (turns 4 and 6), and the tutor evaluates the (in)correctness of the answer (turns 5 and 7). From this short analysis it is clear that the tutor and students have very different interactional roles. The tutor is the authority in terms of knowledge. The students either ask questions (turn 2) or respond to questions.

Example 1: Classroom Teaching in Automotive Technology

1. Tutor: Ok. […] every time an alternator is producing output, it's draining the power off the engine. […] it might just be producing, you know, 80% of the charging voltage to the battery, in other words a lower voltage if you're just cruising down the motorway, under light load so that it can achieve better fuel economy.
2. Student: What if they gear up the driver belt to the…
3. Tutor: Yep, so that's a good question… a very good question. So why don't they gear it up? Anyone want to have a stab at that one?
4. Student: Smaller…
5. Tutor: Smallest… just like your supercharger, let's overdrive the supercharger. So the reason for that is when do we want maximum output of the alternator?
6. Student: Cranking…
7. Tutor: Cranking? Well probably just above that speed, maximum output generally is around about 2000 rpm. So it's not too far above idle, so if we put a higher gear pulley on it, that's going to push that up even further […]

In contrast, in teaching in the context of the workshop, a very different interaction framework, with different interactional roles is found. This has previously been described by Lindwall et al. (2015), who describe the teaching of craft (crocheting). In this interaction framework, instead of interacting with a whole class of students, the tutor interacts with a single student (see Example 2). In this participation framework, students' opportunities for talk are much more similar to those in regular conversation than they are in the classroom. Tutors are able to see what the student is doing, and guide and correct the technique they use (see turn 4 in Example 2). The tutor can give advice that helps the student to approach closer to the ideal achievement of the task. The student can ask questions about the work they are doing (turn 5) and make suggestions about solutions to problems. In the classroom the tutor aims to pass on a body of knowledge, while in the workshop they aim to teach process skills.

Example 2: Tutor-Student Interaction in the Fabrication Workshop

1. Student: I haven't welded it together yet… they should all be the same, they're very close, Anthony,[1] but when I weld it, it should…
2. Tutor: That's why it's always good to make all the bits before you start welding, you're stuck on the bit of … you can make one a bit smaller to...
3. Student: I have to make that and actually make sure that it fits.
4. Tutor: Chris, when you hold a scriber, hold it like that, ok? Not like that, hold it like that.
5. Student: Oh… so like a knife when you're cutting?
6. Tutor: Yeah, use your index finger, it's like when you're holding a pencil, it's exactly the same as holding a pencil and you should always have it angled away from your thing so you're getting it right into the corner.

Because a key part of learning a trade is learning practical process skills, analysis of talk in workshops, building sites and other trades-based contexts is important. More research on this context would be of value to trades teaching.

Student Writing: The Builders Diary

Although carpentry was the only trade in the study in which students wrote a daily diary, writing of reflective journals is common in vocational courses worldwide. For example, reflective journals are written by hairdressing apprentices in the Netherlands (Kicken, Brand-Gruwel, van Merriënboer, & Slot, 2009), apprentice bakers in Switzerland (Mauroux et al., 2014) and apprentice office clerks in Switzerland (Boldrini & Cattaneo, 2014). Our study, which addressed the question of what the language features of the builders diary were, thus has relevance beyond the carpentry trade.

We found that although the builders diary was not assessed in itself, it was used to assess students' knowledge and ability to perform practical tasks on the building site. It was also an apprenticeship genre in that it is kept by professional carpenters as a record of quotations for jobs, and of the completed work they have done. Learning to write (and talk) like a builder is important in acquiring the identity of a builder. One of our carpentry tutor informants told us that "builders have their own sort of language, and I try and get the guys to talk to me in that sort of language" (Parkinson & Mackay, 2016). This notion of an identity as a builder has been documented in Holmes and Woodhams (2013), who found that through talk apprentices become acculturated into the trades community. Similarly, Vaughan et al. (2015)

[1] Pseudonyms are used in all examples. 'Anthony' is the tutor and 'Chris' is a student.

report that during their training, carpentry apprentices develop pride in their work, an important value of the building community.

We investigated the written language of the builders diary from two perspectives. The first concerned the meanings expressed (Parkinson et al., 2018). Meanings included: setting the context (e.g. date and location of the work); detailing the equipment and materials; detailing the cost (found only in the diaries of the most experienced apprentice builder in our study); detailing the work (e.g. task, method and purpose); and evaluating the work.

Our second investigation of the builders diary concerned the language used (Parkinson et al., 2017b). As indicated above, 33 diaries were written by students in their initial on-campus training (see Example 3 for an extract from the diary of a student in initial on-campus training). Eleven of the diaries were written by apprentices (Examples 4 and 5). As can be seen in these examples, there are differences in the writing of the two groups of students, suggesting development over the course of their training. Example 3, by a student in initial on-campus training, is written in full sentences. It uses personal pronouns (*I* and *we*). It reports the instructions of the carpentry tutor and gives full details of what was done.

Example 3: Extract from a Diary Written by a Student in Their Initial On-campus Training

Today I continued to use the router with Bill,[2] finishing off the last of the strap bracing at the door at the rear end of the house, Steve[3] telling us that the straps need to be almost vertical and not the way we had been doing it, so we were able to fix it up at the lintels we had not done yet, we then started to put some ply up so we knew what to do for the next day nailing the top 150¢ both sides at 150¢ over the studs there are 300¢ at the bottom there are 150¢ we put up 2 boards before we had to finish.

In contrast, Examples 4 and 5, by two more experienced apprentices, concern their paid work, as shown in the initial line of Example 4 concerning the location of the job. Both Examples 4 and 5 are written in a very different style to Example 3. They are impersonal, with no personal pronouns. Point form, rather than full sentences are used. Two grammatical features are used in writing in point form. Firstly, imperatives are used such as ‘Drill steel starters’ and ‘Pour concrete’. This gives the impression of writing a ‘to-do list’. Secondly, passives are used such as ‘Vertical Cedar weatherboards stained’ and ‘horizontal battens which were checked out’.

[2] ‘Bill’ is a fellow student.

[3] ‘Steve’ is the tutor.

Example 4: Extract from a Diary Written by Apprentice 1
17 XXX Street

Vertical Cedar weatherboards stained to protect timber. Cut, fit and fixed vertical cedar weatherboards, placed board on wall, made plumb and fixed then repeated. Openings for lights, etc. measured and marked on board, then sealed to protect from water. Used 75mm stainless steel nails to fix boards to horizontal battens which were checked out to allow water to fall.

Example 5: Extract from a Diary Written by Apprentice 2

Drill steel starters D10 Dyna drill into side of house.
Extra bracing down centre of stairs
Must be 390 mm wide, 181 mm step height
Box up top of stairs nib wall.
Pour concrete & pump truck to reach top steps and nib wall.

These differences were discussed in interviews with the students' tutors, who viewed both sets of writing as appropriate to the stage of development of the writers. They viewed the short point form writing of the apprentices as reflecting their greater knowledge of the work they were doing. In contrast, perhaps to aid memory, the less knowledgeable on-campus students need to record more detail of the steps involved in doing a talk. We argue that identity concerns are present in both writing styles. The students in initial training claim an identity as a carpenter by 'putting themselves into their work'. In their move to a more impersonal style apprentices reflect a change from a trainee identity towards a professional identity.

The personal/impersonal difference in the writing of less experienced and more experienced students was also reflected in the visual images they used (Parkinson, 2019; Parkinson et al., 2020). The less experienced students in initial on-campus training were more likely to include more personal photographs of themselves and their teammates, while the apprentices included 'impersonal' photographs focusing on the work being done. Again, this reflects a movement to a more professional identity.

Multimodality in Trades Texts

In this section, we give an overview of the multimodal nature and reliance on visual elements in trades texts as well as the visual literacy demands of the course material analysed. Our research question in this part of our study concerned the types and uses of visual material in trades texts. This was investigated looking at three sources of data: Interviews with 25 tutors at the start of the study, the analysis of written course material and classroom observations. Teaching materials in all four trades relied in one or more ways on the production and interpretation of diagrams. This is

particularly true of those trades that rely heavily on understanding more complex concepts such as is the case in automotive technology and the electrical trades. The use of mathematical symbolism in trades education is a complicated matter and probably requires its own study with a focus on numeracy. In the materials selected for this project, such reference was minimal and so this feature of the multimodal nature of trades texts was excluded from the study. Other aspects, such as the use of sound, touch and the feeling of pressure when performing procedures (Rose, 2005), while interesting was also beyond the scope of the study but could possibly be the subject of further research. This part of the chapter is framed by the seminal work on visual elements in texts by Kress and van Leeuwen (1996) and draws heavily on the analytical framework for science texts developed by Dimopoulos et al. (2003).

Tutor Interviews

Evidence of the wide use of visual elements in the four trades came initially from the interviews with trades tutors. Tutors identified two kinds of diagrammatic interpretation. The first was the drawing of products, artefacts and structures using standard technical drawing methods. This was found to be common in fabrication, carpentry, and plumbing, where interpretation focuses on shape and size. In the electrical and automotive trades, what was deemed important was the interpretation of diagrams representing abstract concepts.

Written Material

In our analysis of the nine courses covering four trades, comparisons were made using the number of visual images per 1000 words (see Table 10.6). We found that the visual density of the most common images (photographs, drawn diagrams and graphs and tables), was not consistent across the four trades with fabrication being quite high (10.25) and plumbing being low (2.64). The average of 7.31 images per 1000 words across the four trades is high compared with data from other studies (e.g., Bezemer & Kress, 2009), where the visual density in English language textbooks was found to be around 2.96 images per 1000 words.

Table 10.6 Visual images in instructional booklets

Words	Automotive 36,344	Carpentry 59,231	Plumbing 13,281	Fabrication 34,034	Total 142,890
Visuals/1000 words	6.91	6.92	2.64	10.25	7.31
Photographs/1000 words	0.80	2.58	0.00	3.41	2.09
Drawings/1000 words	6.11	3.97	2.26	6.76	5.02
Graphs & tables/1000 words	0.33	0.24	0.38	0.41	0.31

Drawings made up 68% of visual elements while photographs were less likely to be found in the texts (23%). Two functions of the use of photographs emerged from the study. The first was as a sequence of connected photos to perform a procedure and the second was at the beginning of sections, perhaps as a way of scaffolding images from the more concrete photograph to the more abstract line and schematic drawings.

Images were often connected to each other, either in a temporal sense, for example a sequence of diagrams showing the sequence of gear positions in a gearbox, alongside graphs of engine performance vs time, or in a functional sense, showing different ways of mounting a chuck on a spindle. Only 4% of the images were graphs and charts, perhaps indicating the low mathematical demand of the courses studied. These appeared mostly in the automotive courses.

Use of Multiple Ways of Depicting the Same Phenomenon

More than one way of depicting the same phenomenon was found. These were particularly common in automotive technology. These included cases where two different drawings, or a drawing and a photograph of the same artefact were used to identify the artefact and provide information as to how it worked. This helps the student identify the individual components of a system as well as see the system itself. The diagrams in Fig. 10.1 show multiple representations of the concept of inductance used by an automotive tutor in the classroom. In electrical technology, circuits are usually represented by different diagrams, (circuit, wiring, block, single line, and location) each of which have a specific function.

Conclusion

As can be seen from the above discussion, our research on language in the trades was multifaceted, drawing on perspectives in vocabulary studies, classroom discourse studies, multimodality, and materials development. Innovative findings in

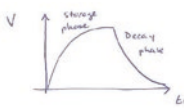
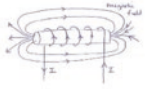
Circuit diagram 	Graph 	physical demonstration
Analogy 	Schematic 	Written and verbal explanation

Fig. 10.1 Multiple visual representation of concepts

these areas include a description of the heavy load of technical vocabulary in the trades in our study, the different nature of educational discourse in the teaching of content in the classroom compared to teaching a process in the workshop or building site, as well as investigations of the multimodal nature of written trades discourse. Our findings make clear the complexity of the language that trades students are faced with, particularly in the texts they have to read. The results of our study have informed innovative curriculum developments, which we describe below.

Implications for Pedagogy

The findings from the Language in Trades Education project (Parkinson et al., 2017a) highlighted that there is a large technical vocabulary across the trades and learners need to be able to understand and use these words to operate effectively in a trades context. Tutors and learners are aware of the challenges these words present and describe and use a range of ways to support the acquisition of these words, mainly through oral interaction on the building site and doing the work around the words (McLaughlin & Parkinson, 2018). In the carpentry trade, learners write builders diaries, to describe the building work they complete each day, and they need to use the language of carpentry to do this effectively. It became apparent from the research that an apprenticeship approach underpins trades training, where language is developed through practice and learning from a more experienced other (Lave & Wenger, 1991; Wenger, 1998). Therefore, any attempt to put research into practice needed to respond to this specific context where language is learned 'as they go' through the practice of the trade. A range of resources were developed drawing on a strengths-based approach (Lopez & Louis, 2009; Schriener and Anderson, 2005) recognising and building on what tutors and learners were already doing integrating supporting language acquisition with learning a trade. The resource *Working around the words – Unpacking language learning in vocational training* (McLaughlin & Reid, 2017), takes an organisational approach to incorporating language development in trades training. It begins with an overview of the vocabulary findings and frameworks to support tutors to help their learners learn the words, followed by a section containing a range of resources that tutors can use including posters detailing the strategies they are already using, videos developed by the trades tutors, resources for glossaries, planning for language use and supporting reading and writing in the trades. The final section of the guide presents a model for supporting tutors to develop their skills at 'embedding' or incorporating language development with vocational teaching (Alkema & Rean, 2014), and a series of workshop outlines for in-house professional development. In addition to this is a separate guide *Building Writing Skills in Trades Training: The Case of Carpentry. A Guide For Tutors* (McLaughlin, 2017), where the carpentry diaries are used as a tool to develop the learners' writing skills, that is aligned with the stages of building a house, the practical task they complete during the Carpentry programme. All the resources

developed aim to make a link between the research and pedagogical implications, supporting organisations, tutors and learners to build the linguistic bridges (Gibbons, 2003) and ultimately walk and talk like the 'tradies' they are training to be.

Future Research

Research into the nature of bilingual technical vocabulary knowledge was badly affected by COVID-19 lockdown and border closures in 2020. The planned research involved investigating technical word use and knowledge in the Tongan trades education context. It is very much hoped that we can resume this work once borders are open again. One area of current research is the development of vocabulary knowledge tasks based on the first 300 words in each of the technical trades education word lists described above. A recognition task involves selecting a technical item which matches a picture from four multichoice options. A recall task asks learners to look at the same picture and write down the technical word. This work has benefitted a great deal from the efforts of Jenny Drayton and Kiko Tu'amoheloa, who have sourced pictures and helped with the conceptualisation and operationalisation of the tasks. Tutors from WelTec have also offered their professional knowledge and support to ensure that the pictures clearly represent the technical meaning of the words. We are also looking more closely at multiword units in the spoken and written texts. This work is underway. It is clear that there are many technical multiword units in trades texts, for example, *cooling system*, *control valve*, and *ignition system* in automotive engineering (Coxhead, 2020). It would be highly beneficial to translate the technical word lists into other languages, beginning with Te Reo Māori.

Another area of future research is further work on the spoken corpus, investigating teaching in different contexts (classroom compared to workshop) and participation frameworks (whole class teaching in the classroom compared to one-on-one teaching in the workshop). Forthcoming research involves analysis of use of tag questions (e.g. *don't they*, *isn't it*, *right*, *okay*, *eh*) in these contexts, and how teachers use tag questions to focus student attention.

Further attention needs to be given to the broader aspects of the multimodal nature of trades education. This study was limited to the visual elements of the teaching materials that were scrutinised. In the future, this could be widened to include the mathematical aspects of trades practice as well as the use multi-sensory meaning making resources, such as touch, sound and smell, used by tradespeople every day in the workplace.

Acknowledgements We acknowledge the kind participation of the tutors of WelTec who recorded their teaching and participated in interviews as expert informants. We also acknowledge the participation of the students of WelTec. Our gratitude to Ako Aotearoa, New Zealand who funded our research with a generous [grant ID E2551].

Appendices

Appendix 1: The First Ten Most Frequent Technical Words in the Technical Word Lists

Plumbing	Carpentry	Automotive technology	Fabrication
Pipe(s/−ing/−ed)	Requirement(s)	Check(ing/−s/−ed)/ recheck	Welding / weld(−s/−ed/−er/−ability)
Drain(s/−ing/−ed)	Figure	Engine(s)	Work(−ing/−er(s))
Building(s)/builder	Building	Test(ing/−s/−er/−ed)/ retest	Figure(s)
Required/requirements	Wall	Voltage(s) /volt(s)/ voltmeter(s)	Cutting/cutter(s)/cut(s)
Gas(es)/gaseous	Timber	Figure(s)	Tool(s)/tooling
Heat(ing/er/ers/ed)	Roof	Pressure(s)/(de) pressurise(d)	Material(s)
Installation(s)/installed/ ing/er	Concrete	Battery(/−ies)	Machine(s)/−ery/−ing/−ed/−ability
Work(ing)	Installation	Vehicle(s)	Source
Pressure(s)/pressurised	Construction	Fuel(s)	Steel(s)
Valve(s)	Fixing	Circuit(s) /circuity/ circuited	Centre(s)

Adapted from Coxhead et al. (2020)

Appendix 2: Features of Technical Vocabulary in Tongan and What Learning Is Needed

Category	Features of these words	The learners need
Words with Tongan equivalents	Might be everyday words with technical meanings in the trades; many lexical items are in this category	Exposure to the technical meanings of everyday words in the trades context; understanding that there are many technical words in the trades which have equivalents in Tongan, so learners can draw on that knowledge in their first language
Tonganised words	Have Tongan spelling and pronunciation; are likely to be high frequency words	Recognise spelling patterns in borrowings from English and use these patterns to focus on the Tonganised words in English; focus on how these words are pronounced in English
Loan words	Known in the spoken form; possibly not known in the written form	Exposure to the written form and practice recognising the spoken form in English

Category	Features of these words	The learners need
Words with no single word equivalent in Tongan	Are likely to be lower frequency technical words in the trades; neither the technical meaning nor the word is likely to be known by the learner	Ensure there is repetition in the learning to help remember the words; ensure there are opportunities to use these words in writing as well as encounter them in listening and reading; use strategies such as word cards to keep track of the words and learn them directly
Words which are translated into a number of synonyms	The word in Tongan covers the same meaning, but the English words might have slightly different meanings; collocations for the synonyms might be different in the trades context	Focus on the meaning and form of the most frequent synonym first, and then work on the less frequent synonyms when they appear in the trades texts; check collocations of the words in trades texts to see if there is a difference (for example, what words are commonly used with *apparatus* and which words are commonly used with *equipment*?

From Coxhead et al. (2019, p. 14)

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Chapter 11
Secondary/Tertiary High School, Changing Student Experiences Through VET

Stuart Middleton

Abstract In 2010 a unique and innovative educational institution opened at the Manukau Institute of Technology (MIT) in Auckland NZ. A bridging programme for 15–16-year-old students at risk of disengagement from secondary schools. Students would, with their agreement, their caregivers, their secondary school, and the tertiary provider, enrol at the Manukau Institute of Technology Tertiary High School (THS) (Internally this Tertiary High School programme/school is known as the "School of Secondary Tertiary Studies."). Students would complete their Year 12 and 13 in a post-compulsory setting. To make this possible, the NZ Education Act was changed, new funding rules applied, curriculum written, policy settings developed as this new VET pathway opened for low-skilled and disadvantaged students certain to be left behind.

Keywords Vocational education and training (VET) · Manukau Institute of Technology (MIT) · Tertiary high school · Student engagement · Equity of access · Parity of outcomes

Introduction

MIT has been at the forefront of developments of programmes targeting youth and based on the same principles as the MIT Tertiary High School (Middleton, 2014a). Students were fully, dual-enrolled in a secondary school and at MIT, a unique programme delivered wholly in and by the tertiary institution. A description at the time argued that the students were not being taken *out of* school but were *in* school even though they were not *at* school!

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_11

The programme was fully integrated between the New Zealand qualification, the National Certificate of Educational Achievement[1] and an array of VET New Zealand Qualifications Authority (certificate, diploma, and degree qualifications). Students undertake assessments at multiple levels avoiding the more typical but slower paced one level each year approach in the conventional schools. Transitions are managed over time. Students must study four technical disciplines in the first year before settling out on their main VET pathway. The focus is on basic and essential skills taught in a practical context.

The key principles underpinning this new model for VET education in Aotearoa NZ are:

- early access to technical and vocational education,
- integration of secondary and tertiary curriculum,
- access to multiple pathways,
- managed transitions,
- remediation through acceleration,
- mandated engagement,
- flexibility and seamlessness.

The Gap in Secondary Schooling for All in the Comprehensive School Model

The key issue was that students were disengaging from age 14 years at disconcerting levels. The United Kingdom, the United States of America, Canada, Australia, and Aotearoa NZ shared statistics related to outcomes of schooling that bore close similarity within several percentage points of each other on each element.

G.K Chesterton argued that *"it isn't that they can't see the solution. It is that they can't see the problem" (1935, The Scandal of Father Brown, 2014, Penguin NZ Classics)*

- Students were dropping out of secondary school at rates approaching 20% of each cohort and over time this had become a stubborn statistic.
- Levels of absenteeism were increasing at all levels with schools challenged to find ways of arresting this. Recent reports showed that Regular student attendance declined to 58%, down 6% points following a brief period of stability in 2018 (64%). It was commonly believed that rates of attendance of students in the senior school may have been as high as 80% to 90%.
- A lack of attention to managing transitions was resulting in gaps in academic preparation for the successive levels of education and training, were increasingly

[1] The programme generating credit towards NCEA – NZ's High School Diploma) and tertiary TVET curricula was taught alongside the secondary level components often with levels of integration.

problematic and increasing numbers of students were presenting themselves ill-prepared and well behind in their academic development and learning capability at each successive transition point. This was a recurring issue for students starting a post-secondary qualification.

- The growth of the phenomenon of NEETs, (*Not in Education, Employment or Training),* was creeping up on educators who, until the 1980s had the luxury of seeing their graduating students leaving after 2–3 years secondary schooling to move into employment. A new realisation was dawning that the growth of NEETs was an outcome of the performance of the schooling systems and their increasing inability to teach the full range of students. Some of this was exacerbated by a wider set of social issues.
- Exploratory data analysis shows that up to 30% of the total working age population (aged 16–65) experience limited employment during a year. The proportions are higher for women (34%), Māori (40%) and Pacific (33%). Most of these people will only be in limited employment for a specific period. However, some are likely to spend most of their life in limited employment (Ministry of Education, 2019, op.cit.).
- Secondary students were now staying at school longer despite the evidence that extending the length of compulsory schooling and encouraging students to stay longer in conventional schools, repeatedly failed to have any impact (Middleton, 2008).
- This mix of factors saw an increase in the number of dropouts seemed to have become hard-wired into the educational and skill landscape. Recent analysis of school leavers' destinations in Auckland NZ showed that "going nowhere" constituted the largest group of school leavers (TEC, information supplied for internal use).

In ways that were similar, these issues were present to a markedly similar degree across the five large Anglo-Saxon education systems.

The politics of the 1970s and 1980s also played a part as large government organisations were turned into state-owned organisations which seemed to have a smaller appetite for taking apprentices into their training environment also contributing to these trends. The newly introduced apprenticeship programmes took time to achieve scale. A Senior Minister at the time, Rt.Hon. Bob Tizard, believed that the impact of this might have been as high as an 80% reduction in apprenticeship places initially.

In addition to the above, Aotearoa NZ had a significant issue that was not shared with other countries. Education was free up until the age of 19-years provided you were in a secondary school. If you wished to exercise your legal right to leave school at the age of 16-years, students face a situation where they most students were only able to access applied learning VET courses in either a trade training organisation course such as the Māori and Pasifika Trades Training Course or at an ITP where they were required to start paying fees. In communities where some strengthening of basic skills was required paying fees constituted a problem. From the students' perspective, schools seemed to have a monopoly on free education to

age 19-years. And the academic curriculum that schools offered, essentially one with an academic focus, which served well the stream of Aotearoa NZ students headed for university (around 30%). This was an issue during the 2000s and by the time the 2008 general election came around, both major parties had policies to address this issue, the National Party the "Youth Guarantee Policy" and Labour with the "Schools-Plus Policy."

As noted above (Middleton, 2008, op.cit) students had progressively increased the length of time spent in secondary schools from 2–3 years around 1960 before leaving generally into employment. By the new millennium, it was typical that secondary students stayed in secondary school for five-years. This resulted in the growth of senior school roles between 1960 when the 10–13% of a secondary cohort had grown to 65% of the senior cohort spending 5 years in a senior secondary school. Students were staying in secondary schools in which the curriculum offered only greatly reduced and often no vocational and technical subjects and was largely academic (Middleton, 2008).

The result was increasing disengagement from school and of NEETs resulted in an increase in numbers of students stranded and without pathways. A further factor that exacerbated this situation was that over that same period, secondary schools had reduced, and in many cases dropped, industrial arts from the curriculum for a variety of reasons which included a rejection of tracking (general courses were seen to be more equitable), a desire to promote gender equity by minimising subjects which had for many years been characterised as subjects for girls (for instance typing, languages, hole economics etc.) and subjects for boys (metalwork, woodwork and technical drawing for instance). And from 1960 the responsibility for teaching technical and professional trades was being shifted to the widening network of ITPs which resulted in a further separation between the professional curriculum and the applied education curriculum. This drift has been traced as being somewhat of a theme in Aotearoa NZ technical education (McKenzie, 1992).

Parental, public and even educational opinion had seemingly swung against VET as being worthwhile and rewarding pathways to and the role of VET institutions was usually trumped by the university brands. Certainly, the communities which included numbers of Māori, Pasifika, lower decile schools[2] and those in lower socio-economic groups held strong aspirations, and reasonably so, for their children to proceed to a university academic track. Some did and achieved well but others did not. The momentum for this was not helped by the sets of views about what the future held for employment, the lack of parity of esteem for non-university options, the advice given to students in their last years in schools and generally a series of untested assumptions which quickly became shibboleths. Some observers of the ideas predicted that young people cannot meet the requirements for working in a tertiary environment but there was confidence which would later be proven in a study of young students in tertiary settings (Middleton, 2014b).

[2] Lower deciles school typically have a disproportionate number of students coming from low-income backgrounds and a concentration of priority learners, i.e. Māori and Pasifika.

An opportunity opened within an international Fulbright programme[3] in 2006 and not wishing to simply add to the stockpile of educational theoretical research on secondary school retention and achievement, Aotearoa NZ's representative on the programme saw a potential solution in a proposal that would address the structural issue identified – the dysfunctional nature of the conventional secondary school in development of pathways to VET disciplines and the careers that came from them for growing numbers of students.

This structural issue demanded a structural solution. Analysing the characteristics of schooling systems that appeared to be outperforming Aotearoa NZ secondary schools. A comparison of the structure of Aotearoa NZ secondary schooling in the 1960s with that of schooling in the 2000s, changes in the nature and structures of the senior secondary school became a focus for new ways of working.

Many students had in the past marked their fifteenth birthday by leaving school (well over half left after 3 years of schooling) were now being encouraged to stay in secondary for longer periods of time. But…….

- the longer time spent in secondary schooling had not lifted achievement levels with the narrowing of the curriculum moving students away from applied learning with a diminishing focus on employment as an objective for schooling leaving ITPs and ITOs to pick up responsibility for education and training for the trades and professions.
- there was widespread concern among officials in successive Aotearoa NZ governments around the performance of the schooling system and the national school leaving level of qualification which was the NCEA Level 2[4] (i.e., National Certificate of Educational Achievement Level 2) results which had within them poor and, to the government, unacceptably low levels of outcomes for Maori and Pasifika students.

An Institutional Solution Emerges Changing the Law for Schooling

An innovative and collaborative proposal was developed to address these issues. A new kind of school would be developed. Students would enter at the end of Year 10 (age 15-years) and complete both the school (NCEA)[5] and tertiary (NZQF) qualifications. To achieve this, students would be in a new hybrid setting that combined the

[3] The Fulbright New Century Scholars Programme brought together 20 scholars from 20 countries to research an international issue – in 2006 Dr. Stuart Middleton was selected to represent New Zealand – the topic was "Equity and access in Higher Education".

[4] The government set NCEA Level 2 as the *de facto* school leaving qualification expected of students.

[5] The existence of the New Zealand Qualification Framework with its 10 levels of achievement made this possible

elements of a senior secondary school and those of a large ITP. They would be dual enrolled fully in both a high school and a tertiary institution drawing funding from both education votes – schooling and tertiary. The programme would be integrated across both secondary and tertiary curricula with credits being generated towards the NCEA and progressively towards tertiary level technical and vocational qualifications.

The proposal won the support of both major political parties. The then current Labour Government offered a generous package of funding for the development. However, 6 weeks later they lost the election and MIT lost the funding! The incoming National Government spent a period coming to terms with what was being proposed, subsequently agreeing that it should go ahead. The development won bipartisan support and was able to start development through 2009 with a planned implementation in 2010.

Overcoming the Legal Hurdle

The proposed approach had strong support, but first there was an issue that could be a serious block to progress – the legislation that governed education blocked such a development and a set of issues had to be *addressed* (McPherson, 2011).

There were some obstacles for the development to overcome within the law. The NZ Education Act had regulations related to attendance at "a school" by all students until the age of 16 years, the ability to be enrolled in two institutions simultaneously was not easily possible, school Boards of Trustees were responsible for the duty of care for all students under the age of 16 years, and the nature of the programme and the differences between it and the conventional school were not provided for in the current legislation. This was seen as a difficulty in funding a programme with the tertiary sector teaching students from the secondary sector for a set of students who transformed themselves into tertiary qualified employees.

The government saw an opportunity, it had a Bill on its legislative programme, the *New Zealand Education (Polytechnics) Bill (2010) onto which* into which the Government was able to introduce changes that would remove the regulatory and legislative impediments to the establishment of the MIT Tertiary High School and allow it to start on 1 February 2010. It was the intention that these changes would in time be replaced by a more comprehensive piece of legislation, an Education and Training Bill later in the 2009 legislation programme. When this piece of legislation did not eventuate at this time, the subsequent changes were instead generalised to apply to all schools and the provisions for "the Manukau Institute of Technology Tertiary High School" were now provisions for all "Secondary Tertiary Programmes".

In summary, the bill dealt with the four key changes that were central to the success of the development.

(a) *Established Dual Enrolment*

A student enrolled at MIT Tertiary High School will (and in the case of a student under the age of 16 years, must) also be enrolled at a school to meet the provisions of section 20(1) of the Education Act 1989 which states that until the age of 16 years all persons shall be enrolled in a school. The bill subsequently allowed a student enrolled in the MIT Tertiary High School to also be enrolled in a school and can subsequently change the school at which they are enrolled thus complying with section 25(1) of the Education Act (which requires compulsory attendance) provided they attend the courses when they are provided, for THS students under 16 year olds, attendance in class at the MIT Tertiary High School is compulsory.

Dual enrolment was an important feature because of the protections offered to students. This has subsequently proved to be important for the 2–3 students who each year return to the school they had previously left. This was different from the typical use of the term "dual enrolment" in other countries where it simply means that a secondary school student can take a paper from a post-secondary provider.

(b) *Provided for the discharge of responsibilities of governance.*

ITPs were governed by a Council appointed by the government, schools were governed by a parent-elected Board of Trustees. The solution was an agreement that the Secretary of Education would sponsor a three-way agreement to be signed by the ITP, the participating school, and the Ministry. Then, the ITP would assume responsibility for governance but work in close collaboration with the students' school on particular needs and issues of specific students as they occurred.

(c) *Clarified the status of the MIT Tertiary High School.*

The MIT Tertiary High School is part of Manukau Institute of Technology and not a registered school although in fact and over time, the MIT Tertiary High School was treated by the Ministry in a fairhanded manner. It was important that a major tertiary provider have a clear and right to operate the school with all the rights and roles accorded secondary schools. This was particularly important to the relationship between the Ministry of Education and the tertiary education institution.

(d) *Supported the purpose of the MIT Tertiary High School.*

The Bill stated that *"The MIT Tertiary High School is intended to help reverse the trend of too many young people leaving school without worthwhile qualifications and to provide a solid pathway and staircase into tertiary qualifications."*

The nature of the programmes is unique, and it has been important in allowing the developments to work outside of the regulatory framework that is appropriate for mainstream schools. This was confirmed in the 2010 Act when the term "Secondary Tertiary Programme" cemented the critical relationship between secondary and tertiary into the concept.

In speaking to the First Reading of the Bill, Hon Ann Tolley, stated that the Government was" *concerned about the number of young people who are leaving school without adequate qualifications"* hence her agreement *"to allow Manukau Institute of Technology to establish a tertiary education high school which will operate from the beginning of 2010."* (Tolley, 2009, p.2.)

A New Approach to Education Premised Upon Opportunities

The high-level goals of the development were clear with intentions that it would:

(a) address issues of disengagement,
(b) strengthen the preparation of disengaging students for higher study,
(c) have a focus on Managed Pathways and Transitions,
(d) create a seamless progression from NCEA through professional and technical qualifications on into employment,
(e) create a pathway that enabled learners to have early access to applied vocational and technical learning,

The programmes would fulfil the promise of the early 1990s that time served would be dead as each of these elements was brought increased success and positive outcomes for the priority groups of learners that included Māori and Pasifika. This allowed students to travel through their programmes at their own speed. They were not expected to equate one level of NCEA with 1 year of schooling.

(i) *Disengagement – a new view*

The development adopted a new approach to disengagement which did not follow the substantial body of research in the United States, which predominantly emphasised a set of socio-cultural models. This new model sought solutions on an experiential basis. Instead of a one-sized-issue fits all, a model was developed to identify three kinds of disengagement and to emphasise that *"disengagement"* (the preferred word for the development rather than "*dropping-out*") was a process and not an event. A model was adopted that differentiated between three distinct and different instantiations of this phenomenon that usually stopped any early chances of progression, of successfully developing a robust self-image, or have any feasible prospect of securing employment (Middleton & Young, 2010).

Physical Disengagement, students physically disengage from the school which can and usually does happen over time, or it can be prompted with suddenness by social behaviours which reflect frustration and anger, decaying relationships between the student and the school, each of which culminates in a discipline procedure. Or students might simply drift off without a fuss.

Virtual Disengagement sees students who may be obliging, pleasant to teach, and quite often enjoying school. But these characteristics mask the reality that the process of learning is not occurring, and that the student is progressively accumulating increasing levels of failure and poor outcomes. These are the students who are left behind.

Finally, *Unintended Disengagement* occurs when a student might have achieved somewhat pleasing results but when wishing to progress, finds that the bundle of achievement gained lacks substance and integrity. Consequently, the student faces a blind alley rather than a pathway.

The development had to equip students with the essential skills for learning, generate a sense of purpose, open pathways and possibilities to a future that involves employment, and develop the social skills inherent in most students but latent and

hidden in too many. Individuals who spend a long period as a NEET are less likely to gain employment and more likely to be receiving a benefit and to be more inactive (Samoilenko & Carter, 2015).

(ii) *Pathways and Managed Transitions*

Increasingly transitions were problematic, blocking pathways which are about connection, seamlessness, cohesion, and integrity. Multiple pathways approaches have some defining characteristics.

- *Pathways are simultaneously academic, vocational, general, and technical.*

It has been conventional wisdom that courses could be either academic or vocational and often certain value was ascribed to each which reflects a lack of parity of esteem between them. "Academic" was thought to be for one group of students and "vocational" for a different group. However, in a setting where students can choose different pathways it is important to view those as being both academic and vocational.

- *Pathways are committed to the development of the broad competencies required for a fulfilling life.*

Programmes in a pathways setting are committed to developing the widest possible range of skills required for a competence for living and the future skills required to be a contributing citizen. In addition to the specific competencies outlined in documents such as the New Zealand Curriculum there are dispositions and aspirations that will equip a student to be ready for both higher education and training and employment. In short, a pathways approach, with its balance of effective skills across a wide range, reflect the holistic nature of a pathways approach.

- *Pathways are respectful of and responsive to individual student identity.*

The increased focus of a pathways approach does not mean a diminished respect for the individual student. The leading of students through the development of the knowledge and understandings required to make informed choices for future directions is not one of suppressing identity or personal skills but rather providing a means of aligning those personal and individual characteristics with a future direction. Pathway settings are supportive of and respect the individual.

- *Pathways bridge the student's past, present, and future.*

Multiple pathways are premised on the notion of seamlessness. High levels of connection between a student's journey into their present programme are guided and directed by a future that reflects the student's aspirations, dispositions, and skills. In short, a pathway is a bridge between past experiences and the future that lies ahead. This ensures that learning has purpose, and that the development of skills is matched by the provision of a context in which the application of those skills is possible. Having a clear line of sight between where they are and where they are headed marks a pathway as authentic and meaningful for the student (Middleton & Young, 2010).

- *Pathways integrate learning between different levels and from different providers.*

Students experience several transitions as they progress through education and training. Some transitions are between the organisational sectors of education such an early childhood education into primary, primary into secondary, secondary into tertiary, and finally tertiary into employment. These are the "major transitions" while others occur within those transitions when students change class levels or get new teachers or move on to the next level of learning. These are the "minor transitions". It therefore follows that for the student to experience quality transitions, providers must collaborate with their fellow instructors and teachers, co-operating to construct the qualities of seamlessness.

A pathways approach requires educators to work in collaborative teams with complementary skill sets including those located in the community. Pathways are purposeful, purposive, planned, and deliberate. Most importantly, pathways do not discard the past. Basic skills, excellent teaching, fun and excitement remain key ingredients in the joyful experience of being a successful learner who accumulates over time, the characteristics of a rounded person and an employee.

(iii) *Seamlessness and Managed Transitions*

It is ironic that in 1993 the NZ Ministry of Education published a policy statement entitled *Education in the twenty-first Century*[6] in which is described a new vision for the future (Ministry of Education, 1993). *"The Seamless Education System."*

I put forward a view of …

> …… an education system that would capitalise on the recently introduced NZ Qualifications Framework, a significantly reviewed school curriculum and new and portable qualifications. It proposed a view of schools and tertiary institutions working together with students accruing credit for their achievements across a range of providers. It concluded: "The education system must be without seams that can for barriers to participation and life-long learning.

This forward-oriented stance was not simply ignored but ridiculed by various lobby groups which characterised seamless as being shapeless. This brushing aside such a forward-looking policy statement was to have serious consequences for many students for many years, but it was not the first time that sound advice had been ignored (Middleton, 2011). In 1986 Phil Capper, an Advisory Officer of the secondary teachers' union, the NZPPTA wrote a policy paper for the union's 1986 Annual Conference which called "The Jagged Edge", an apt image of the boundary between school and post-school education and training. He noted similar issues between primary and secondary schooling. It was not just that lack of clarity on clear boundaries between educational sectors was not good for teachers, it was disastrous for students (Capper, 1986).

[6] In large part the Minister of Education of the day simply was unable to get traction for this policy and the ideas that were broad and forward looking. Ironically the essences of this policy supports the Secondary / Tertiary pathways.

As schooling systems broadened their reach towards universal participation, they also committed increasing attention to developing a comprehensive approach to education. The "tracking" of students became increasingly rejected, the vocational / employment focus was diminished and preparation for post-secondary education and teaching increasingly focussed on the "academic" track towards university – a pathway that was realistic for 30% of the students but generally out of the reach of the others due simply to a lack of academic preparation and the different exacerbating issues outlined in this paper – a rejection of the value of vocational education and training, the generalised comprehensive nature of the modern secondary school, and the world into which students would have to make their way.

A key point in the development was an understanding that the problem to be addressed was largely structural, a solution that would address the issue would also be structural.

(iv) Early access to applied learning through early exposure to Vocational and Technical Education and Training.

It should be noted that previously most learners had access to an experience of vocational and technical learning regardless of their ultimate destination. Be it that they were taking an "Academic" course or any of the other options such as "General" or "Technical" or "Commercial" or "Home Economics" they each offered options such as woodwork, metalwork and so on. Those who opted for the mostly technical and vocational streams usually left school at age 15 years to enter employment.

With those experiences stripped from the school curriculum at the time, combined with the fact that students were being encouraged to stay in secondary school longer,[7] there was developing understanding of the importance the role of early exposure to vocational and technical learning in Great Britain, Scandinavia, Austria, the US – it was considered to enhance the performance of all learners.

The stars aligned. Students were dropping out of school and the age of 14–15 years seemed to be a recurring and critical feature of this phenomenon. The solution being sought therefore suggested an intervention that:

- reached vulnerable students earlier than the current pattern,
- allowed students to move at their own speed rather than with the lock-step year-by-year pattern of the conventional school,
- allowed students to have early access to TVET programmes,
- involved close involvement with vocational and technical education, applied learning,
- enabled students to cross managed transitions between the sectors,
- where needed, remediation of basic skills would be accelerated and contextualised,
- students would be accelerated in their progress to qualifications,
- students set their own pace for learning, time served would not be observed,
- and had a clear line of sight to employment.

[7] In the 1970s around 12% of students stayed at secondary school for 5 years whereas by the 1990s over 65% stayed in secondary school for 5 years (Middleton, 2008).

The MIT Tertiary High School and its programme extends schooling into a new direction in and through tertiary and TVET. As a model it redresses the lopsided narrowed focus that emerged in the uniform comprehensive school approach. A new model of where students could effectively study might challenge the age-appropriate limits place on students currently (Middleton, 2014b).

An important question – has a new pedagogy emerged? Having outlined the characteristics of an approach based on multiple pathways and managed transitions, it is axiomatic that educators will need to accommodate themselves to a changed way of working that is characterised by more flexibility, clear and early success, a strong focus on early access to VET programmes, collaborative processes, clear purpose and above all, a seamlessly managed transition. A Pathways approach demands certain other characteristics in the delivery of the programme. The development of the MIT Tertiary High School demanded a new way of thinking. With the extension of the principles to trades academies, and to international programmes (in the Kingdom of Tonga) it could be that a paradigm shift has occurred.

The Programme in Summary

Target Group
Students in Year 10 who were facing failure and poor educational outcomes and who were considered to "at the end of the road" in the school's opinion, were after consultations between the students, the school, parents/caregivers, and MIT were invited to enter the programme. Annual cohorts were to be 80 students each year.

Year 1
Students focus on essential skills in the frameworks of the NCEA Level 1 and the MIT Certificates in Tertiary Skills. The start the *Preparing for Careers and Professions* programme which sees them experience substantial but short courses in four different vocational and technical disciplines. Students gain credits across the Levels (i.e., 1 & 2) which flow from the secondary programmes and the tertiary programmes simultaneously. Individual Educational Plans and high levels of support is available to every student as they build up their catalogue of literacy, numeracy, digital and social skills.

Year 2
This pattern continues as NCEA Level 2 (the NZ school leaving standard) is reached and work continues into Level 3 with the NCEA Level 3 or a TVET course based on a NZQA accredited course. The Level 3 programmes are in two directions. If the student wishes to head towards degree level study, they will complete the NCEA Level 3 requirements while those intending to further their learning and to follow their chosen career pathway and start a Level 3 NZQA programme they would at this point commence a TVET MIT programme headed towards their chosen outcomes in a vocational and technical field at MIT.

Year 3
From this point they are either completing NCEA L3 (this is a small group) or transitioning into what is essentially a tertiary programme supported by the capabilities of the THS to provide support and advice to students as they head towards employment. The exit points for employment could be at any of the levels between Level 3 and Level 7 so some students experience a long contact with the THS.

Students
This section should be read with a reminder of the target student group. They each come into the THS programme with low expectations of success, they are often on the brink of failure, and many are disengaged. Typically, the parents are desperate to find a future pathway for their teenage children and the schools acknowledge the unlikely prospect of being able to succeed with them. A number have issues between themselves and their previous school, but the slate is wiped clean as they face a new beginning.

Schools
Thirty-eight secondary schools have been involved in the programme. A large proportion are from the southern Auckland suburbs which MIT serves but students have shown that they are well able to travel considerable distances to attend this "school-of-choice".

Decile ratings[8] of school representation in the student body over the period 2011–2020 cumulatively are:

Decile 1–3: 75% Decile 4–7: 15% Decile 9–0 10%

Students
The gender representation during that same period was:

Female: 60% Male, 40%

The student body reflects the wide ethnic diversity of the southern region and of Auckland City. That diversity includes:

[8] New Zealand schools are rated on a multi-factor scale Level 1 (lowest) to Level 10 (Highest) that considers such assessments of socio-economic levels, languages spoken, employment levels and suchlike in the catchment area of the school. This is used as a basis for additional funding.

NZ Māori:	44.6%
Pākehā/ NZ European:	24.10%
Pasifika:	26.30%
Other:	4.40%
Total annual roll:	80 students

In summary, more girls than boys have taken up the opportunity for entry into the MIT Tertiary High School and the enrolment statistics reflect the general statistics for academic outcomes, attendance, and progression along with the proportions of ethnic groups reflect the general academic outcomes. n secondary schooling in the catchment (Auckland City with an emphasis on the south). The strong focus on essential skills and an immediate contact with the allied skills of the THS VET curriculum provides high levels of purpose to a group that finds themselves being treated not as school students but as adults with a growing understanding of responsibility. The programme does have a focus on mandated engagement which is an approach that requires students to respect the orderly conduct of the programmes to practise self-discipline (Edmunds et al., 2013).

Qualifications

The VET programme studied has a breadth in the horizontal spread of disciplines and a vertical spread in terms of the levels attempted. This reflects the sound base of essential skills and academic preparation for further leaning achieved in the first 2 years of the programme but also the high impact of the four required VET discipline courses before they "declare their major!" The trajectory of programme choices in terms of the successful completion of NCEA Levels 1 and 2, with a wider range of programmes from Level 3 onwards and exits to employment predominantly leaving the programme from Level 3 through to Level 7 (Fig. 11.1).

A Wider Impact and a Reflective Conclusion

The progress described above which culminated in the establishment of the MIT Tertiary High School has been a marked success. But in terms of the wider VET developments that were being sought, the work was unfinished.

Working to a palette of an array of programmes started with the suggestion in the National Party 2008 election policy which introduced the education community the names rather than the detail of *Trades Academies* and *Youth Guarantee.* MIT was working towards a larger goal, and this was a suite of programmes that exploited opportunities for students to approach schooling with flexibility particularly in the Year 12 and 13 areas.

The key element of these approaches was the extent of collaboration between tertiary providers and the secondary schools. And this is also the difference between the MIT Tertiary High School and the models that emerged in the USA and Canada.

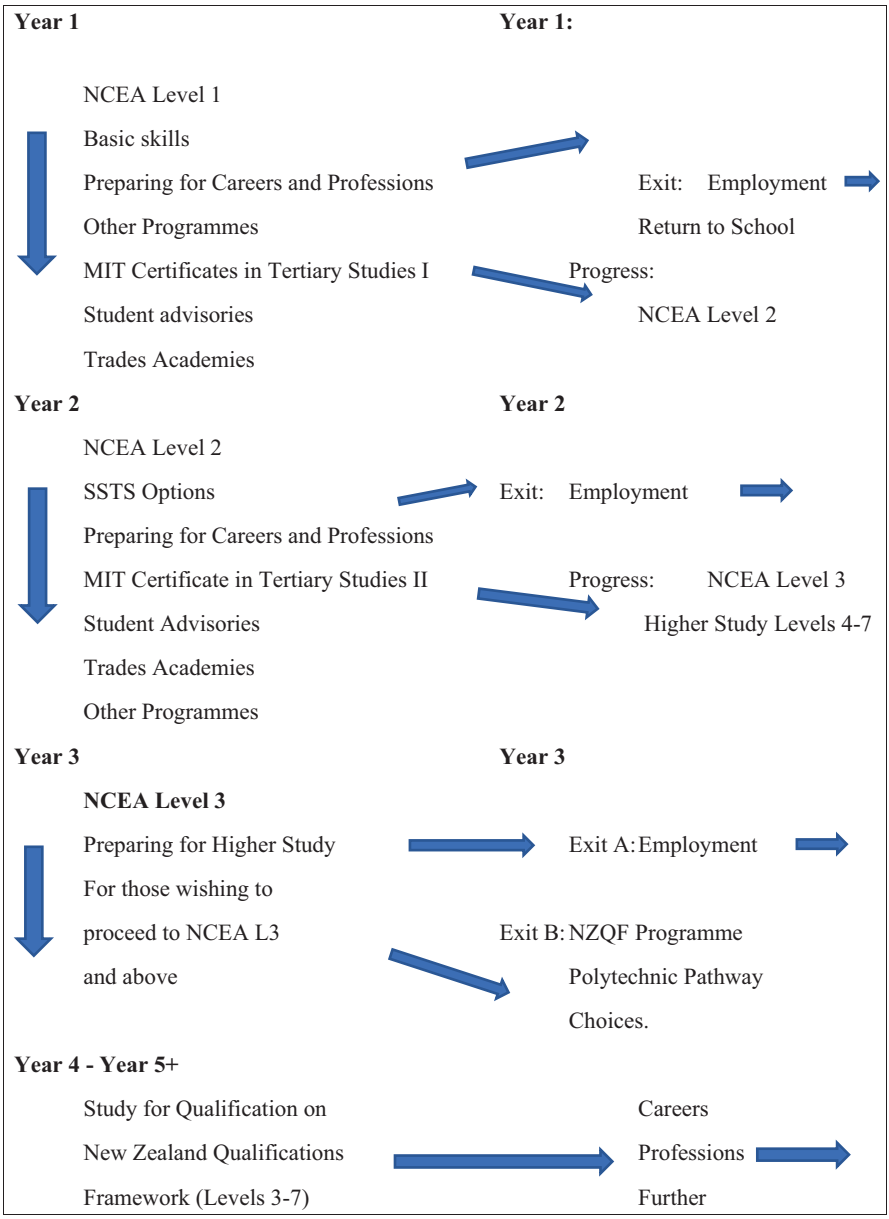

Fig. 11.1 Multiple pathways available for THS students at Manukau Tertiary High School

Whereas MIT saw changes to the law as critical other countries did not and in the process denied themselves the full strength of legislative support, full dual enrolment and the. Experience of being simultaneously secondary and tertiary. The Conference Board of Canada recognised that the Tertiary High School solved the

issues of traditional secondary schooling in three major ways. First the integration in the final years of secondary schooling with the early postsecondary years, secondly, the programmes offer significant one-on-one support with learners learning at their individual pace, and thirdly, the integration of academic and vocational training (The Conference Board of Canada, 2016).

Hindsight supports a view that MIT had seen the future with quite a degree of accuracy. As the *Youth Guarantee Policy*, originally announced as little more than a title during the election campaign as a replacement for the previous government's *Schools Plus Policy*, led to a suite of initiatives developed under this policy. MIT was at the forefront of these developments. And the legislative provisions for the MIT Tertiary High School enable a wider spread of Secondary / Tertiary Programmes to be developed.

At the same time as MIT was developing the Tertiary High School, the Industry Training Federation (ITF) was developing an approach to placing a pattern over the top of the credits available within the NCEA which would allow for clusters of achievement to be recognized for their appropriateness to different industry sectors. This work would become the "Vocational Pathways" and would join the Tertiary High School as elements within a policy setting that would be styled as a "Youth Guarantee." While the Ministry of Education was breathing life into the notion of a "trades academy," the result was a policy setting that that was within the overall Youth Guarantee Policy and extended to provide for places in secondary schools for 16–19-year-old students to continue education and training free of the cost of tuition fees.

One of the greatest problems in the Aotearoa NZ education system is student disengagement. Leading the charge to address this problem is Stuart Middleton at The Manukau Institute of Technology. Middleton recognizes that young people are now staying longer in school but he has shown that that this is accompanied by much higher levels of disengagement…. His solution to this worldwide reality was to develop individual and flexible learning pathways for learners…. To create multiple pathways for diverse learner, we need to break the traditionally sharp division, as well as the barriers between education in institutions and training in employment. Consequently, MIT established Aotearoa NZ's first blended School of Secondary-Tertiary Studies (Dalziel, 2013).

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Part IV
Degree Level Vocational Education in Aotearoa New Zealand

Chapter 12
Project-Based Learning with Contributions from Inquiry and Problem-Based Learning

Selena Chan, Amitrajit Sarkar, Bernadette Muir, and Karen Neill

Abstract Project-based learning (PBL), sometimes augmented or integrated with inquiry or problem-based learning, is a staple pedagogical approach in VET. PBL is not just 'learning by doing' or the completion or production of a project. Instead, PBL requires structured and planned learning activities, encouraging, engaging, and enabling students/learners/ākonga to learn through practice, inquiry, problem finding and solving, and through guided reflection.

Although the case studies provided in this chapter are from degree programmes, discipline-specific approaches to PBL are common across all levels of learning in Aotearoa New Zealand (NZ). The examples provided, illustrate the breadth and innovation possible. These cases are presented to discuss the challenges, development, and learning design required to underpin effective PBL.

Keywords Vocational education and training (VET) · Project-based learning · Practice-based learning · Architecture education · Broadcasting education · Information and computer technologies (ICT) education

Introduction

Project-based learning (PBL) is a student-and learning-centred methodology designed to help develop effective problem-solving skills; support the development of the skills and dispositions to become self-directed learners; develop students' effective collaboration skills; and cultivate intrinsic motivation (Albion, 2015). It is a pedagogical approach encouraging learners to attain knowledge and skills by

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_12

working for an extended time to investigate and respond to absorbing and complex questions, problems, or challenges. The approach involves students in learning that is deep and long-lasting (Barron et al., 1998). Hence, PBL can be transformative for students – especially those furthest from educational opportunity (Adams & Duncan Grand, 2019). Learners who experience PBL can be more engrossed in learning and better prepared to undertake real-world projects (Albion, 2015).

PBL focuses on projects, and these can be defined as planned undertakings to accomplish specific learning aims (Barron et al., 1998). Projects are often part of a larger body of work, with other types of planned activities contributing partially towards the result. PBL may be engaged with, through completion of individual or group work. Importantly, there is a difference between including projects in learning programmes and undertaking PBL. Much of VET learning and teaching centres around the construction of a product or participation in processes exampled by performance, customer service or technical system, or through 'learning by doing'. Aspects of these may form the structure or framework for PBL as participation in 'learning by doing' activities do not constitute actual PBL.

In PBL the project is the unit of work. It encapsulates and integrates the learning of subject and discipline-specific skills and knowledge. Therefore, the project may support learners to attain specialised knowledge and skills and also apply the dispositions and more generic skills (i.e. communication, time and self-management, project organisation and planning etc.) which are required to complete the PBL requirements. The project frames the curriculum and instruction aspects determined by learning design of the programme of learning (Barron et al., 1998). Additional and varied relational interactions and authentic situations need to be planned and facilitated by teachers to actuate PBL. Digital technologies can be integrated in innovative and intentional ways into PBL and have the potential to improve the process and resulting products or services created through PBL. Authentic PBL allows students to address challenges that are real to them and their lives. For PBL to be successful, learning design needs to acknowledge the interests and passions of learners; and then connect these learner motivations to available real-world context and enterprises.

In this chapter, we introduce PBL, how it is deployed and how learners work with teachers/facilitators within the framework of PBL. We will also present examples and derive some guidelines for the development and deployment of PBL in the Aotearoa NZ VET context.

Literature Review

Project-based learning has roots in constructivist learning theories as proposed by Dewey (Maida, 2011) whereby learners actively construct knowledge through 'experiential' learning. The focus for constructivist approaches is on how concepts, skills and attributes are learnt and applied. Within vocational education, 'learning by doing' is often the term used to describe how learners attain skills, knowledge,

and attributes through participation with authentic work (Chan, 2020). Through deep engagement with authentic work, learnt knowledge is applied to hone technical skills. Importantly through 'learning by doing', attributes defining certain occupations including aspects of 'craftsmanship' (Chan, 2020; Maida, 2011) and 'professional practice' (Billett & Noble, 2017); the morals and practices of specialised work communities (Chan, 2020; Gherardi, 2010); and the ways relationships and communications are enacted (See for example the Chap. 10 for 'the languages of the trade); are also acquired.

Rees et al., (2019) define PBL as participation and completion of authentic learning activities leading to the achievement of clear learning outcomes. As such, PBL is one approach to realise constructivist theories of learning whereby learners make sense of and construct concepts through experiential learning (i.e. active learning exampled by learning as doing). Effective PBL must be supported with appropriate curriculum planning and the scaffolding of learners' skills and attributes to undertake PBL. The structure of PBL will depend on the level of learning expected and the length of courses. Barron et al. (1998) propose four principles to be followed when developing PBL. These are the need to ensure the selected or identified project has clear connection to learning goals to be achieved; teachers and students must be prepared with the appropriate skills to maximise the advantages conferred by engagement with PBL; frequent opportunities must be provided for learner feedback to ensure they are on track and to support PBL learning processes; and encouragement for learners to share and discuss their work as the project proceeds to build learner agency. Authentic projects often include players external to institutional boundaries. Rees et al. (2019) recommend the need to balance the learning requirement perspectives of educational institutions with the expectations of 'clients' or 'industry'. In all endeavours based on specialised pedagogical direction, there is a need to ensure teachers are well-versed with the challenges of PBL and be empathic to both the learning needs of students and that of external stakeholders.

Inquiry or problem-based learning may be also used to augment PBL (Albion, 2015). Each approach, PBL, inquiry or problem-based learning correlates to specific learning outcome requirements. It is important to match the project's learning outcome to the pedagogical approach and to provide appropriate support. All three approaches help learners to not only learn knowledge components but also provide affordances for learners to apply learnt knowledge and experiences to find and solve problems; attain self-management and metacognition skills leading to greater self-efficacy; increase intrinsic motivation; and practice important inter-relational and communication skills (Hmelo-Silver et al., 2007). For successful problem-based learning, Tan (2004) recommends the need to shift perspectives on learning and teaching from an emphasis on learning content to engagement with the processes of problem solving; the role of teachers to become that of coaches rather than lecturers; and to shift learners from passive learners to that of active problem finders and solvers.

Within the VET context, PBL contributes towards the attainment of skills and attributes required to successfully negotiate the demands of present and future work needs (Larmer & Megerndoller, 2012). Work of the near and far future will require

people to continually learn, relearn and un-learn as technologies and social and economic challenges are met and advanced (Billett, 2021). Hence, life-long learning is an ever- present reality for all. There are many learner attributes attained whilst participating in PBL which contribute towards the development of 'habits of mind' or characteristics required to for occupational success (Maida, 2011).

Research Method

Case studies were collated from a selected number of programmes based on their inclusion of PBL. Some also included problem and/or inquiry-based learning as an adjunct to PBL. Case study methodology with theory building (Eisenhardt & Graebner, 2007) using process tracing (Collier, 2011) was used to generate common themes, identify innovative pedagogical practices and to better understand how these have evolved over time. To create the case studies, data was collected from each programme's approval documentation and descriptions (see below) written by the teachers/lecturers who teach the PBL framed courses.

Programme approval documentation, especially for degree level programmes in NZ include information on the historical evolution of the programme, the programme's foundational pedagogical approaches, and course descriptors. The course descriptors provide details of the aims, learning outcomes, indicative curriculum, and assessment types. The descriptions evaluated included details of how PBL was structured, introduced to students, and deployed. Rationale for the selection of PBL was also included along with logistical and support requirements enabling the effective conduct of PBL.

Each of the cases was then analysed using case study process tracing comparative analysis (Collier, 2011) to identify commonalities and divergences between the cases. Where cases exhibited similarities of divergences, these were followed through to ascertain processes, systems or approaches which may have contributed to these. Themes were then categorised and are reported below in the discussion section.

Presenting the Cases

The cases of each programme (Architectural Studies, Broadcasting, and Information and Communications Technology (ICT) are now presented. With each, a general description of the evolution of project-based learning into the programme and its pedagogical foundations are provided.

Studio-Based Project Learning – Bachelor of Architectural Studies (BAS)

The Bachelor of Architectural Studies (BAS) has its origins in the Department of Art and Design in the early 2000s. The studio-based project format was introduced by key teaching staff who had observed it in Europe. The course design model for the Ara BAS can be described as a blend of approaches, with architectural design and industry practice along with architectural communication and technology as key components, refer diagram Fig. 12.1. The teaching of Architectural Design is informed by the Art and Design School context, alongside a technology approach to better understand the impact and influences of construction on design.

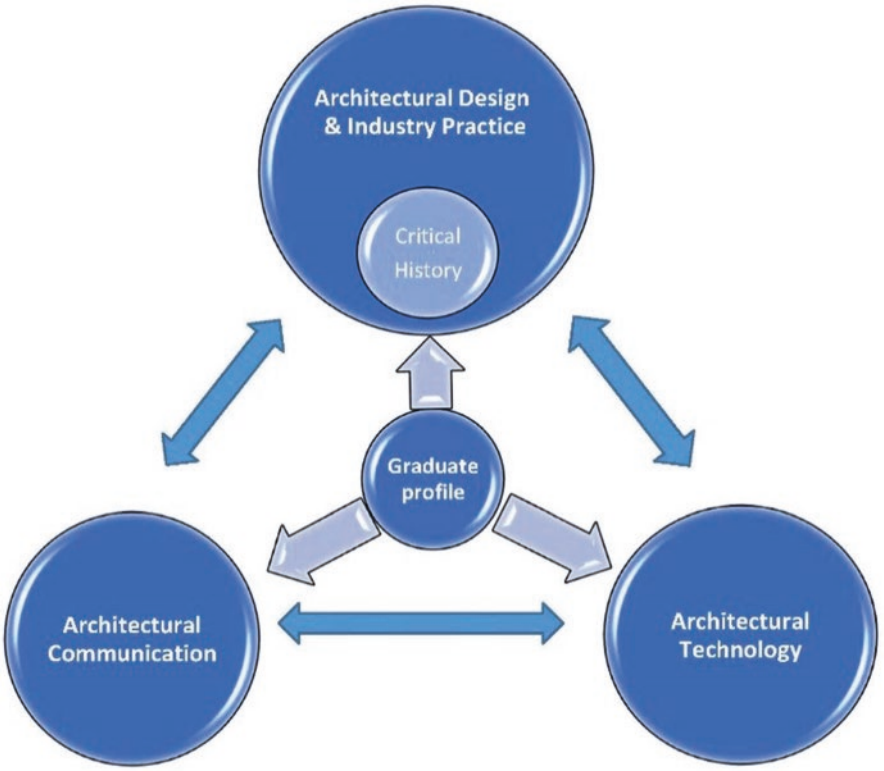

Fig. 12.1 Components underpinning the degree structure

Pedagogical Roots of Architectural Education

PBL as a teaching method for architecture has its origins in the Ecole des Beaux-Arts (as the Académie Royale d'Architecture) founded in Paris in 1671 (Cret, 1941). In this learning approach constructivist methods are used, as advocated by Dewey, whereby students actively participate in a studio-based learning model through discussion, defending ideas, forming hypotheses, and sharing opinions (see Bolling et al., 2016 for details of studio teaching in higher education). Similar pedagogies influenced teaching in the Bauhaus School founded in 1919. Itten, the founder of the Bauhaus Basic Design Course aimed to "enable the student to question the schemas or mindscapes acquired before and to think consistently about the issues before making decisions" (Lerner, 2005). At Ara, the studio-based learning for architectural studies centre on the project brief which form the focus for students' learning. In this approach, the project is considered "not as an aim but a tool emphasizing the process aspect of the learning rather than the product aspect" (Tasci, 2015).

Relationships

"Empowering our students with the attitudes, skills and knowledge to adapt and effectively confront the dynamic changes in the world today and tomorrow" (Tan, 2004) is at the heart of BAS curriculum and teaching. For PBL to work well, Tan (2004) argues for the careful introduction of students to problem design, effective coaching and development and application of an understanding of the needs of the problem solver. To foster trust and mutual respect within the student cohort, we begin by getting to know the learner (Hattie, 2009). Asking students to bring their values, attitudes and experiences to the design studio requires a strong relationship between the student and tutor as coach (Rogers, 1969). Several key experiences at the beginning of the course such as a *mihi whakatau* (formal Māori welcome), speak to our respect for different cultures, and this is followed up, through guest visits from leading Māori design professionals alongside others. To enable this relationship to develop, constant feedback, careful pastoral care, and role modelling with tutors in the role of coach, support the development of the concept of a team within the studio, akin to that within architectural practice.

Process

Studio-based project learning requires structure and planning to be effective. The project is carefully selected and framed and then students are stepped through, and their learning scaffolded on a design process that is highly controlled, with focus

sessions on resource guides and how to use them, technical definitions, and foundation knowledge review. The process is made visible to the students and reflection on each stage of the process is given appropriate time and prominence (Refer to Fig. 12.2 below). There is a strong emphasis placed on preparing the mind set of students as one of the most challenging tasks in PBL is the development of process skills (Woods, 2000).

Visibility over the design process is achieved using a project programme highlighting key stages in the design process when students submit work in progress and receive feedback. These stages are closely aligned with the design process in the real world, where a construction programme works to structured milestones and critical path. This link is crucial to make the experiences in studio relevant to life in the profession and industry-based tutors authenticate professional practice through their modelling of industry standards and by using anecdotes and industry narratives.

Reflection is a key skill for architects, as the design process is iterative and requires synthesising of many varied inputs and performance criteria. One of the most important outcomes is for students to learn to "adopt flexible thinking and multiple perspectives, and to learn that there are often many alternatives and possibilities in solutions" (Tan, 2004). This is made visible in EXIT, the end of year exhibition of student models and drawings, which displays a rich variety of solutions to the same design problem. (See Fig. 12.3 of some examples of designs from EXIT).

Fig. 12.2 PBL cycle 3. (Tan, 2004)

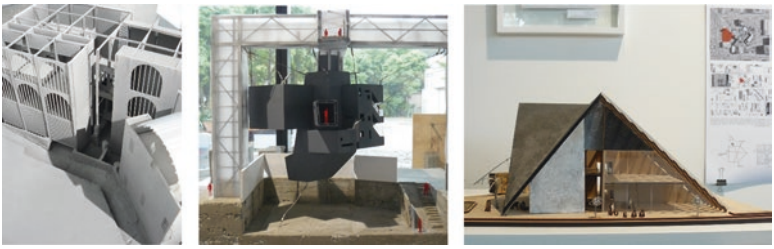

Fig. 12.3 Examples of students' work from EXIT. The students are all provided with the same brief, but the results are very different

The Real World

The design of the problems is informed by insights our teaching team have gained through industry experience. Project parameters are selected as a direct response to current issues, informed by current projects with insights and design responses being shared in studio by architect/tutors and their close collaborators in industry. Relationships and currency are maintained by supporting tutors to engage in continuous professional development (CPD) through undertaking roles on industry bodies, judging on awards, co-authoring publications, and participation on active projects.

Students seek input for their projects from external consultants essential to the design process – structural engineers, sustainability consultants, interior designers and clients are all regular visitors to the studio classroom as they would be in a design office. There is a deliberate blurring of the boundaries between the education space and the world of work, allowing for visibility with the important aspects of collaboration and teamwork. Through regular interactions, students develop the confidence and skills to communicate effectively through discussion, diagramming, and listening. Students also have opportunities to present to industry critique panels, participate in internships and actively participate in industry functions and CPD events as ways of developing their professional identity.

Evolution, Design Jam, Sustainable and Regenerative Design

PBL is scaffolded during years one and two, during which time key content and skills relating to design, history, technology, and communication are studied. Graduates who can problem-solve, critically-evaluate, and think creatively require a sound discipline-specific knowledge base which is acquired and integrated over this time. By the third and final year, the essential building blocks are in place and the PBL approach is applied holistically. In 2018, the BAS moved into Kahukura the Engineering and Architectural Studies Building on the City Campus. Designed with the philosophy of "the building as a learning tool", this award winning,

Fig. 12.4 Photos from 2016 Design Jam

sustainable, engineered-timber building provides BAS students with open plan studios for all three student year groups, to work adjacently across an open plan floor plate. Through proximity, collaboration is encouraged and there is a desire within the programme to develop further opportunities. One example where this works well is the annual Ara Design Jam (see Fig. 12.4 for Design Jam photos from 2016). This is a one-day event providing an opportunity for vertical integration and collaboration between all the BAS year groups, alongside industry, our Māori studies team and other tertiary providers (in 2019 with Lincoln University). The Design Jam is focused on sustainability themed Living Building Challenge – "a philosophy, certification, and advocacy tool for projects to move beyond merely being less bad and to become truly regenerative" (Living future, n.d.). Feedback from students, staff and industry on these events running since 2016 has been positive and will be incorporated into the BAS review in 2022 where this paradigm can be applied holistically.

Simulated Workplace Learning Through the Advanced Radio Broadcasting Model – Bachelor of Broadcasting Communication (BBc)

In 1986, a Media Centre was established at Christchurch Polytechnic offering certificate and diploma courses in radio broadcasting. Broadcast journalism and television production courses were later added to the curriculum, and in 1992 the centre became the New Zealand Broadcasting School (NZBS) and introduced a Bachelor of Broadcasting Communications (BBc) degree, one of the first polytechnic (ITP) degrees in Aotearoa NZ. The genesis and foundation of the certificate and diploma courses (and now the radio stream of the BBc) was the formation of a student-run commercial radio station on an FM frequency owned by the institution and broadcasting to the greater Canterbury region. It is the cornerstone of the radio course, forming the basis of all learning for students with kia akitu or learner success demonstrated by graduates who are:

- Capable, effective and ethical media professionals
- Aware of their creative potential
- Skilled in their disciplines of choice (Ara, 2017)

The PBL approach to learning enabled by the radio station helps to support learner success and is grounded by the pedagogies of immersion learning, learning for capability, cooperative education and learning and formative feedback. These are expressed in the course in the following ways:

Immersion and Authentic Learning

All teaching and learning is integrated into the setup and operation of the radio station which runs for the duration of the 75-credit second year advanced radio course (i.e. representing 750 h of learning). Here, learners are required to meet the learning outcome to "Function as a member of professional radio and sound production team" (Ara, 2017). The course is part of an accelerated programme comprising of 2 years on campus in a fully immersive environment, followed by a 24-week paid industry internship. Following this, most graduates are engaged in fulltime employment. Unlike many other media qualifications, BBc learners select their stream on application (journalism, radio, or screen (TV/video)) and that is their area of focus for the entire programme. The deep engagement with experiential learning affords learners the opportunity to be fully immersed (Blaskin & Nicol, 2008) into the professional milieu of journalism, or radio/screen broadcasting.

Cooperative Education

This is inherent in the strong connection with industry professionals who are engaged in the annual selection of the station format and contribute to teaching on the programme, as well as acting as internship supervisors later in the programme. Students pitch station formats to an audience of tutor and industry personnel, and then conduct the 'business' of radio by creating the successful station (see Fig. 12.5 for the radio station theme of 2021) and undertaking various production and performance roles with teacher/tutor input and feedback from industry professionals. The station pitches are formally assessed and include the development of a Strategic Plan, and a review of goals and objectives prior to broadcast. A student-tutor negotiated sales target must also be attained before the station can go to air. In doing so, students achieve the learning outcome to "Use basic radio business and sales theory and practice to research, write, pitch and implement a radio station business plan" (Ara, 2017).

Learning for Capability

Learners develop their skills in a real-world context. All aspects of the radio station are underpinned by advertising sales which is undertaken by each learner and contributes to an ecosystem from which content is created. To operationalise, learners

Fig. 12.5 2021 student radio brand – Fever FM – a disco inspired and fully commercial radio station running 24-hours a day, 7-days a week – Permission obtained Ara Institute of Canterbury

Fig. 12.6 Student learning digital/programme production. (Permission obtained Ara Institute of Canterbury)

select two specialist disciplines from announcing (see Fig. 12.6), creative writing, digital/social media, on-air producing, production, programme making/podcasting, music programming, and promotions, with some undertaking leadership roles. The capability approach proposed by Stevenson (1998) underpins curriculum design and teaching and learning approaches. Learning outcomes assessed are: "Apply and analyse technical, creative, research and planning skills in selected areas of radio and sound production and performance" and "Exercise appropriate decision-making

about sound content that meets legal, moral and social responsibilities" (Ara, 2017). First year learners observe and document the second-year group as part of their learning journey from dependent to independent learner. They also run the station for 1 week during the broadcast period under the purview of the senior group. This provides year one students with an understanding of all areas of the station before selecting their own disciplines in year two of the programme.

Learning and Formative Feedback

The authentic workplace setting allows for ongoing monitoring and formative feedback of learners by peers and tutors and contributes to their growth as a media professional. Learners' performance in running the radio station allows for the exploration and development of soft skills (referred to as professional skills in the BBc) which are uniquely assessed alongside craft skills (i.e., the technical and practice aspects of broadcasting) at each level of the programme and by request from NZBS industry partners. Professional practice occurs as a 'live' assessment conducted alongside authentic industry tasks designed to engage learners. There is no formal teaching programme, rather behaviour is modelled and professionalism discussed with tutors and industry guests. This enables the different specialisations offered as part of the BBc programme (radio, journalism, and screen) to adapt the discussion for learners by drawing on real-life examples from their own industry. Achievement standards are scaffolded with year two of the course requiring learners to attain a minimum 'industry' standard of professionalism as indicated by the formal learning outcome which is to; "Demonstrate the personal and interpersonal knowledge, skills and attitudes required of an ethical media professional working independently and in a team environment". Learners need to attain a minimum pass of 65% in this assessment to proceed to the final stage of the degree, the industry internship (Ara, 2014, p. 47).

The Importance of Formative Feedback and Peer Support

The importance of this authentic and live assessment, and the programme's formative learning nature aligns well with the PBL model. Broadcasting students are entering an industry where their performance will be judged on a regular, if not daily, basis. Therefore, the ability to self-reflect and to be able to receive, evaluate and act on feedback is critical. NZBS Professional Practice employs the methodology of peer-tutor-self assessment, which enables learners to assess their performance and provide feedback on how others perceive them. Enabling students to learn from insights into their own development, as well as from others, follows the principles of student-centred learning. According to van Mook et al. (2009) "there is general agreement that professionalism and professional behaviour should be

(formatively and summatively) assessed" (p.153). On the BBc programme, formative feedback occurs at the mid-way point of the course and summative assessment at the end of the course, also acting as a gateway to the next programme level.

Peer support is a tool used to support learners struggling to attain minimum standards in the assessment. Unlike the formal peer-tutor-self assessment process where learners have anonymity, peers can be identified (either by the tutor or the learner at the centre of the process) as suitable for taking on this role. Formal, academic peer support programmes are common in university settings such as the 'Peer Learning and Support Team' at the University of Otago (n.d.) and for distance students and in the retention of Māori and Pasifika students (Ross, 2008). According to Ross (2008) peer support can increase a learner's motivation and their engagement with a course of study (p. 4). Peer support also highlights the importance of relationships by encouraging collaboration – an essential professional skill – mimicking the media industry environment learners will be heading in to once they progress to the internship, which sees PBL applied and assessed at an even higher level. With continuing successful outcomes for graduates, PBL continues to be a key feature of the NZBS's degree redesign to be implemented in 2022.

PBL Industry-Based Projects with the Embedding of Problem-Based Learning – Bachelor of Information and Communication Technology (BICT)

Learning theories are attempts to describe and understand the various ways in which people learn. The work-integrated learning (WIL) projects are constructed upon the 'learning by doing' approach, which focuses on the specific learning activities the student performs. 'Learning by doing' draws inspiration from the situated learning theory (Lave & Wenger, 1991), which is concerned with the environment in which the learning by doing takes place. It is based on the belief that knowledge is situated, being in large part a component of the activity, context, and culture in which it is developed and used (Lave & Wenger, 1991).

Therefore, the environment in which the student practices their newly learned knowledge should be authentic and resembling as closely as possible, the context in which the knowledge will be used in real life. A popular application of this theory in Information and Communications Technology (ICT) education focuses on incorporating aspects of authenticity into the PBL projects, such as embedding the industry sponsor to play the role of the mentor. In ICT education, PBL projects are managed by using Agile[1] project management. This is an iterative and incremental approach to manage ICT projects focused on continuous 'product' releases and incorporating customer feedback with every iteration. WIL projects may embrace

[1] A term used in information and communications technology to indicate a method for managing projects through several phrases, usually cycling between planning, execution and evaluation.

Table 12.1 The four ceremonies of SCRUM

Sprint planning	Sprint demo	Daily stand up	Retrospective
A team planning meeting that determines what to complete in the coming sprint.	A sharing meeting where the team shows what they've shipped in that sprint.	Also known as a stand-up, a 15-minute mini-meeting for the software team to sync.	A review of what did and didn't go well with actions to make the next sprint better.

Summarised from Venkatachalam et al. (2017)

Agile project management methodologies to increase the development speed, expand collaboration, and foster the ability to better respond to market trends. Additionally, SCRUM is a framework for Agile project management that uses fixed-length iterations of work, called sprints. Four ceremonies bring structure to each sprint (Venkatachalam et al., 2017) and are summarised in Table 12.1.

The ICT team within the Department of Business and Digital Technologies at Ara Institute of Canterbury has a long-standing relationship with industry and practicing WIL which also includes elements of a project and problem-based learning. The department has been successfully nurturing industry professional connections over a long period. Moreover, they have successfully reduced the gap between academic delivery and industry expectation. Two PLB examples are detailed below:

Work-Integrated Learning (WIL) PLB

The Bachelor of Information and Communication Technologies (BICT) WIL co-operative education project course provides students with the opportunity to work on industry-based real-world projects. This course, along with summer internships and participation in hackathon events (see below), provides ongoing opportunities for students to gain experience and contribute to solutions with our industry partners. The PBL has been weaved seamlessly in the curriculum and has becomes an integral part of the course. Providing ICT students with the opportunity to connect with industry has been a long-established component of the programme.

Information technology (IT) students in their last semester of the degree program undertake a WIL capstone project requiring them to carry out a significant piece of work together with documentation of their experience and a presentation to a panel of tutors and industry. In the WIL capstone model, students not only apply a wide range of technical skills but also enhance their 'soft skills' through authentic PBL. The feedback from stakeholders strongly suggests capstone projects boost students' engagement, skills, and knowledge and offer a competitive advantage in gaining employment with project sponsors and other industry employers. The course has a weightage of 45 credits (equivalent to 450 h), which is 75% of a full-time semester workload of 60 credits. The WIL industry project proportion of the course has a work commitment from the student of 300 h with an additional of up to 150 h available for the academic outcomes. The project requires the involvement

of an IT professional as the Industry Supervisor (IS) and a member of the IT teaching staff as the Academic Supervisor (AS). In addition, the course has an academic staff member in the role of the Course Convenor (CC).

The project allocation process follows a marketplace model, whereby students apply for different projects based on their interests and capability. Industry sponsors run in-depth interviews to evaluate and select students for the Capstone project. This process enhances the person-organisation fit. Students are assigned an AS at the commencement of the course. Students meet with their AS weekly for the entire duration of the project. When an appropriate project is secured, the student completes a WIL agreement form with signoff from the industry sponsor, the student, academic supervisor, and the WIL CC. The student then works with the Industry and Academic Supervisors to create a project proposal. This becomes a formal agreement of the work they are committed to, both for the IS/Client and the AS.

As a continuous process of risk identification and mitigation by the major stakeholders of the PBL projects, towards the halfway (150 industry hours) of the planned duration, a halfway progress report is created by the student and submitted to both the IS and AS, who give formal assessment and feedback. Another important aspect of this halfway assessment is to provide an updating opportunity for the project documentation incorporating any renegotiated deliverables and scope changes, following Agile project management principles. After the project completion, students confirm the fulfilment of the deliverables and submit a final project report, methodology essay, poster, poster short paper, and panel presentation. Each student has a final oral presentation and panel examination attended by the IS, AS, and CC. The grading of the project and course deliverables are based on the guidelines and rubrics for each of the deliverables.

Hackathon

In 2020, 'Smart Christchurch Hackathon' was the collaborative effort of Ara Institute of Canterbury, Ministry of Awesome, Te Ōhaka, and Christchurch City Council's Smart Cities Programme, designed to attract the input of Ara students who were challenged to come up with concepts, designs, and prototypes for smart technology solutions to help solve issues faced by Christchurch city.

Students are provided the opportunity to work with a wide range of companies and organisations and several of the recent projects have been through Te Ōhaka based ventures. Te Ōhaka – Centre for Growth and Innovation – is wholly dedicated to supporting, nurturing, and growing Aotearoa NZ start-ups and innovators with the bold ambition and drive to transform our world by staying true to the principles of kaitiakianga (sustainability) and culturally intelligent businesses. It is Christchurch's official home for early-stage high growth start-ups, as acknowledged by the partnership between Ara Institute of Canterbury, Ministry of Awesome, and ChristchurchNZ. The success with the joint initiatives has resulted in several recent graduates continuing in employment with the project sponsors.

Conducting the hackathon for ICT students not only generated solutions for real-world problems but also provides students with opportunities to empathise and create a solution for the SmartCity team and people of Christchurch. The software development teaching team restructured assignments to meet the acceptance criteria of the industry and provide students with a seamless learning experience without over-burdening them. An example of this is the winning SmartWater Team taking their solution into prototyping and trial at SmartCity (Christchurch City Council). The SmartWater Metering team developed a 'smart water' metering system allowing residential households to track their water usage and reduce unnecessary waste. Another team focused on public health and built a web app to help pharmacies send push notifications to remind patients about their upcoming repeat prescriptions. The platform aimed to help patients with memory loss to remember their prescriptions and allow pharmacies to better serve their patients using an automated system. The Software Development Team, along with Te Ōhaka mentored and supported students to create, trial, test, and validate their solutions in the real world. These are examples of academic assignments which have the potential to generate real-world solutions to a real-world problem. New smart technologies and sensors allow us to gather real-time data, so we can see how the city is functioning and responding.

Discussion

In this section, the common themes identified through the conduct of case study process tracing are presented. These include the key enablers to incorporate into learning design and curriculum development for the deployment of PBL in VET programs.

Authentic Learning, Industry Networks and Occupational Identity

All the three programmes include interaction with authentic learning (Herrington & Oliver, 2000). The BAS working on a real-world design which was then presented to and critiqued by industry; BBc in the form of a radio station broadcasting live to an intended audience; and BITC through industry or community-initiated projects. All the programmes utilised constructivists learning approaches to anchor their PBL. The caveat with authentic learning is the need to balance students' learning requirements with the expectations of clients or industry (Rees et al. 2019). Sound learning design and strong institutional relationships with industry partners, assist the formation of partnerships which balances students' learning with industry/community expectations.

In all the programmes, PBL enable students to demonstrate industry work readiness by applying their knowledge to real-life problem-solving scenarios. Students deepen their learning experience, build confidence in applying their technical and communication skills and capabilities, and work on authentic projects. Hence PBL provides multi-faceted benefits. For the institution, the integration of PBL reinforces the notion that academic activities relate meaningfully to industry by bridging the industry/academia or practical/theory gap. For students, project deliverables (i.e., an inspirational and aspirational architectural brief, a 'successful' radio station, an 'effective' ICT solution) endorses their knowledge and skills relevant to the domain. For industry and community, projects can be a useful experience to investigate solutions to real-world problems and save valuable organisational time and money as well as finding potential assets and future resources for the organisation.

Another strong theme through the three programmes of study is the deployment of authentic learning to support the professional identity formation of students (See Chan (2020) for studies in occupational identity in vocational education contexts). Through participation in PBL, students have professional communication, behaviours, social expectations, workplace culture etc. modelled to them by tutors/teachers/industry representatives. The learning outcomes require students to evidence their work as being based on industry standards and expectations including aspects of professional presentation and attributes. Thus, PBL is a framework for authentic learning and professional identity attainment to be enacted.

Each programme's approach drew on the historical ways the discipline has inducted and developed their workforce. The BAS integrates studio-based learning through their entire programme, provisioning from the very start of the programme, the ways of doing, thinking, feeling and being (Chan, 2020) which frame students' occupational identity as architects. The BBc utilised the apprenticeship approach, akin to the cadetship/internship models used across the Aotearoa NZ media industry to train and develop their personnel. The BICT's PBL is based on the processes commonly used through the ICT industry to create software and is further made more authentic through the addition of the entrepreneurial and 'client/industry' focus underpinning ICT 'start-ups'. Hence, PBL is structured to replicate industry practice processes, and utilised to prime students for their eventual occupational roles.

Preparation of Students for PBL

Across the PBL course of learning, all students in the programmes are required to attend presentations on a range of topics related to both the conduct of the project itself and the associated academic outcomes from a range of teachers/tutors. In various courses through the programmes, PBL methodology is introduced and undertaken to guide students into industry practices before exposure to the real environment. All the programmes prepared students through scaffolding students

through the PBL process. The BAS programme leveraged off their studio-based learning environment to allow vertical integration of all students across the 3 years of the programme. Each year could view the projects/models/plans other students were working on and peer feedback was encouraged to develop students' abilities to judge the standards required and to be able to articulate and defend their design decisions. BBc first year students shadow the second-year students as they run their radio station. For BBc students, this helps first year students recognise the need to develop capability in the technical aspects of broadcasting and attain the academic results required to progress in the programme. For the BICT, first and second year students are able to participate in Hackathon teams, contributing where able, to the team's 'solution' but more importantly, learning through mimesis (i.e. observation, imitation and practice (Chan, 2020)).

Connecting Learning Outcomes to PBL

All of the programmes' PBL were framed by the learning outcome objectives of the courses in which the students were enrolled. These learning outcomes (See the BBc above for examples) tend to focus on transformative learning required by students to not only apply theory/knowledge and skills learnt in other courses to authentic practice, but to also rehearse and realise the important attributes/dispositions required to be effective professionals as recognised by industry. Therefore, PBL is a means to consolidate learning and provide opportunities for students to engage in holistic professional practice within a guided and supportive environment.

Not Just PBL

A key difference across the three programmes was the depth of project-based learning deployed and the ways problem or inquiry-based learning were incorporated. PBL afforded students in the BAS, BBc, and BICT to also learn through inquiry and problem-based learning. Both individual and group work were also availed. The authentic/immersive learning environments of architectural design studio, radio station, or ICT start-up/ICT company, provided a range of opportunities for real-world problem finding, solving and reflective learning from successful and unsuccessful endeavours. Hence, PBL could be envisaged as an anchoring pedagogical approach, providing options for students to participate in authentic learning activities which also require many learners to have to undertake self-motivated and self-directed study.

Conclusion

In this chapter, three cases were used to explore how PBL was structured and supported. The are many ways to deploy PBL and in the examples, discipline specificity permeated the frameworks and learning approaches used. PBL integration into authentic/immersive 'simulated' and real-world projects, provide students with the deep engagement within supportive learning environments to learn difficult and complex tasks. This prepares students well beyond graduation for the world of work with its many challenges (i.e., volatile, uncertain, complex and ambiguous (VUCA)). However, the deployment of PBL must be planned and structured to ensure learning experience are enriched rather than confused and intimidating. The chapter has provided three examples out of many common through the Aotearoa NZ ITP sector. In doing, the salient principles of PBL were identified and discussed.

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Chapter 13
Deconstructing Learning: The Modernist Classroom

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Abstract This chapter explores the innovation processes at play in the development of Otago Polytechnic's Bachelor of Culinary Arts (BCA) as it moved away from the French culinary canon, master-apprentice pedagogy, and compartmentalized curriculum. Much like Adria et al.'s (Statement on the "new cookery." The Observer. http://www.theguardian.com/uk/2006/dec/10/foodanddrink.obsfoodmonthly, 2006) comment that 'new cookery' (or modernist cuisine) "… has been widely misunderstood, both outside and inside our profession", the development of the BCA has been seen by many as being a purely radical change that is disconnected from its roots. This could not be further from the truth and this chapter tells the story of the design of a new approach to culinary education that has paralleled the development of contemporary cuisine. It provides an analysis of the innovation processes at play underpinned by Henderson and Clark's (Adm Sci Q 35:9–30, 1990) architectural innovation model, while framing its development within the wider narrative of innovation in the global culinary community. To this end, the narrative is structured around the four (modernist) principles of 'new cookery' outlined by Adria et al. (Statement on the "new cookery." The Observer. http://www.theguardian.com/uk/2006/dec/10/foodanddrink.obsfoodmonthly, 2006). These are: we "value tradi-

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_13

tion and build on it" and aspire to influence the natural evolution of cookery and culinary education; we are motivated by "excellence, openness, and integrity"; we "embrace innovation" that makes a real contribution to culinary education, and; we believe that "cooking can affect people in profound ways" by empowering learners to have agency over their learning. The chapter concludes by mapping the broad phases of an innovation process that began in 2004 using Henderson and Clark's (Adm Sci Q 35:9–30, 1990) architectural innovation model.

Keywords Curriculum development · Practice-based learning · Design thinking · Assessment of prior learning (APL) · Culinary education · Academic change management

Introduction

Over the decade since the Bachelor of Culinary Arts (BCA) at Otago Polytechnic began, the programme has seen 250 graduates go on to start careers as chefs, business owners, culinary educators, marketing and sales managers, recipe developers, food laboratory technicians, events managers, fast-moving consumer goods (FMCG) product developers, kitchen designers, food stylists/photographers, and social media influencers. Additionally, several have also become postgraduate students. The roughly 40% who are Assessment of Prior Learning (APL) graduates have developed a new appreciation of their own self-worth and self-efficacy, shifted careers (e.g. educators have become entrepreneurs, chefs have become educators), gained significant career promotion and gone on to further studies in subjects as diverse as teaching, design and psychology.

In 2014 the BCA teaching team was awarded the Sustained Excellence in Tertiary Teaching award (Ako Aotearoa, 2014). In 2014 and 2016 the staff and students developed and hosted two international food design conferences with a combined media reach of nearly 10 million (Glow Consulting, 2016) and that were described by Chef Al Brown as "extraordinary", "world class" and "unbelievable" (Otago Polytechnic, 2016). Meanwhile, the APL version of the BCA was recently highlighted in an Australian study on international best practice in VET as fostering "a profound transformation in thinking" in learners (Williams, 2019, p. 21). However, to paraphrase Marco Pierre White, there is no such thing as overnight success and it takes years of investment and dedication to get the results you desire (OxfordUnion, 2016). This is also true of the story of how the BCA has come to be what it is today, and this chapter provides insights into the almost 20-year journey to get there. It is a story of dogged determination to develop a different (some would say, better) way for culinary education that has embraced (sometimes accidental) innovation and an openness to change.

‘Radical’ Innovation Does Not Happen Overnight

Beyond Incremental and Radical Innovation

There have been recent calls for radical changes to culinary education (Hegarty, 2015; Mitchell et al., 2013) and this is contrasted with a long period of stasis in the dominant logic of slow incremental change in culinary pedagogies (Mitchell et al., 2013; Woodhouse & Mitchell, 2018). However, over 40 years ago Henderson and Clark (1990, p. 9) stated that “… the traditional categorization of innovation as either incremental or radical is incomplete and potentially misleading” and this artificial dichotomy persists. They argue that incremental refinement and radical innovation require fundamentally different organisational capabilities and that well-established institutions/organisations struggle to implement radical innovation strategies.

Henderson and Clark (1990, p. 11) propose an ‘architectural innovation’ model that makes the “distinction between the product as a system and the product as a set of components”. Figure 13.1 shows that the architectural model suggests that innovation can challenge the core concepts of a product (in this instance culinary education) and the linkage between these concepts and the components of the product. This conceptualisation creates four quadrants of innovation which includes incremental and radical but adds modular (overturning core concepts at the component level) and architectural (changing the linkage between the components and the unchallenged core concept) innovation.

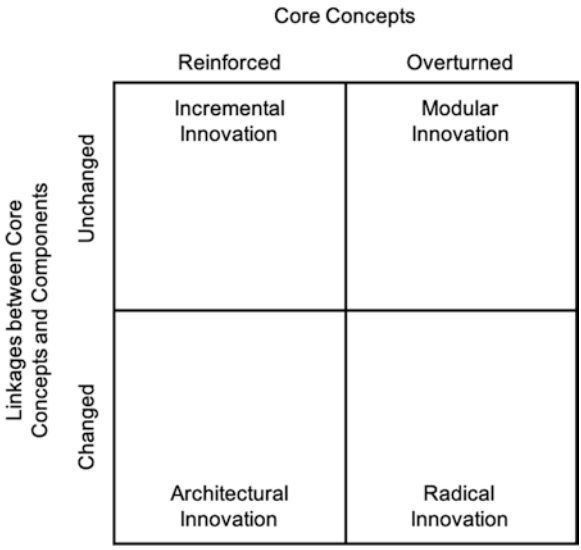

Fig. 13.1 A framework for defining innovation. (Source: Henderson & Clark, 1990, p. 12)

Henderson and Clark's more nuanced view helps us to explore the innovation processes at play in the development of BCA, moving the discussion beyond the dichotomous incremental/radical distinction. Hence, to explore the innovation process for the Bachelor of Culinary Arts, it is important to first outline the core concepts and components of culinary education.

Core Concepts and Components of Culinary Education

In the west, the core concepts of culinary education are directly and indirectly drawn from the classical French culinary canon, primarily from the work of Escoffier and the technical and social structures of cookery introduced in his book 1903 *Le Guide Culinaire* (Deutsch, 2014; Woodhouse, 2015). Despite more than a century passing, it is still common practice for a culinary student to start their formal education with simple vegetable cuts before transitioning to more technical tasks such as meat production and cooking in accordance with structures of Escoffier's book (Deutsch, 2014). Aotearoa New Zealand's culinary education long ago adopted Escoffier's canon as a means to formally educate and train its chefs (Woodhouse, 2015).

Throughout the latter part of the Twentieth Century, this training took the form of London City and Guides international qualifications, as well as the 751, 752 and 753 national qualifications in professional cookery. These qualification structures were repertoire/recipe driven and were largely compartmentalised but also included capstone assessments where trainee chefs demonstrated a variety of technical and cognitive culinary skills. In the mid-1990s, the Aotearoa New Zealand government abandoned the capstone assessment process and embarked upon an era of competency-based assessment. This unit standards framework further atomized learning as it saw learners complete a series of smaller, bite-sized assessment activities in various technical areas such as sauce, vegetable, and meat production. These unit standards were taught using separate learning and assessment activities and primarily delivered with a master-apprentice pedagogy that has been commonplace since the advent of the guilds in the Middle Ages (Woodhouse, 2015; Woodhouse & Mitchell, 2018).

Modernist Cuisine and Innovation: A Framework for Analysis

This chapter explores the innovation processes at play on the development of Otago Polytechnic's Bachelor of Culinary Arts (BCA), as it moved away from the French culinary canon, master-apprentice pedagogy, and compartmentalized curriculum. Much like Adria et al.'s (2006) comment that 'new cookery' (or modernist cuisine) "… has been widely misunderstood, both outside and inside our profession", the development of the BCA has been misunderstood as being a purely radical change that is disconnected from its roots. This could not be further from the truth.

This chapter provides an analysis of the innovation processes at play using Henderson and Clark's (1990) architectural innovation model. However, it is useful to also frame its development within the wider narrative of innovation in the global culinary community. To this end, we have structured our narrative around the four (modernist) principles of 'new cookery' outlined by Adria et al. (2006). These are (Adria et al.'s principles in quotation marks):

- We "value tradition and build on it" and aspire to influence the natural evolution of cookery and culinary education
- We are motivated by "excellence, openness, and integrity"
- We "embrace innovation" that makes a real contribution to culinary education, and
- We believe that "cooking can affect people in profound ways", so we should empower learners to have agency over their learning.

What follows is the story of the, sometimes serendipitous and accidental, design of a new approach to culinary education. It is a story that is well-aligned with the principles put forward by Adria et al. (2006) as being fundamental to modernist cooking and we explore each of these in turn. Underlying this story are the principles of Henderson and Clark's (1990) architectural model of innovation and we return to this in the discussion at the end of the chapter.

"Valuing Tradition and Building on It"

In 2004, several of the BCA team started to raise questions as to the pedagogic value of the siloed assessment process of the unit standard framework. This was driven by observations relating to the volume of assessment work required of students. As each kitchen session was directly linked to an assessment outcome, learners noted the lack of quality time to develop mastery of their craft and assessment fatigue from constant assessment was common. The teaching team also struggled to stay on top of the assessment workload, which by now, demonstrated no noticeable improvements in a graduate's ability.

By 2006 this questioning resulted in the trialing of a more holistic assessment process, where individual technical elements were demonstrated in the production of a 'whole dish' demonstrating evidence required for multiple unit standards. For example, a roasted lamb rump with grilled polenta, red wine jus and ratatouille was used to provide evidence for the technical elements of complex meat, sauce, farinaceous and vegetable unit standards.

By and large, the focus remained on the classical French canon so in practice this holistic assessment approach was only a relatively small, incremental change to assessment. However, it represented a significant transition in the team's teaching and learning philosophy and what it believed about the role of assessment and evidence gathering processes. This new philosophy allowed the team to focus on teaching and learning activities that used 'naturally occurring', everyday culinary

practices in the preparation of dishes and menus and not on activities only designed to gather evidence specific to a given unit standard. Although we did not know it at the time, we had begun to shift to a pedagogy that privileged learning over assessment, whereby assessment evidence was a by-product of the learning. Looking back, while we still adhered to the French culinary canon and largely traditional cookery classroom practices, this change in philosophy was pivotal to everything that has followed.

A year on, fueled by this shift in assessment philosophy, the team re-visited the unit standards assessment requirements and how these requirements were being interpretated for the classroom. This review provided an opportunity to extend the team's new teaching philosophy and we did so by closely examining the evidence criteria for the unit standards.

At the time, the curriculum was delivered both in the classroom and via a work-based apprenticeship system. So, to maintain relevance for the different host workplaces, the unit standard evidence criteria stated that the technical culinary skills needed to be demonstrated in the production of "any recipe or dish type specified by or *specific to the establishment*[1]" (New Zealand Qualifications Authority (NZQA), 2015). This meant that an apprentice needed to produce food consistent with their workplace food aesthetics and style and this was likely to be different to the range items (specified by the tutor and almost always taken from a classically-inspired textbook) that a classroom learner was required to cook.

A useful example to demonstrate this is the production of a cream soup. An apprentice in a fine dining restaurant context, might demonstrate a 'cream soup' through a degustation dish such as a cream of celeriac topped with an espuma of wild mushrooms, whilst a learner in a seaside café, might produce a hearty serving of a creamy seafood chowder. In both contexts, the trainee chef would be required to apply the principles of producing a cream soup but in a manner reflective of the technical and aesthetic approaches unique to their respective working environments.

What the team unearthed in this review process was an understanding that the application and execution of a technical culinary skill is directly influenced by the context in which it is enacted. As the classroom was devoid of such contextualization, learners would likely struggle to adapt what they had learned by rote when they got into the work environment. We concluded that the notion that a dish is deemed to be of quality (and meeting the assessment requirements) is not solely premised on its technical execution, but also on its successful adaptation to the culinary environment. The '*specific to the establishment*' qualifier in the assessment criteria had opened a whole new avenue of exploration around contextualized learning for the team and this led to 6 years of incremental changes to the assessments that allowed the curriculum to slowly include more and more dishes beyond the classical repertoire.

[1] Emphasis added.

Running alongside this internally driven change in philosophy was disquiet from industry surrounding the graduates from the unit standards-based programmes. This also had a significant impact on the team, and this reinforced the need for them to move away from their own reliance on traditional culinary teaching approaches.

The Call from Industry for Learners to 'Think on Their Feet'

In the years surrounding the delivery of unit standards, industry had provided feedback that graduates demonstrated a lack of initiative and were slow to adapt to new situations in the workplace. They said that, when graduates were presented with new dishes to make, they would often respond: 'I'm not sure how to make that, I wasn't shown at polytechnic'. These comments further highlighted the limitations of a recipe-centric and compartmentalised approach to the unit standards curriculum design.

There was also a growing number of international voices raising critical questions of the traditional chef master-apprentice pedagogy (Hegarty, 2001, 2011; Mills, 2007; O'Mahony, 2007). Since then, Deutsch (2014) has also suggested that the traditional culinary arts education model, where the chef teacher demonstrates a dish and the student replicates it for the lecturer's approval, devalues the individual and, in turn, their creative processes. He continues that this inhibits learners' ability to become better prepared for the challenges they faced when having to think innovatively in a real-world, commercial context – exactly what industry was looking for.

In response, the team gradually moved towards a pedagogic model that focused on teaching technical cookery concepts (rather than just dishes), which the student then had to adapt to specific contextual requirements. This transitioned the team's pedagogy from a traditional technocratic, master-apprentice (*"I show and you repeat"*) pedagogy, to problem-based projects and a constructivist pedagogy.

The first application of this new approach to pedagogy was through the development of a small project applied to the technical production of concepts of cream soup. In this project, learners reapplied these concepts to the design of a cream soup inspired by a chef of their choice. In essence, they were choosing their own context to apply the concept to and this had the dual benefit of improving student engagement and providing a way for them to practice initiative and problem-solving skills. The project unfolded as follows:

- ***Engage*** with established technical concepts
- ***Explore*** how these technical concepts are applied by others
- Use this exploration to ***Reimagine*** the application of the technical concept
- ***Repurpose*** these reimagined technical concepts into a new context

The results of engaging students in this process were a revelation. Learners moved from being passive consumers of the teachers' knowledge, to highly active learners who were co-constructing knowledge with their teachers. This shift in pedagogy

also had the added benefit of bringing alternative forms of knowledge into the classroom that were shared with all learners.

In the past, learners had only been exposed to the technical production by producing dishes from recipes provided to them (e.g., cream soups were traditional crab bisque, corn and bacon chowder and creamy puree soups). As they were now undertaking their own investigations, learners were bringing contemporary adaptions of the technical concepts behind the recipes into the classroom. This resulted in a classroom environment where many of the newly introduced techniques were unfamiliar to everyone, including the teachers.

An example of a student dish developed in this project was a cream of parsnip soup with two textures of beetroot inspired by German molecular gastronomy chef Heiko Antoniewicz. The dish involved the production of a purée of parsnip finished with cream and garnished with a hot gel of diced beetroot and croutons made from compressed micro-planed beetroot flesh. These techniques came from the emerging movement of molecular gastronomy and were well outside the traditional curriculum.

The Transition to Culinary Higher Education

In 2009, two key moments became the catalyst to investigate the development of a culinary arts degree. The first was a chance discussion with fashion colleagues from the Design School who shared a staff room with us. One day over coffee, the culinary team was discussing its implementation of a project-based learning pedagogy and the fashion lecturers noted that what we had stumbled upon was a teaching and learning framework typically delivered in a design school. The fashion team noted that they too had observed positive changes in student engagement and outcomes once they moved to a project-based approach when they set up their bachelor's degree and they encouraged us to explore design as a framework for culinary arts education.

At the same time, the School of Hospitality (as it was then) was approached by the University of Otago to explore a potential relationship to respond to a shortage of food technology teachers. The university was considering ways for professional chefs to bridge into the University's Graduate Diploma in Teaching and was looking for an undergraduate partner to deliver graduates. The existing culinary arts programme was at NZQA Level 4 (sub-degree level), so it quickly became evident that there was little possibility of academic bridging from this programme.

From these two interactions the concept of developing a design-led bachelor's degree in culinary arts emerged. A desktop study of higher education culinary programmes worldwide identified that the United Kingdom established a number of culinary arts degrees in the 1990s. In particular, 1992 had been a watershed moment for vocational education, as a change in legislation converted the 35 polytechnics into new universities (Boliver, 2015). As a result, the 'vocational' cookery programmes (the equivalent of the New Zealand's qualifications) were delivered at Further Education Colleges and the 'new universities' developed 'higher education'

culinary programmes (initially to the equivalent of New Zealand's Levels 6 diplomas but, by the 2000s, many had become bachelor's degrees) (Woodhouse, 2015). A research trip to the UK was planned to explore best-practice and excellence in degree-level culinary education that could inform the development of our own degree.

"Excellence, Openness, and Integrity"

In Search of Excellence

Four universities were identified as having excellent programmes worthy of closer examination and early in 2010 two staff embarked on a study tour of Thames Valley University, Brighton University (Eastbourne Campus), University of Darby (Buxton Campus) and the University of Ulster (Belfast). Of particular interest was Thames Valley University, whose School of Hospitality and Tourism was awarded the Queens Anniversary Award for Outstanding Hospitality and Tourism Training (The Business Magazine, 2010). The school offered one of the largest selections of cookery programmes in the United Kingdom including short courses, national vocational qualifications, undergraduate and post graduate studies.

The trip provided insights into course structures, pedagogic approaches, curriculum and the facilities and resources needed to run a culinary degree. While most of these insights were positive, the main finding of the research was a concern over how the degree programmes had been constructed and delivered. These programmes (and others) had been developed using a combination of the existing polytechnic cookery qualifications and university business courses and faculty and students spoken to frequently criticised the programmes as having a heavy emphasis on management theory that had limited relevance to the culinary arts (Otago Polytechnic, 2010). In most cases, management/business theory classes also replaced kitchen workshop sessions and management/business assessments were traditional essays or case studies and many faculty members noted the lack of learner engagement and poor course completions because of this (Otago Polytechnic, 2010).

The study tour made it clear that UK culinary arts degrees were actually just a combination of traditional models and modes of 'vocational' culinary education with 'higher education' advancements delivered via management papers already offered by the university. This created a disconnect between the kitchen-oriented cookery courses and the classroom-oriented management courses and, as a result, the programmes were often compartmentalized and lacking in cohesion. This was the very approach that we had moved away from some years earlier and something we wished to avoid at all costs.

The curriculum design and assessment practices in United Kingdom were in direct conflict with the team's pedagogic philosophy, project-based learning approach and newfound interest in design teaching. So, the team decided to depart from tradition again and began the development of a very different culinary arts

degree – one founded on design as pedagogy (for more details on this pedagogic approach see Mitchell et al., 2013; Mitchell & Woodhouse, 2018; Woodhouse & Mitchell, 2018).

Openness to Change and Gaining Integrity

As the study tour had not found a model of excellence that aligned with the team's vision, we quickly had to be open to looking elsewhere for models of excellence in teaching. Our attention turned to design education and what it might offer, but the team also identified that this would require significant upskilling and/or the addition of staff with different skills.

By now, we were comfortable in the problem-based culinary learning space and believed that it would work at degree-level. However, the need to upskill in design education, combined with NZQA requirements for degree-qualified staff, meant that staff felt uneasy about being able to deliver a quality programme that could meet the needs of industry and learners alike. This started a decade-long upskilling programme for existing staff and a diversification of the skills brought to the programme by new staff.

Between 2010 and 2013 all existing staff completed degrees, between 2014 and the present all but one of these staff has undertaken masters study (see Ellwood, 2018; Pfyl, 2019; Woodhouse, 2015) and one has just completed doctoral study (see Woodhouse, 2021). All staff postgraduate research has been of relevance to the development of pedagogic practices for the BCA and as a result the team has deepened its understanding of their pedagogic practice and opened their thinking to yet more pedagogic practices.

Since 2011, several new staff have also been added to the team and these staff all had existing postgraduate qualifications (one each with honours, masters, and PhD qualifications). Importantly, new staff needed to bring skills that were complementary to those of the existing team and that would help build the integrity of the design-led pedagogy they were developing and implementing. New staff included: a social scientist with a background in wine and food consumer behaviour and experiential consumption who brought 10 years of research and degree-level teaching; a secondary school teacher with a degree in art history and design and several years of kitchen experience (but no formal cookery qualification), and; a qualified chef and graduate of the BCA APL programme with a Master of Design Enterprise that explored FMCG (food) product development. Each brought with them important expert knowledge and experience, as well as skills that filled gaps in the team's pedagogic practice.

From the outset, the team also identified opportunities for testing their thinking on the international stage. In 2011 we presented the framework for the BCA at a food conference in Australia (Heptinstall et al., 2011) (before we had started our taught programme) and were told in no uncertain terms by several culinary academics that it was far too radical and it would never work. Somewhat deflated and now

more uncertain than ever, we continued to develop what we believed should work despite the nay-sayers.

Around this time, in a complete coincidence and unbeknownst to the team, a new area of design practice and education – food design – was also emerging in Europe and the USA. While searching for resources to inform classroom activities, the team stumbled upon a call for papers for the first ever international conference on food design to be held in London in 2012. Three of the team presented at the conference and were the only attendees who were from outside of design education and practice. To our surprise (and relief, given our previous conference experience) our presentation was well-received, and feedback suggested that what we were doing was at the vanguard of practice not only in culinary arts, but also in food design. The paper presented was one of a handful from the conference to be selected for publication in an academic journal (see Mitchell et al., 2013) and so began a programme of research on the BCA that continues today.

The 2012 conference was also the beginning of the BCA becoming connected with this new field of food design across the globe. Members of the team have since presented at food design conferences in New York (Mitchell, 2015) and Lisbon (Lynch & Niimi, 2018; Mitchell & Woodhouse, 2018; Woodhouse & Mitchell, 2018) and are active in editorial work for the *International Journal of Food Design*. Along with hosting two of our own international food design conferences (2014 and 2016), this has meant that we are part of a global food design community of practice that has aided in establishing the integrity of the programme.

The emergence of a global food design community of practice mirrors the development of a global culinary community of practice that has begun to question the dominant logic of the culinary world over the last decade. We have also been proactive in engaging in these networks, attending Rene Redzepi's 2012 Mad Food Symposium and Ben Shewry's 2014 WAW Gathering, and presenting at the Symposium of Australian Gastronomy in 2018 and 2019 and ConversatioNZ (now known as Eat NZ) in 2015.

While there were many happy coincidences along the way, excellence and integrity (and the openness that was necessary to achieve this) have been at the core the way we have operated. In part this is due to a focus on excellence and innovation at Otago Polytechnic that began with the tenure of, the then CEO, Phil Ker. However, it is also the result of the team setting high standards and, like modernist chefs such as Feran Adrian and Heston Blumenthal, constantly asking 'why?' and 'why not?'

"Embracing Innovation"

The Bachelor of Culinary Arts was approved in 2010 and was first delivered as an assessment of prior learning (APL) programme in 2011, with the in-class programme commencing in 2012. The first on-campus intake (a combined Diploma of Culinary Arts and Bachelor of Culinary Arts cohort) had 51 learners that were a mix of school leavers, Level 4 cookery graduates from Otago Polytechnic, mature

students (who were mostly career-changers) and a handful of learners from other Polytechnics and Universities. Skills and experience ranged from complete novice to technically proficient with up to 5 years of industry experience.

The first course we delivered was, as tradition dictated, Larder Fundamentals, a 15-credit, 8-week course that introduced learners to the larder section and some rudimentary design tools. Our programme structure reinforced core culinary structures (Larder, Hot Kitchen, Patisserie, etc.), partly so that gatekeepers (i.e. those involved in endorsing and approving the programme) could see its relevance, partly so that learners could see how this related to other programmes and partly because the whole team knew this structure and already had skills that could contribute to one or more of these courses.

Assessment was in the form of a portfolio of dishes prepared in class (30 marks) and a design project (70 marks, sub-divided into seven areas relating to process and outcome). In reality, the portfolio work looked a lot like the BCA's antecedent Level 4 programme with some added 'complexity' to the techniques and, for those with any degree of technical proficiency, this presented little challenge. However, the significant number of complete novices presented teaching staff with challenges in terms of getting everyone up to speed with these core culinary concepts, while still engaging those with a degree of technical proficiency.

The design project leveled the playing field somewhat, as it relied on a different skill set that did not necessarily need a broad range of technical skill. The staggering results of this project and the many and varied processes used by learners to arrive at the outcome, forced us to move from the incremental changes to our pedagogic practices to a more radical innovation phase. In short, our learners had hit the ground running and our pedagogy was decidedly pedestrian by comparison.

In this project, and the subsequent Hot Kitchen and Patisserie projects, a number of the dishes that resulted were *de rigueur*, especially from those who had completed previous culinary qualifications, and these were largely variations on the classical repertoire. However, at least a third of the learners produced dishes that simply had no reference point – certainly no classic reference point. Learners designed and produced everything from smoked salmon with blood orange granita, to venison with a transparent pink-tinted, wild black currant flower jelly or a Cinderella-inspired white chocolate sphere, encapsulating a spicy pumpkin mousse and all were highly resolved and eminently commercial.

We soon came to the conclusion that, if this was what could be produced in the first few months of study, we would need a sophisticated set of learning tools to stay ahead of (or even just keep up with) these learners – this moved us from a pedagogic (curriculum-centred teaching) to an andrologic (student-centred facilitation) approach. Like the modernist cuisine movement which draws upon other fields (mostly in the sciences) for its departures from the traditional (Borkenhagen, 2017), we had to look outside of traditional culinary education pedagogies to help us to radically innovate and we found what we were looking for in design (Mitchell et al., 2013).

We immersed ourselves in the world of design and design education, drawing upon fields as diverse as architecture, design for business, design thinking, product/

industrial design and communication and user experience (UX) design. We borrowed design tools and frameworks and trialed them in class. Some worked, many did not. Our students were excited and frustrated in equal measure as we introduced one tool after another. Sometimes a student would introduce a way of doing things that we had not yet come across and, in an environment built on openness and sharing, they willingly shared it with staff and classmates.

We were completely open with students about the fact that we were learning about all of this just like them and that sometimes we might get it wrong. They appreciated this because of the ownership they felt and this meant they were both fully engaged in their learning and actively co-constructing knowledge with us. We were co-designing (even though we did not know co-design existed) and co-constructing pedagogic practices. It was exciting, radical, and pretty damn scary all at the same time. The more we engaged with design education and practice, the more we realized that design pedagogy embraced uncertainty, change and innovation.

In 2015, at the time of the first five-yearly review of the degree, we completely abandoned the traditional French canon in the course structure. By then we had settled on a group of design frameworks and tools that we had found to be more effective than others, often having to adapt them to the special circumstances of the culinary classroom. In particular, unlike other materials like fabric, wood or metal, food is a medium that can be developed, tested and adapted quickly so design practices can be shortened, and more-resolved outcomes can be achieved with less resource. This means that we can place more emphasis on different tools for different contexts and different design situations. We have also developed our own frameworks along the way and, more recently, have moved beyond mainstream design models to include values-driven approaches, mātauranga Māori, and frameworks that support the development and mastery of craft. The most impactful frameworks, however, have been those that promote and support students' agency over their learning.

"Cooking Can Affect People in Profound Ways"

Along the way we inadvertently uncovered the impact that food had already had on the lives of our learners. We knew this was the case for APL learners who had years of experience in the industry, so we had an inkling that this could also be the case for our mostly youthful on-campus learners but we could not be sure. However, by the third year of delivery we could see the profound impact food had on the lives of our learners and because of this they had passion and enthusiasm in spades. The BCA had somehow given them permission to follow this passion and use it in pursuit of their own vision for their future in food.

Knowing this, we felt a moral obligation to help them find their place in the world of food. Unshackling ourselves and our learners from the constraints of the classical cookery canon had provided the learners with a new world of career

opportunities. At the core of this unshackling, was the team's ability to provide our learners with control (agency) over their learning experiences. We have written extensively on this (see for example: Humphreys & Gillespie, 2018; Mitchell & Woodhouse, 2018, 2019; Woodhouse, 2021; Woodhouse & Mitchell, 2018) and believe that this moved us to develop heutagogic (self-directed, reflective, proactive learning) practices and this is perhaps the most significant contribution that the BCA has made to culinary education.

By empowering learners with agency, they are encouraged to follow their food passion projects during their studies and carry this through to their post-study lives. A growing number have followed their entrepreneurial tendencies and opened food enterprises which embrace and embody their food values. These enterprises have included repurposing waste food for commercial sale, a vegan café and cocktail bar, and a Friday-only shop with catering and a cooking school operating in a graduate's small, rural hometown. Some have uncovered a passion for teaching others about food and have entered the teaching profession. Others have adapted their skills in the aesthetics of food and work as food stylists and photographers, while those who have been drawn into systems thinking have risen quickly within large food operations such as hotels. In all of this, most graduates do still work as chefs, bringing a design lens to their everyday work.

Throughout this journey, we have learned the value of empowering our learners with agency. At first, we only let the reins out a little, still holding on to tradition and what we knew as masters, but eventually, we could see the potential of learner agency and holding on to the reins took on a whole new dimension. This time it was us who was keeping abreast of the knowledge our learners brought to the classroom.

Over time we have transitioned our teaching practice from pedagogic to andragogic and eventually heutagogic (self-determined learning) philosophies (Sherlock & Williamson, 2014). We have witnessed first-hand the transformation in classroom engagement and learner outcomes. Where once a recipe-centric formal culinary education had suppressed the desires of trainee chefs to learn (Deutsch, 2014), agency-driven, problem-based learning has enabled us to unleash the inquisitive mind, creative potential and unique cultural identity inherent within each and every learner. Embracing learner agency has affected us as educators in profound ways and it has affected how our learners see themselves within the world of food.

What Have We Learned?

The advent of modernist cuisine was seen by many as revolutionary – a radical innovation that seemed to depart from the dominant logic overnight – but this couldn't be further from the truth. The development of the BCA at Otago Polytechnic appears to have been similarly revolutionary, but this chapter has outlined a process that began in 2004 and the innovation has continued since the advent of the degree in 2011. The story above is intended as a narrative that culinary vocational educators (and hopefully those from other vocations) can relate to – a process that has similar qualities to those experienced in modernist cuisine.

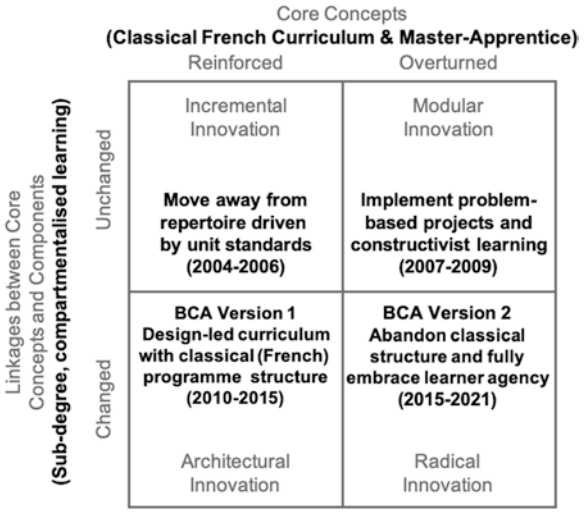

Fig. 13.2 Innovation phases of the Bachelor of Culinary Arts at Otago Polytechnic

The chapter also has insights that align with Henderson and Clark's (1990) architectural innovation model. Figure 13.2 shows that broadly speaking, there are four phases of innovation for the BCA that coincide with the four quadrants of this model. This began with incremental changes that experimented with different approaches to the master-apprentice pedagogy and the unit standards curriculum. Between 2007 and 2009 innovation became more modular as a project-based pedagogy saw students move beyond the classical French tradition, but the unit standards structure remained. The introduction of the BCA built on the learning from the modular innovation but shifted to higher education and a more integrated programme structure. This new architecture resulted in further challenges to the core concepts of the classical tradition, so that by the time of the formal review of BCA in 2015, the majority of the core concepts had been overturned.

In reality, these phases overlap and there are elements of each form of innovation in every phase. However, the architectural innovation model allows us to highlight the dominant innovation processes at play throughout the development of the BCA. It is also possible to overlay the dominant driving forces behind the transition from one quadrant to the next (Fig. 13.3). The transition from incremental to modular was driven by a growing frustration with the failings of the unit standards approach. Modular innovation saw the team experiment with problem-based projects and at this time the team was exposed to influences from the design-led fashion degree at Otago Polytechnic, demand from secondary teaching postgraduate programmes, and research that indicated the business-oriented programmes of the UK were not meeting student needs. Finally, as the BCA was rolled out, learner achievement and outcomes resulted in design concepts replacing the classical culinary concepts developed by Escoffier in 1903.

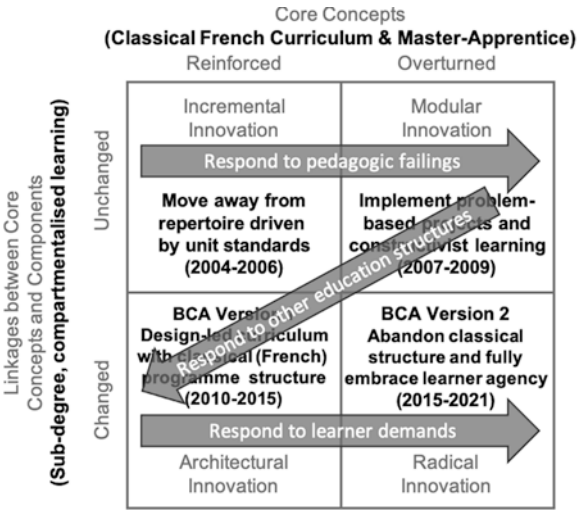

Fig. 13.3 Drivers of the transition between innovation quadrants

In this time of change driven by a radical rethink of Aotearoa New Zealand's vocational education, we have all been challenged to move beyond business as usual to do better for learners and industry alike. This is the first time in a generation that we have been given a license to rebuild, to innovate, to take the best from tradition and make it better, to build a new future. This warts and all account of our, sometimes accidental, journey of innovation is a story that we hope you can see yourself in. We also believe that the more nuanced view of innovation processes afforded by the application of Henderson and Clark's architectural innovation model, demonstrates that the change ahead of us will likely involve innovation processes.

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Chapter 14
Collaboration Across Aotearoa New Zealand ITPs: The Bachelor of Engineering Technology Three-Year Engineering Degree Programme as an Exemplar

Roger Birchmore, John Blakeley, Edward Chai, Jonathan Leaver, Wei Loo, Randall McMullan, David Phillips, Lusa Tuleasca, and Hugh Wilson

Abstract The Bachelor of Engineering Technology (BEngTech) three-year engineering degree in Aotearoa New Zealand (NZ) is the result of an innovative collaborative effort by six Institutes of Technology and Polytechnics (ITPs) and Engineering New Zealand. It is an internationally recognised qualification for graduates seeking recognition as a Chartered Member (Engineering Technologist) through Engineering New Zealand. This chapter outlines the history of degree development from its first year of delivery in 1997 by two institutions to the delivery of the first year of a common multidisciplinary degree in 2010. The dynamics of collaboration and consultation are examined. Innovative practice in the development, delivery, and quality management of the degree is highlighted. Key data are presented to enrich the narrative behind the degree that stands as a exemplar for the development of other qualifications that the new entity, Te Pūkenga, into which all ITPs will be amalgamated in 2023, may seek to develop.

Keywords Engineering education · Institutes of Technology and Polytechnics (ITPs) · Curriculum development · Collaboration in curriculum development · Collaborative course delivery

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_14

Initial Development of the BEngTech Degree Programme in Aotearoa NZ

In this Section the early history and development of the BEngTech is outlined and the path to defining the role of graduates is detailed.

The early impetus for the establishment of a BEngTech degree programme in Aotearoa NZ was the passing of the *Education Act* 1989 [NZ Government, 1989] which gave ITPs the right to confer degrees. Most of the ITPs then considered various proposals for degrees and amongst these proposals were some which wanted to introduce a three-year engineering degree programme.

Meetings were then held in the early 1990's between representatives of several ITPs about the possibilities of establishing a collaborative common BEngTech degree programme across various institutions but eventually it was decided that it would be left to individual institutions to develop, establish, and deliver their own BEngTech degree programmes.

There was considerable debate at about that time over the need to introduce an intermediate level of engineering qualification between the New Zealand Certificate in Engineering (NZCE) (Blakeley, 2016) which had extensive practical work experience requirements and the four-year BE or BE(Hons) degrees. The BEngTech then being proposed was a three-year engineering degree qualification. It had earlier been envisaged as being a replacement for the NZCE qualification but it was now proposed that the NZCE be replaced by a two-year engineering diploma qualification, subsequently called the New Zealand Diploma in Engineering (NZDE).

In 1998, the government announced that the NZCE qualification would be progressively disestablished from 2000. It was to be replaced by a two-year engineering diploma qualification. The main reason given was that the term "certificate" was no longer appropriate for what was to be regarded as being a two-year engineering diploma qualification with no practical work experience requirements.

This led to renewed impetus to have the BEngTech three-year engineering degree established by 2001. This would enable students who would formerly have enrolled in the NZCE to choose between enrolling in the two-year NZDE qualification or the three-year BEngTech qualification.

The BEngTech was initially proposed to incorporate the NZCE replacement, the Diploma in Engineering, as an exit qualification. However, this was found to be academically unacceptable and the BEngTech was redesigned to stand alone before seeking New Zealand Qualifications Authority (NZQA) approval. Provision was made for students completing the Diploma qualification to "staircase" into the BEngTech qualification. The wisdom of doing this is now demonstrated by the fact that at Unitec, up to 32% of completing NZDE students progress into the BEngTech degree (see Fig. 14.5).

The first two BEngTech qualifications to be approved were both under way by 1997. One was at the old Wellington Polytechnic (taken over by Massey University around 1997) and the other was at Christchurch Polytechnic Institute of Technology (CPIT), now Ara Institute of Canterbury (Ara). The Massey qualification was discontinued after several years but the CPIT qualification continued.

The application in 2000 to NZQA for approval of the BEngTech (Civil) three-year degree at Unitec, stated that the qualification was "designed to produce engineering managers as opposed to technicians or professional engineers". The engineering managers would receive training in similar technical subjects to those being trained at two-year diploma level with the opportunity to take additional technical courses in the third year along with a final year project and additional management courses. Graduates were later designated as technologists by The International Engineering Alliance which administers the Sydney Accord[1] and confirmed that "People with a three-year engineering qualification can work independently on solving broadly-defined engineering problems" (International Engineering Alliance, 2013).

By comparison, for people with a BE or BE(Hons) four-year engineering degree qualification under the Washington Accord, it is stated that "People with a four-year engineering qualification can work independently on solving complex engineering problems" (International Engineering Alliance, 2013). This is based on an assumption by the International Engineering Alliance (IEA) that people with engineering qualifications which take longer to obtain are able to tackle more complex engineering problems. The IEA also states that people with a two-year engineering diploma qualification under the Dublin Accord "can work independently on solving well-defined engineering problems" (International Engineering Alliance, 2013).

As the NZCE qualification commenced phasing out from 2000, six ITPs including CPIT and Unitec, plus the Auckland University of Technology (AUT), and the Open Polytechnic began to offer a three-year BEng Tech degree in civil, electrical, or mechanical engineering from 2001.

Following the signing by Aotearoa NZ of the Sydney Accord (International Engineering Alliance, 2013) in 2001, the first BEngTech accreditation by IPENZ, (Institution of Professional Engineers New Zealand) was at CPIT in 2001 in electrotechnology. This accreditation was followed soon after at other ITPs, the AUT and the Open Polytechnic. Although IPENZ became a founding signatory of the Sydney Accord in 2001, it had already begun accrediting BEngTech three-year engineering degree programmes before that date.

[1] Dublin, Sydney and Washington Accords are international mutual recognition agreements that describe the knowledge content and graduate profiles of engineering qualifications suitable for the qualification of graduates at the level of technicians, technologists, and professional engineers respectively.

Consultation and Development of Course Structure

In this Section the consultation process and development of a course structure for the multidisciplinary BEngTech degree that was to be common amongst all ITPs is discussed.

Consultation for a Common Degree

In 2009 six major metropolitan ITPs, joined to form the Metro Group.[2] Its instigation resulted from the similarities of challenges provided by their place in the tertiary educational landscape and opportunities from their shared vocational and applied training focus. They articulated a strategic focus which included the development and delivery of joint national programmes and improved efficiency through the sharing of systems process and infrastructure.

During the period of its existence, from about 2008 to 2016 the Metro Group, subsequently renamed the BEngTech Management Group, established a functioning Industry Consultation Group operating at a national level which had a mix of civil, electrical, and mechanical engineers. Wide-ranging consultation was undertaken during the development process to give both the academic and industry communities an opportunity to shape the curriculum (Metro group, 2014). The BEngTech development team prepared an outline of the proposed rationale, philosophy, and structure of the degree to form the starting point of discussion for consultation.

The work on a common Metro Group BEngTech degree coincided with a nationwide consultation convened by IPENZ about the National Engineering Education Plan (NEEP Project Governing Group, 2010) project which actively supported the development of three-year engineering degree qualifications at NZQF Level 7,[3] including the Metro Group common BEngTech degree. The IPENZ consultation covered all BEngTech degrees in Aotearoa NZ, including AUT and TOPNZ degrees. Consultations were held in the main cities and included meetings with representatives from Industry.

The Industry Consultation Group was concerned with issues relating to the BEngTech degree more broadly rather than focusing on the establishment of the common degree across the six institutions which was considered to be too detailed a subject for this group to discuss.

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[2] The Metro Group consisted of Christchurch Polytechnic Institute of Technology (CPIT), Manukau Institute of Technology (MIT), Otago Polytechnic, Unitec Institute of Technology, Wellington Institute of Technology (WelTec), Waikato Institute of Technology (Wintec). https://doczz.net/doc/7869414/what-is-the-metro-group%3F%2D%2D-why-the-metro-group%3F

[3] The NZQF is divided into 10 levels, ranging through qualifications from certificates to doctoral degrees. The levels are based on breadth and depth the learning is, with a level 1 certificate defined as being foundational. https://www.nzqa.govt.nz/providers-partners/approval-accreditation-and-registration/provider-categories/

Specific regional consultation and feedback was obtained by this group from Māori and Pasifika representatives and especially about how well suited the three-year engineering degree was to Māori and Pacific students, and how these students could be encouraged to enrol.

Development of a Common Course Structure

The Sydney Accord documents provided by the International Engineering Alliance (International Engineering Alliance, 2013) were used as a base for the development of the common BEngTech. The duration of the development process was about 15 months, commencing soon after mid-year in 2008 through to late 2009, leading to the establishment of the new first year BEngTech course programmes commencing from early 2010, with the second year commencing in early 2011 and the third year in early 2012. The development of the new common cross disciplinary degree was divided into three stages focusing on course structure, course descriptors, and course outlines respectively. These stages are now examined in more detail.

Course Structure

Stage 1 was the development of a common course structure for each of civil, electrical, and mechanical engineering options across the six institutions. Also, the standardising of course names and compulsory and optional courses across the six institutions and defining common courses such as engineering mathematics courses, a professional practice course, and the final year project course. This led to an equal number of courses required to complete the degree, and this needed a careful comparison with the existing course structures at each of the six institutions.

While there was only one course structure adopted for electrical and for mechanical engineering but with optional courses within that structure, in civil engineering there were five different course structure options comprising structural, roading, water, geotechnical and environmental. Each institution offering civil engineering would decide which of those five options they would offer. These options were based on a study of the existing BEngTech (Civil) degrees being offered across the six institutions. An environmental option was taken up by only one institution (Unitec). This used material from an existing four-year Bachelor of Engineering (Environmental) degree no longer available.

Comparing the existing course structures at the six ITPs was initially done as a desk top study. Only a few people were involved in a sub-committee to standardise the course structures, which initially had people separately examining the civil, electrical, and mechanical engineering course structures. The sub-committee then circulated a draft document for comment. This was followed by a one-day workshop held at MIT and attended by representatives of all six Metro Group institutions

where drafts were shared, refined and agreed and some lively discussions took place. This workshop was a key point in the whole process of establishing the common BEngTech degree across the six institutions.

An early issue to be resolved was that each institution had a different number of credits[4] for some subjects. Some still had 12 and 18 credit courses but it was agreed that the new course structure would be standardised on 15 credit courses. In general, the existing 12 credit courses were expanded to 15 credits. But some of the lecturers involved were resistant to shedding material from existing 18 credit courses to create new standard 15 credit courses and ways had to be found to solve this dilemma.

Another problem which emerged was that the electrical engineering lecturers involved in early formation meetings were tending to try and dominate direction and detail of the course structure for the common BEngTech degree, which did not sit comfortably with the civil and mechanical engineering lecturers. Eventually a more flexible approach had to be adopted in the process of course development.

There was also much debate over the size of the final year engineering project and the expectation that a student could complete a largely self-directed 45 credit project in one semester. This was past practice in some institutions, especially in electrical engineering. There were concerns that some students who were often working part-time would not be able to devote sufficient time to be successful, without lowering standards or without pushing the boundaries of academic integrity. Eventually it was agreed that there would be an option of completing this final year project over two semesters, and more recently this project has been reduced to 30 credits.

There were further concerns about inappropriate levels (usually too high) of learning and assessment, especially in the early courses/papers. This was difficult to standardise in words but was helped by a mechanism of peer reviews.

Course Descriptors

Stage 2 was writing the brief course descriptor for each course in electrical, mechanical, and civil engineering and the common courses, along with comparing the descriptors previously used for each subject at each of the six institutions, before coming up with new proposed course descriptors for the new common degree. This task was shared across several people from the various institutions to complete, then circulated for comment.

[4] The BEngTech degree totals 360 credits totalling 3600 h of learning.

Course Outlines

Stage 3 was then to complete the detailed course outline for each course, expanding from the agreed course descriptor for the new common degree and using material from individual course outlines across the six institutions. Again, this was divided up and handed to people from the various institutions to complete and then circulated for comment. The agreed course outlines were then reviewed, and a final version produced for each course. A further workshop was held for people from the various institutions to discuss and agree on each of the final course outlines as the process evolved.

Near the end of the process, IPENZ, later incorporated as Engineering New Zealand from 2017, was asked to comment on the proposed new common Metro Group BEngTech degree. This was because IPENZ would have to approve this new degree as part of its future accreditation process for the BEng Tech degree. IPENZ accreditation of the BEngTech three-year degree was essential for the recognition of this degree internationally.

By 2009 detailed charts of the new course structure had been developed for wide distribution in the various ITPs in time for the enrolment process for first year courses commencing in the first semester of 2010.

Collaboration, Governance, and Quality Assurance

In this section collaboration, governance and quality assurance are discussed.

An important factor in the success of the BEngTech over the years of its existence has been the successful co-operation of the teaching and quality assurance staff as well as other people such as marketing and administration staff at the Institutes (Hogan et al., 2014).

The original over-arching governance was provided by the Council of Engineering Tertiary Technical Education New Zealand (CETTENZ). This group included all the ITPs in the country and included IPENZ representation who also provided administration. Both the BEngTech and NZDE came under the umbrella of this Council, although it had no controlling or governance responsibility, it was more a forum to work together and provide a leadership group for ITP technical education in NZ. AUT ceased to participate when the Government required them to cease delivering Level 6 Diploma courses as they were now a University and they had their own 3-year degree. With the Metro Management Committee and newly formed New Zealand Board of Engineering Diplomas (NZBED)[5] in place it was decided that the Council was no longer required and ceased to operate in 2016.

The NZBED includes Management Committees with three technical groups (Civil, Electrical, and Mechanical) and a separate Quality Group. The NZBED also runs some common nationwide exams for core subjects. At one stage all exams in

[5] https://www.nzbed.org.nz/

the NZDE were proposed to be common throughout the country, and a return to the previous Authority for Advanced Vocational Awards (AAVA) model was mooted. The AAVA administered and awarded the NZCE. However, this was not feasible and too expensive, and local autonomy was seen as a positive requirement in the programme. The authors and moderators of the common exams were paid by the Consortium, and marking was undertaken at each ITP by the lecturer of the course.

In comparison, the Metro Group allows for all exams in the BEngTech to be set by local Institutes with no common National exams. A key innovative change in the way the BEngTech was administered came into practice in 2011 when the Metro Group commissioned an Operations Group which reported to the Management Committee for running of day-to-day activities of the providers and teaching staff. This allowed the Metro Management Committee to deal with governance, leadership, and industry engagement to advance a positive future for the programme and avoided being caught up in excessive amounts of operational discussions.

It was further proposed by Unitec and decided by the Metro Management Committee with support from the Quality Assurance Group to allow each ITP to deliver and assess a course based on their understanding of how to best serve their students, their region and, importantly, fit with the vision, goals, and practice of the Institute. This was added into the Programme Regulations of the degree and at each provider on the Course Descriptors. It was realised that although seen as a small country, Aotearoa NZ's large diversity of providers in different regions could never be completely the same, and this flexibility was the best approach to be taking if the programme was to be successful.

A framework with an autonomous, flexible, and collaborative model was essentially created which allowed both individual and joint innovative practice and was a much more progressive model through which to take the degree forward and to prosper. From that moment it was like a weight was lifted from within the Metro Management Group. Rather than voting to decide if a proposed change was suitable to everyone, and a provider possibly losing the vote for their proposition and having to tell their staff they could not implement a new teaching innovation that they wanted to embrace, decisions were made collectively for the good of all without the burden of trying to be all the same.

Hence from 2011 all delivery and assessment were not required to be standardised across the country, but rather local autonomy would be utilised for teaching and assessment. This was seen as progressive and collaborative and allowed each provider to deliver a course in a manner they felt was best suited to their region. Delivery options included online, block, and full semester courses, flipped and blended learning, inclusion of grade thresholds, and methods for ensuring priority group success, in particular Māori and Pasifika. These options, constrained within a framework and leadership structure, ensured a high-quality programme with international recognition. Previously there had been issues and disagreement about delivery methods, and compulsory rules, such as a 40% minimum threshold in coursework and exam grades, which some providers wanted to be included and others did not. The teaching innovation or new practice is shared and learnt from another ITP's experience, and everyone has the choice of whether or not to adopt this. These innovations included:

- Metro Vouchers – of up to $5 K in matched funding if industry contributed to a research project.
- A shared Moodle (online Learning Management System (LMS)) page to openly share class materials with other lecturers throughout the country. Any lecturer could log on to the page and share their materials or take what they needed.
- A tutor/research forum each year for lecturers to get together and meet, share experiences, and discuss classes and present research.
- Students throughout the country benefitted from institutes such as Otago Polytechnic, Unitec Institute of Technology, and Ara providing live video feed of certain courses. While these larger institutes could afford to deliver all or most of the elective courses within a particular engineering discipline, institutes with smaller student cohorts were limited in the range of courses they could deliver, and at other times found it difficult to hire a subject matter expert for a particular course. The collaborative model was thus of particular benefit to students studying in Aotearoa NZ's more remote regions.
- Soils and materials (concrete) laboratories in industry were used where needed rather than establishing laboratories on campus that would only be used a limited number of times a year. This saved the capital outlay and need for a dedicated laboratory technician. Companies such as Fulton Hogan provided their facilities. The downside of this was that when industry was very busy and needed the laboratory, the students could be pushed from their timeslot. Using the industry laboratories at weekends was an option considered to alleviate this issue.
- A shared mobile laboratory in a container was investigated that could move around the various campuses in the country. The drawbacks were being able to have an expert technician move around with the container and the high capital cost to set up.
- A shared marketing strategy was implemented for some years after 2010 where for a year a provider would designate their Marketing Manager to lead the marketing for the degree in collaboration with Marketing staff from each provider so they formed a BEngTech team. The team was tasked with organising and implementing new initiatives. The time/cost for the marketing staff was just absorbed at their place of employment and so no extra costs were incurred by the BEngTech Management group. This practice was very beneficial for the degree as the collaboration benefitted all the providers. The marketing teams enjoyed working together on shared best practice and the initiatives undertaken were successful in recruiting more students to the BEngTech. The profile was greatly enhanced throughout the country and regions.
- Cluster Moderation groups were formed, and tutor/research forums held each year where lecturers could get together to discuss their courses, and present research. Resources were shared over a Moodle site where learning and teaching material could be uploaded and shared with all lecturers. Sometimes lectures could be streamed across the country to providers with low student numbers to make the course costs viable. Similarly, laboratory space and equipment can be shared. For example, in the Auckland region, students from MIT travelled to Unitec to use the survey equipment and the soils/materials labs.

- Cluster and External Moderation allows for a National Quality Assurance check on the standards being delivered and assessed (with a small group of courses selected each year – not all courses every year), and appropriate actions recommended, as and if required. This is done in a collaborative and respectful manner, rather than a punitive style, and recognises the existing knowledge, experience, and professionalism of staff to deliver a degree programme of national significance. The system is not overly bureaucratic, and instead operates closer to university level which is appropriate for ITP's delivering degrees.
- Collaboration and sharing stories and methods with the group of providers in the BEngTech led to greater Māori and Pacific success and, importantly, the collection and sharing of data to measure and compare how the priority groups are performing across the country.[6]
- Accessibility and analysis of this data has allowed a leadership plan to be implemented to collectively increase success with the use of best practice from those that are doing well and providing any further assistance. For instance, Unitec's Engineering School created the strategy "Moana – The Pacific Way" to provide a pathway for Pasifika success, which was shared to other providers at various forums and meetings to show how this had led to a significant change from a low 45% success rate to 85% over a few years.

In summary, the most important outcome in the evolution of the Programme Regulations was that they allowed each Institute to deliver and assess courses in ways that best suited that Institute, whilst still meeting the outcomes required for each course and overall graduate profile.

Regionally this innovative and flexible practice methodology would seem to fit very well within Te Pūkenga[7] and its aspirations for future success of working together across the country for a shared vision of mahi kotahitanga (co-operation) and kaitiakitanga (guardianship) of learners.

More Recent Developments

Curriculum Development

Having established the new common BEngTech degree across the six Metro Group institutions, it was important in the years following the first completion of the final year of the degree in 2012 that there be further reviews of how the introduction of this common degree was working out in practice and then deciding what changes

[6] Personal communication D Phillips dphillips@unitec.ac.nz

[7] All ITPs will be part of a new government entity Te Pūkenga – New Zealand Institute of Skills and Technology from 2023 that will govern on-the-job, on campus, and online vocational education and training. https://tepūkenga.ac.nz/

might need to be made. During this period the Metro Group was disestablished and its role with this common BEngTech degree project was taken over by the newly formed NZ BEngTech Management Group.

In the civil engineering area, there was considerable curriculum development since the new BEngTech (Civil) started in 2010. The 45 credit MG7001 Engineering Development Project was changed to a 30 credits MG7101 Engineering Development Project for the new students starting in February 2015. There was a new study plan for new BEngTech students starting in 2015 which included the discontinuing of MG5031 Professional Engineering Development with some of the content being transferred to the revised MG7121 Professional Engineering Practice (previously MG7021).

Another notable change in the new 2015 study plan was MG7025 Project Management Principles was dropped as a civil compulsory course and replaced by MG5012 Highway Engineering as a new civil compulsory course. Also in the new 2015 study plan, Structural Principles was upgraded from Level 5 to Level 6.

It has been mandatory for all BEngTech (Civil) students to complete four specialization courses in their chosen field (structures, roading, geotechnical, water or environment) from the start of the common BEngTech programme. But, shortly after 2015, this mandatory requirement was downgraded and overridden by the new requirements to complete all compulsory courses, and seven electives with two of them at least at Level 7. This is seen to be the strategy to widen the scope of the BEngTech graduates and in line with the four-year BE course with no specialization major.

Since 2019, the BEngTech Management Group have embarked on the alignment of BEngTech courses with the NZDE programmes for the relevant civil, electrical, and mechanical courses. The purpose of this is that the aligned NZDE and BEngTech courses can be co-taught with the same learning outcomes, contents, and assessment, which is especially beneficial for the individual courses with a small number of students. However, when the student numbers are large, the aligned NZDE and BEngTech courses can still be taught separately. Now 11 Civil engineering courses are aligned for NZDE and BEngTech (DE6208 Civil Engineering Construction Practice became a new NZDE course in semester 1, 2021).

New Members

In late 2020, the original six members of the BEngTech Management Group were joined by the Open Polytechnic and Western Institute of Technology (WITT). WITT gained NZQA approval to deliver the programme in late 2020 and started delivery in early 2021. The Open Polytechnic has NZQA approval and, as at late 2021, were preparing courses to allow them to start delivering the programme in Semester 1 of 2022.

Joint NZDE/BEngTech Governance

The amalgamation of the governance of the NZDE and BEngTech had been discussed for several years as it was realised that the two qualifications needed to be better linked to provide a seamless pathway for students. The implementation of the Review of Vocational Education (RoVE) process initiated by the Labour government in 2019 provided the final impetus required to make the change. It was realised that both the NZDE and BEngTech governance structures were not compatible with the combination of all ITPs into one institution (Te Pūkenga) and with the programme accreditation moving to Workforce Development Councils (WDCs). In early 2021, the BEngTech Management Group and the New Zealand Board of Engineering Diplomas (NZBED) agreed to combine the governance of both programmes into one structure with one governing board. This change was later approved by the combined Board of ITP CEOs providing Te Pūkenga support for the initiative. At the time of writing (October 2021), a joint committee has been working on the details of the new body called the Vocational Engineering Education New Zealand (VEENZ).

VEENZ will be an Incorporated Society responsible for the governance of the NZDE and BEngTech qualifications. There is also scope for additional vocational qualifications such as micro-credentials and skill standards to be added to the VEENZ responsibilities. The VEENZ Board will have representatives from providers, industry members, WDCs and the Māori community. The main difference from the existing NZBED structure is that the VEENZ will have an Operations Group. The Operations Group will be responsible to the delivery of the programmes and is based on the BEngTech Management Group structure with the Operations Groups management team being mainly composed of members from each subsidiary delivering either the NZDE or the combined NZDE/BEngTech programmes.

It is planned to have VEENZ formally established in March 2022. When this occurs, the BEngTech Management Group and the NZBED will have a name change and a new constitution with all their responsibilities and functions taken over by the VEENZ.

Responding to Industry Needs

Curriculum development has been influenced by the changing needs of industry and the profession. One example of the responsiveness of the BEngTech Metro Group to industry's needs was Unitec's advice to the Royal Commission on the Canterbury Earthquakes in 2011 (Nummy, 2014). Unitec informed the Commission in August 2011 that civil engineers should all have a firm understanding of earthquake engineering, and that a review of the curricula was required to ensure that the interrelationship between geotechnical and structural concepts were embedded in the programme.

Indeed, this was a weakness that was identified in a review of the BEngTech curricula at Unitec in 2010 by IPENZ (now Engineering New Zealand). To address this need, Unitec led the way in developing the course Geotechnical Engineering C, which focussed on fundamental concepts of geotechnical earthquake engineering, and which would serve as the capstone course of the Geotechnical specialisation. Geotechnical Engineering C was ratified by the Metro Group network, and delivered for the first time in 2013, at Unitec.

Work on aligning the BEngTech with industry needs was influenced both by the Engineering E2E (education-to-employment) programme established in 2014 by the Tertiary Education Commission to increase the number of engineers in Aotearoa NZ and by establishment of a high-level steering group in June 2016 following an 'Engineering e2e Talking with Employers Workshop' held in June 2015 (Naylor, 2016; Vaughan, 2018). This group led a study into methods of engaging employers to improve education providers' understanding of what employers want from engineering graduates, particularly in Level 6 (NZDE) and Level 7 BEngTech courses.

Enrolment Trends and the Internationalisation of the Student Body

The development of the BEngTech common degree across the six institutions from 2010, for year 1 students, coincided with a period of rapidly increasing student enrolments and the increased internationalisation of the student body. The total EFTS[8] for all six participating ITPs are shown in Fig. 14.1. There was rapid growth from 2010 to 2012 with EFTS almost doubling as students and employers responded to the improved national profile of the collaborative degree.

More detailed analysis of student engagement can be obtained from data for the BEngTech (Civil) stream at Unitec. The figures below are from Unitec but they are typical of what was happening across the six Metro Group institutions.

From a disappointingly slow start in 2001, enrolments in the BEngTech (Civil) degree programme at Unitec plateaued over the period from 2006 to 2009 but then rose rapidly from 105 EFTS in 2009 to 252 EFTS in 2015, an increase of 140% over the six-year period. This was followed by a small decrease in EFTS numbers to 222 in 2016 and 210 in 2017 (see Fig. 14.2).

At the same time the rise in international students on the BEngTech (Civil) programme at Unitec rose from 12.5% in 2009 to 36.3% in 2015. The reasons for this rise are firstly the introduction of the common BEngTech degree programme introduced in 2010 across the six institutions as opposed to the previous situation where each institution had its own BEngTech degree programme. Secondly, changes in the student visa rules allowed individual students and their spouses to work and the

[8] A typical full-time student in the BEngTech studies 8 × 15-credit courses in a year, representing one Equivalent Full-time Student (EFTS).

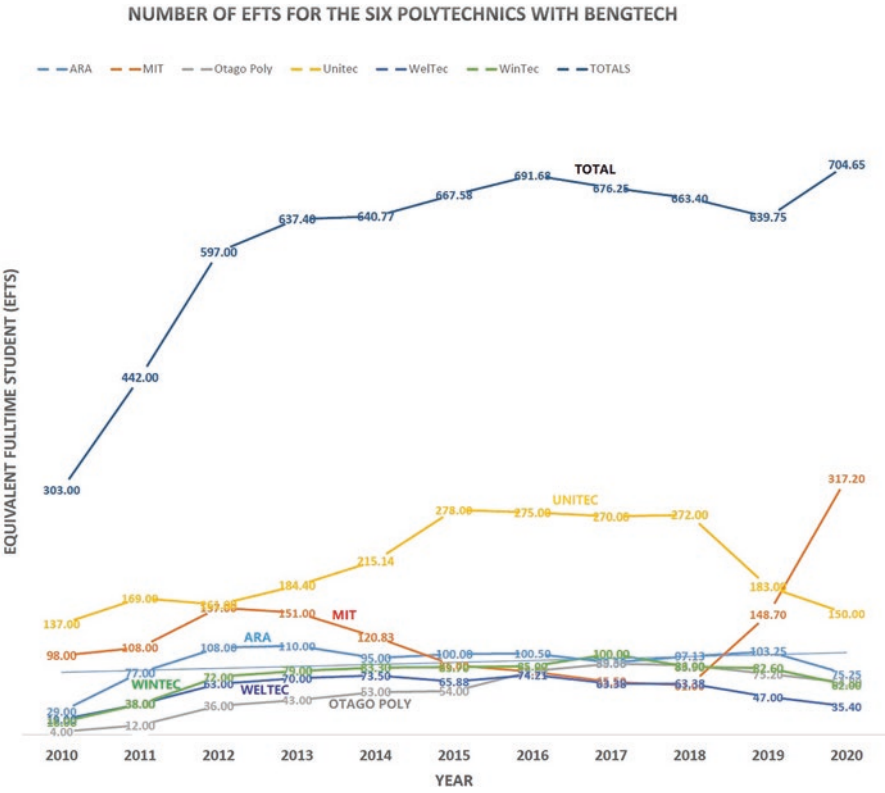

Fig. 14.1 BEngTech: Enrolments (EFTS) in all 6 ITPs for all disciplines 2010–2020

transition to residence was made easier for students who wanted to stay on in Aotearoa NZ after graduating to gain engineering experience. Finally government sponsored campaigns promoted engineering as a career and made employers and the public more aware that the 3-year degree and 2-year diploma were excellent routes towards an engineering career.

The decline in numbers from 2015 was likely due to two main factors. Firstly four other tertiary providers in the Auckland and Waikato regions offering new civil focused degrees. Secondly Unitec suffered reputational damage due to an unsuccessful 'transformation' restructure between 2013 annd 2017 and subsequent successive NZQA category[9] downgrades, from NZQA Category 1 to 2 in late 2016, and Category 2 to 3 in late 2018, that created difficulties in processing international visas (Cooke, 2018; Loo, 2018).

[9] NZQA places non-university tertiary education organisations (TEOs) into one of four categories based on their EER statements of confidence. https://www.nzqa.govt.nz/providers-partners/approval-accreditation-and-registration/provider-categories/

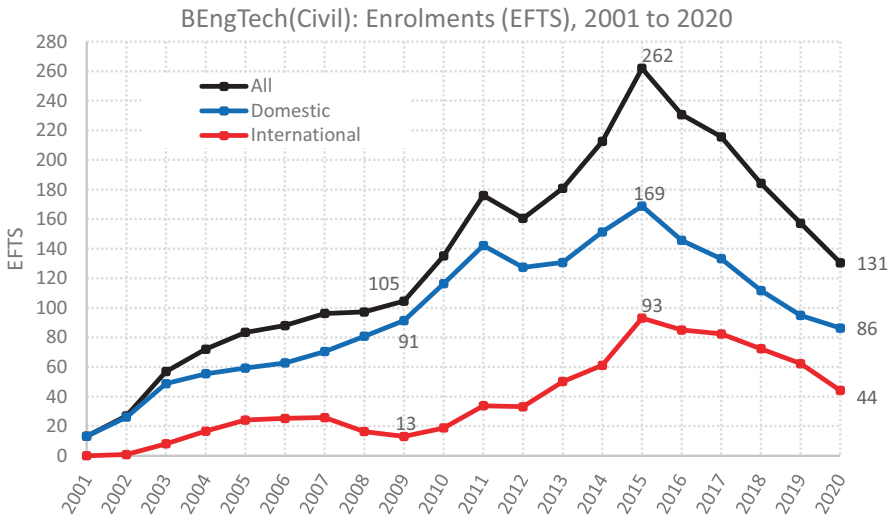

Fig. 14.2 BEngTech (Civil): Enrolments (EFTS)

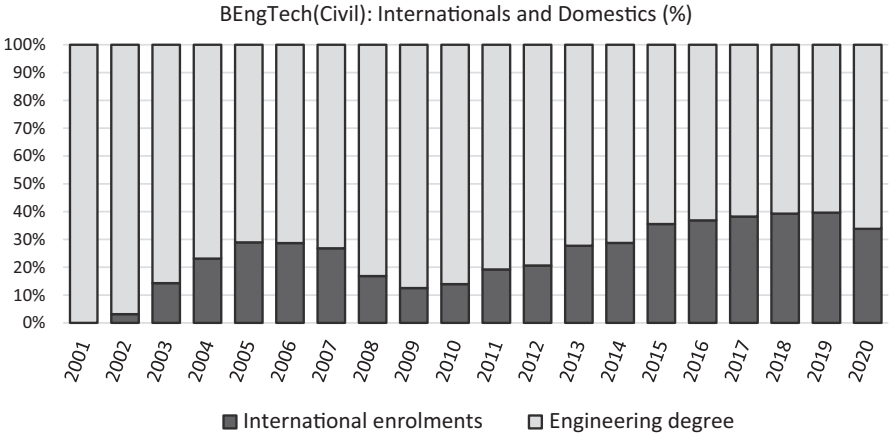

Fig. 14.3 BEngTech(Civil): Percentage of International students

International enrolments increased by over 700% from 2009 to 2015 (13–93 EFTS) (Fig. 14.3). The proportion of international students increased from 12.5% to 40% in 2019.

For context Diploma in Engineering (Civil) enrolments are shown in conjunction with BEngTech (Civil) enrolments in Fig. 14.4.

A significant percentage of students starting on the Diploma of Engineering (Civil) go on to study the Bachelor of Engineering Technology (Civil) (Fig. 14.5).

From 2010 to 2020 the Metro Group BEngTech (Civil) BETMG enrolled a total of 601 International EFTS from 31 different nationalities (Fig. 14.6).

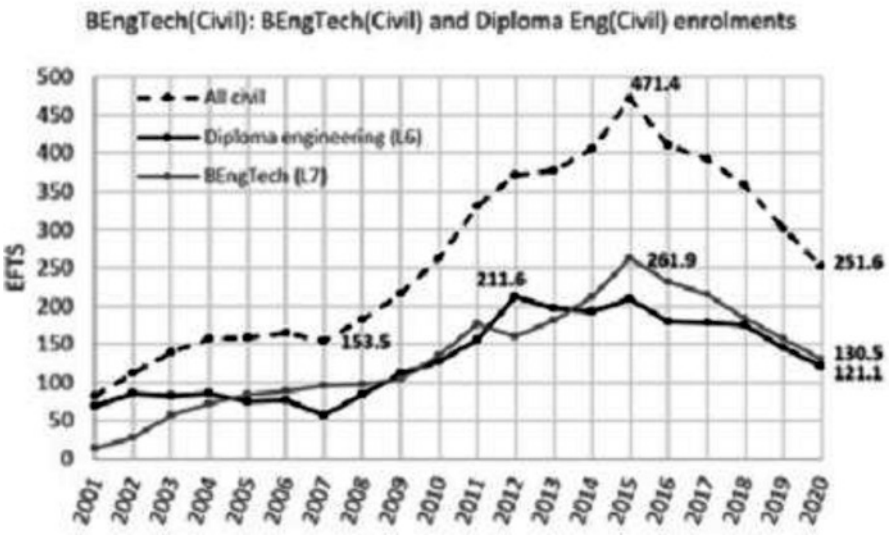

Fig. 14.4 Diploma in Engineering (Civil) enrolments and Bachelor of Engineering Technology (Civil) enrolments

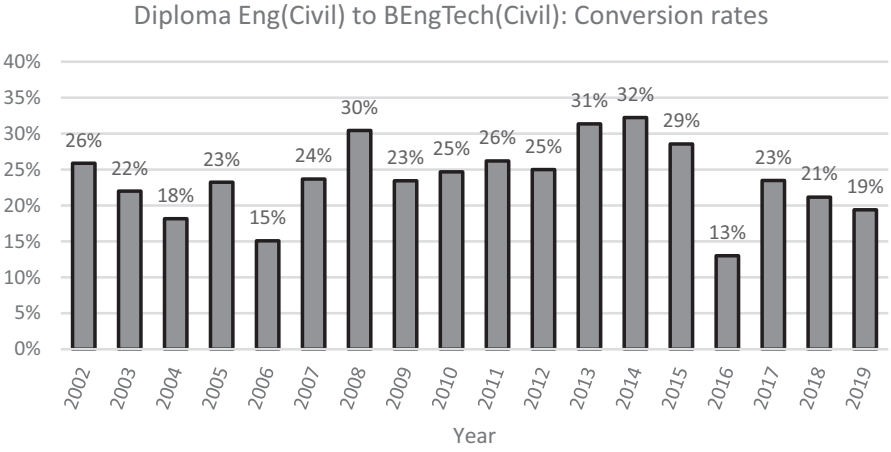

Fig. 14.5 Percentage of students *starting* the Diploma in Engineering (Civil) in a certain year who go on to study the Bachelor of Engineering (Civil)

By geographic region from 2010 to 2020, 60.4% of international students were from Asia, 25% from the Pacific, and 9.4% from the Middle East (Fig. 14.7).

International students typically outperform domestic academically (Fig. 14.8).

In 2010 female enrolments approached 10% of EFTS enrolments and have comfortably maintained above that level since then, with a maximum of 17.1% in 2019 (Fig. 14.9).

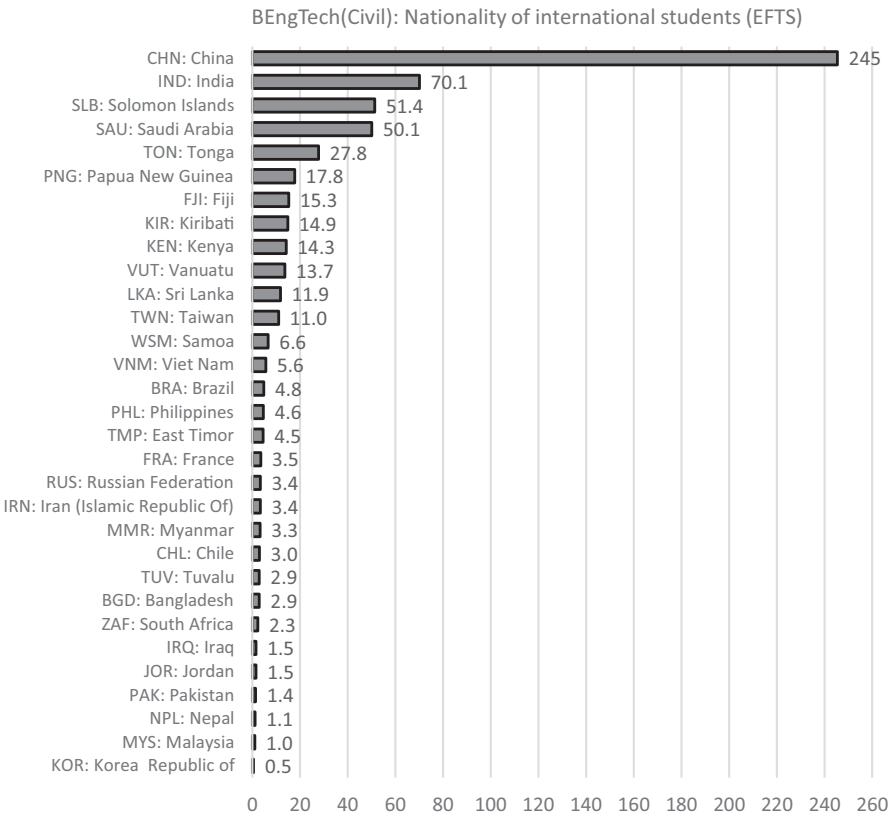

Fig. 14.6 BEngTech (Civil) students (2010–2020). Enrolments by nationality

Female students consistently outperform male students in terms of course success (Fig. 14.10).

Māori and Pasifika enrolments (domestic) enrolments are shown in Fig. 14.11.

Over the past 10 years, Māori/Pasifika enrolments have fluctuated between 9.5% and 18.7% of domestic enrolments calculated in terms of EFTS with a maximum 18.7% in 2019 (Fig. 14.12).

Māori students have typically outperformed domestic non-Māori/Pasifika students, in terms of course success (Fig. 14.13). Domestic Pasifika underperformed.

International Pasifika students are the highest performing group, performing far better than not only domestic Pasifika students, but all other non-Pasifika students as well (Fig. 14.14).

The statistical parameters for the age distribution by enrolments at the start of the semester of study (Fig. 14.15) are shown in Table 14.1.

Academic performance increases with age (Fig. 14.16).

Full-time enrolment is preferred by a majority of students (Fig. 14.17).

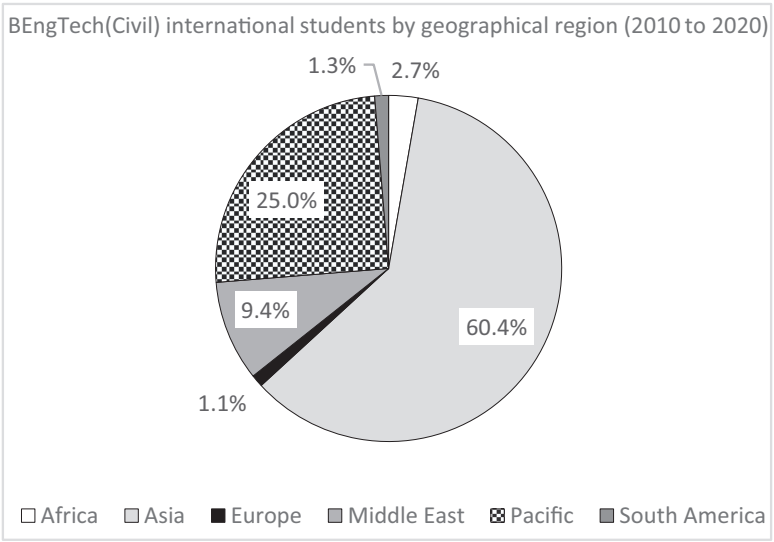

Fig. 14.7 International students by geographical region

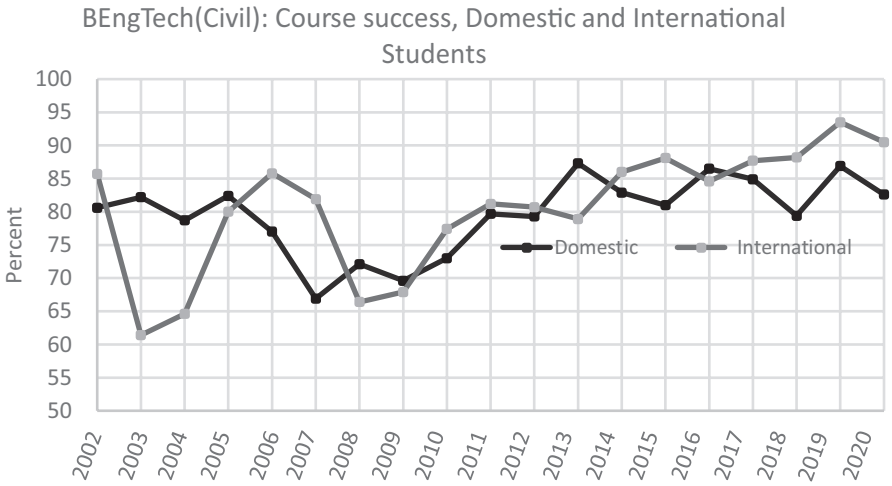

Fig. 14.8 BEngTech (Civil): Course success, international compared with domestic students

Full-time students have typically performed better than part-time students (Fig. 14.18).

In the BEngTech (Civil) the structural and geotechnical specialist courses have the most enrolments over the period 2010–2020 (Fig. 14.19).

The BEngTech (Electrical) started in 2015. EFTS peaked at 52.1 in 2016 but, as with the BEngTech (Civil), have declined since then (Fig. 14.20).

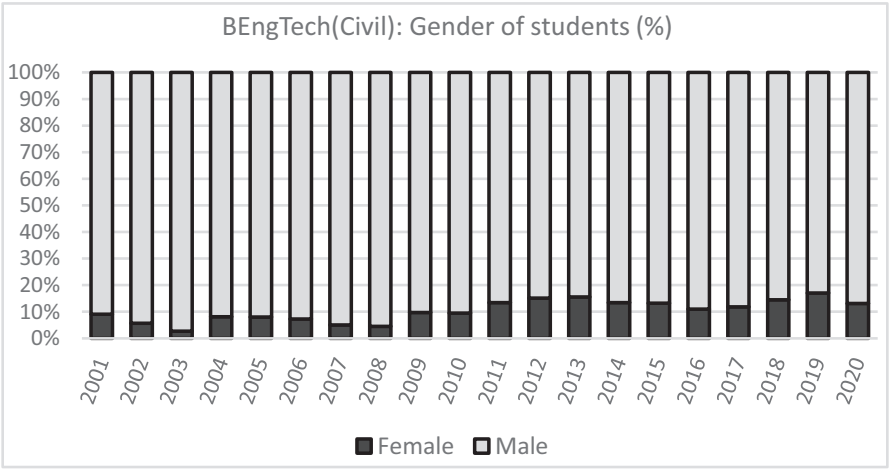

Fig. 14.9 BEngTech (Civil): Gender of students by percentage (calculated in terms of EFTS)

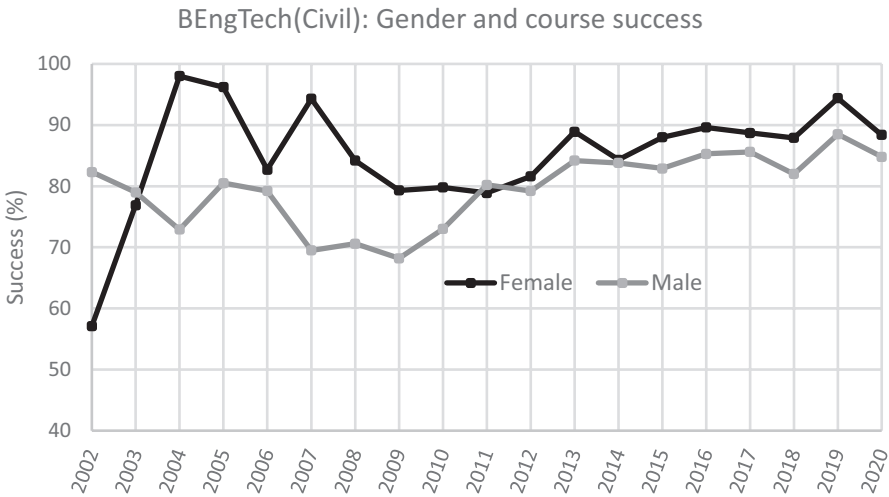

Fig. 14.10 BEngTech (Civil): Course success and gender

Future Collaborative Model Development

Hogan et al. (2014) reflected on the development of the collaborative BEngTech after 5 years of delivery and concluded that the collaborative structure produced beneficial outcomes for students, tutors, and industry. Maintaining group communication was noted as a challenge. This is easier today with the wide availability and use of communications platforms such as MS Teams and Zoom.

Based on experience in the development and delivery of the BEngTech over the past 10 years the authors identify a range of desirable features below in the development of the collaborative BEngTech programme.

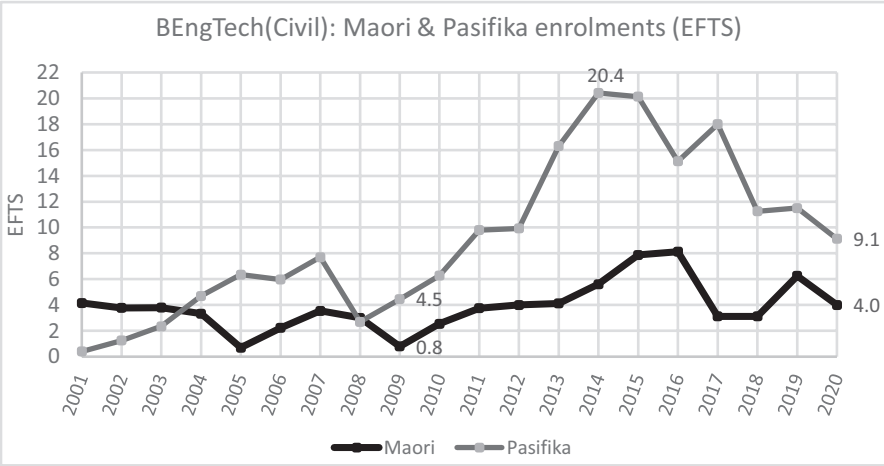

Fig. 14.11 BEngTech (Civil): Domestic Māori and Pasifika enrolments

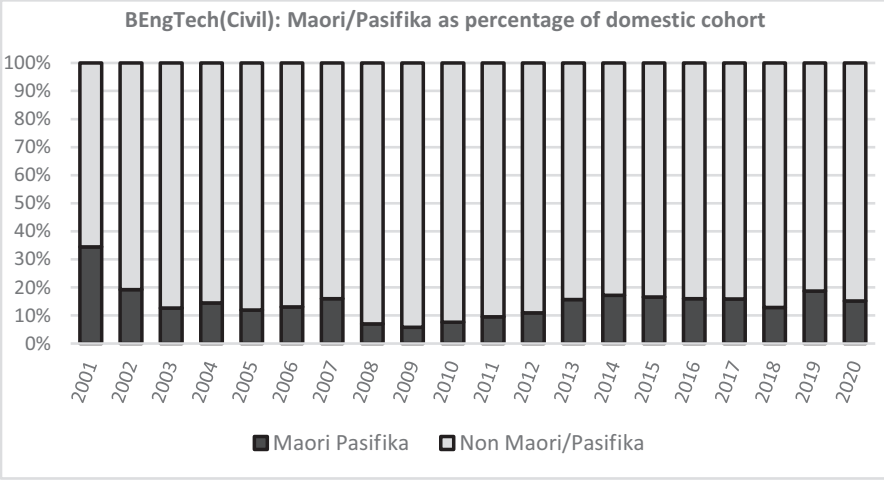

Fig. 14.12 BEngTech (Civil): Māori and Pasifika enrolments as percentage of domestic cohort

Features of the Collaborative Model

Features of the collaborative model are:

- The various institutes throughout the country recognised the desirability of a single consistent qualification across Aotearoa NZ, attributes that employers would readily recognize. Students may start their qualification at one institute and complete at another. The qualification is internationally benchmarked against the Sydney Accord.

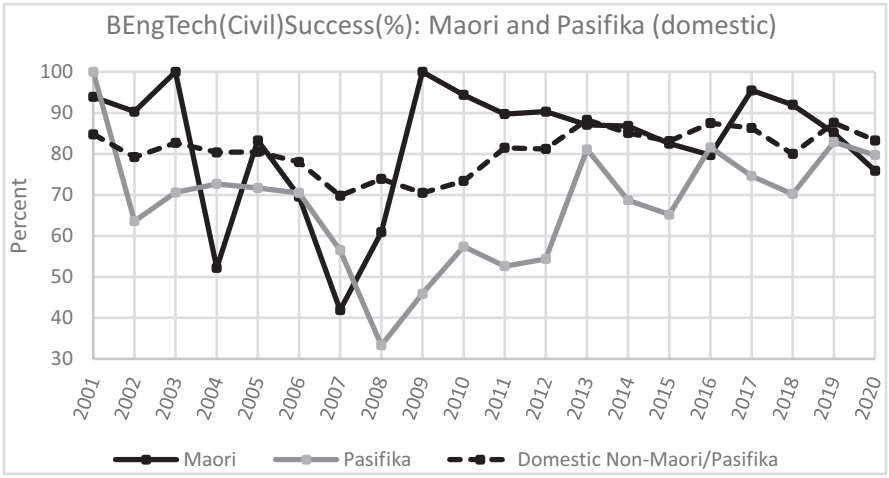

Fig. 14.13 BEngTech (Civil): Māori and Pasifika students course success, compared with non-Māori/Pasifika

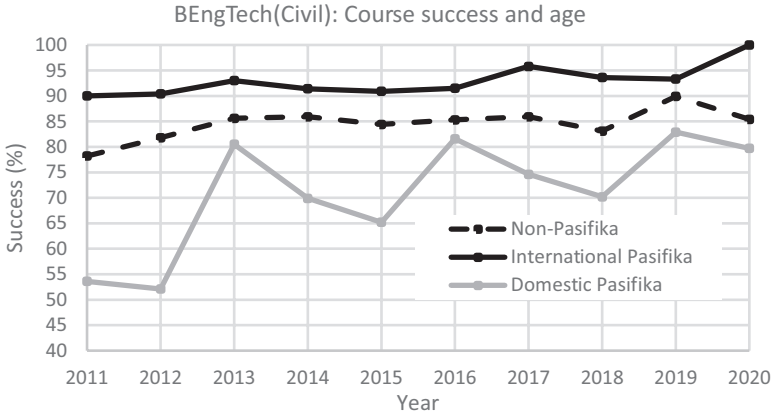

Fig. 14.14 BEngTech (Civil): Course success, Pasifika internationals cf. domestic, cf. with all non-Pasifika

- Industry has significant involvement, particularly through Engineering New Zealand who accredit the BEngTech programme, and the institutes regularly meeting with local industry advisory groups through the country.
- Academics across six large polytechnics agree on learning outcomes and content for the courses of the BEngTech. The course descriptor documents while common to all providers provides significant latitude for local autonomy in delivery and assessment. (It is noted that three other institutes still deliver their own version of the Sydney Accord qualification).

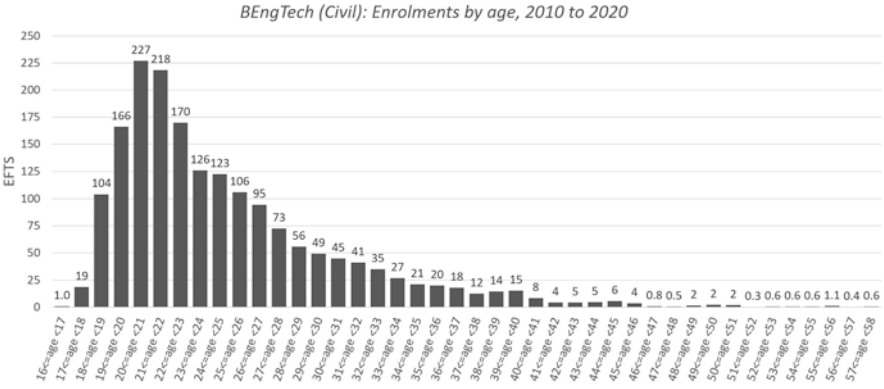

Fig. 14.15 BEngTech (Civil): Enrolments by age, 2010–2020

Table 14.1 Statistical parameters for the age distribution

EFTS	1824
Average age	24.8
Median age	23.0
Oldest	57.9
Youngest	16.3
SD	5.8

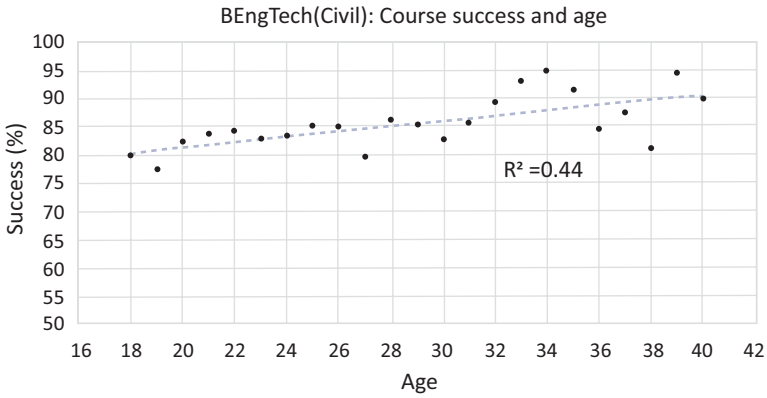

Fig. 14.16 BEngTech (Civil): Relationship of Course success with age

- The BEngTech programme for each discipline is a mix of common core compulsories, discipline-specific compulsories, and discipline-specific electives.
- Different institutes can choose to deliver, or not to deliver, different elective courses. This is one way that local flavour and variation can be expressed. For

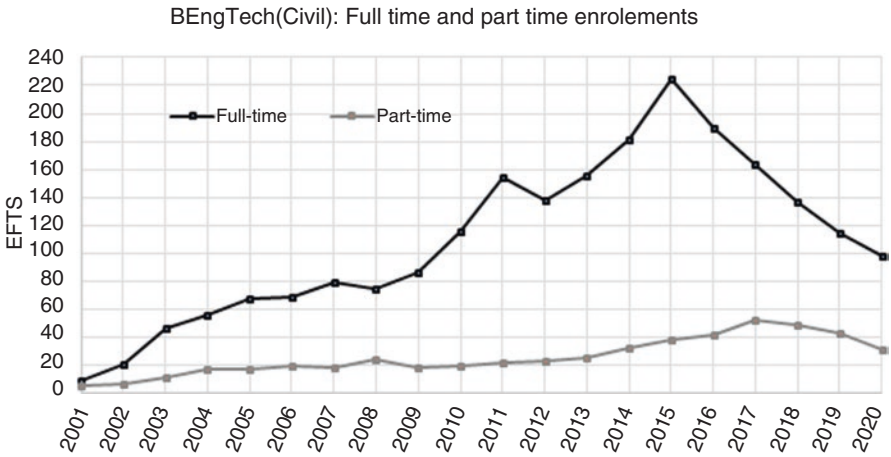

Fig. 14.17 BEngTech (Civil): Full-time and part-time enrolments

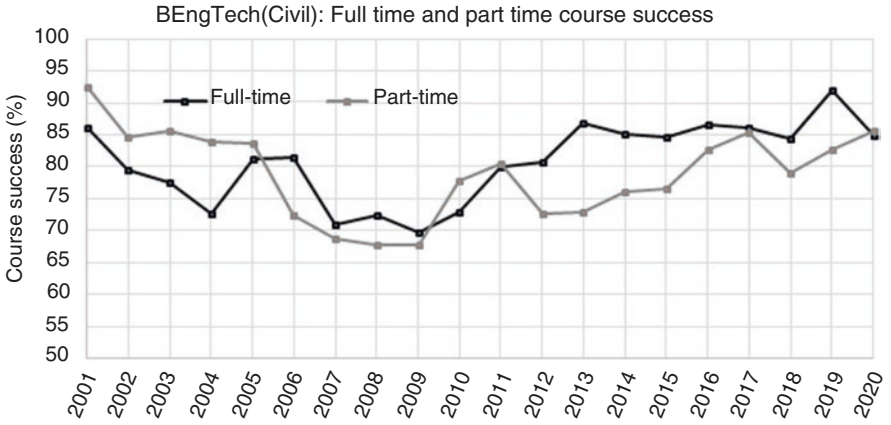

Fig. 14.18 BEngTech (Civil). Full-time and part-time students success compared

example, Unitec is the only institute that has delivered the entire geotechnical engineering specialisation.

- Institutes develop and deliver courses that only their institute has the current capability or desire to deliver. At the same time, the staff at the various institutes continually benefit from feedback from colleagues of the other participating institutes, and from support and advice of the quality infrastructure provided by the wider group.
- All courses are standardised with course names and codes that apply throughout all participating institutes. Courses completed in any part of the country are automatically eligible for cross-credits at any of the other institutes which deliver the BEngTech.

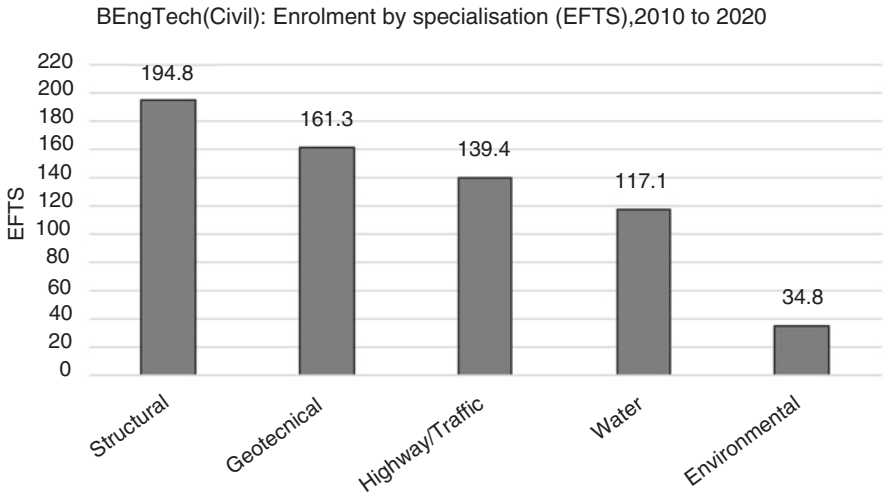

Fig. 14.19 BEngTech (Civil): Enrolments by specialist courses

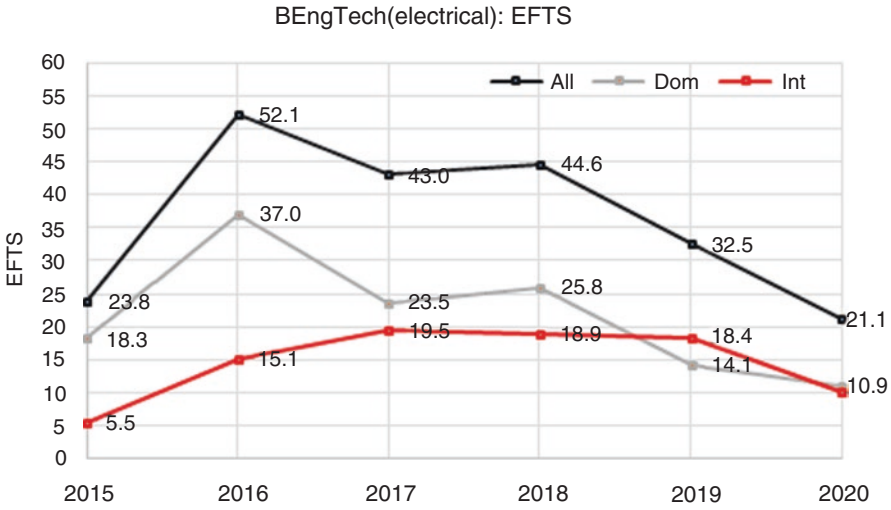

Fig. 14.20 BEngTech (Electrical) enrolments

- The programme document (course descriptor) specifies assessment type, weighting, and learning outcomes. Learning outcomes and content are typically specified broadly, and course preparation and delivery is selected by individual institute and lecturers within the institutes.
- Assessments may include items like assignments, tests, practicals, projects, or an exam. Beyond this point, each lecturer has autonomy in writing assessments, provided they conform to the broad requirements of the course descriptor.

- Cluster moderations are held annually, allowing lecturers from the various institutes to converge, review one another's course material and assessments, rate them, and moderate marking. It is always beneficial to see the many ways that different lecturers approach a course, such as engineering computing, even while achieving the same ultimate learning outcomes and graduate attributes.
- Any academic at any of the participating institutes can propose changes to courses and curricula for discussion with colleagues at other institutes prior to implementation. Quality assurance exercises assist in ensuring the course descriptors meet the academic requirements and standard practice appropriate to the level at which the course is delivered.
- One lead tutor is appointed for each course, to facilitate discussion over changes and to assist in sharing new ideas for all academics teaching the course.
- Course material developed at any one institute can be uploaded to a shared Moodle site, making it freely available for use. Lecturers can also share material and ideas by exchange of emails or at the annual meeting, and other meetings such as cluster moderations.
- There is no stipulated central office for the engineering group, but rather a dispersed community of engineering educators governed by committees drawn from the staff. The network facilitates discussions, sharing, and interchange of knowledge and best practice throughout the country, while at the same time setting and monitoring regulations for the qualification.
- Annual meetings have typically been held at Weltec, simply as a matter of optimising convenience of travel, given Wellington's geographically central location.
- A research forum is part of the annual meetings that include the participation of Engineers New Zealand. Staff of the participating institutes submit research articles and delivery presentations with a balance of topics relating to engineering pedagogy and applied engineering research. This has been an excellent forum for sharing of educational experience, particular challenges, and methodologies across the country.

Conclusion

This Chapter has outlined how six ITPs undertook the collaborative work necessary to develop a common BEngTech three-year degree for delivery across those institutes of year one from 2010 to year three in 2012. The work involved establishing governance and quality assurance protocols, formulating course content that aligned with industry needs and international practice, implementing collaborative and flexible delivery mechanisms, sharing of resources, and cooperating on marketing strategy.

More recently the number of ITPs has expanded to eight members and more would have joined if the RoVE initiatives had been fully implemented. The amalgamation of all 16 polytechnics into Te Pūkenga and the change of qualification accreditation structures has sped up the process of integrating the governance of the

NZDE and BEngTech programmes and better promote the role of the BEngTech as the high level vocational qualification for engineering.

It is hoped that this may serve as an exemplar to inform Te Pūkenga of one model for common programme development worthy of adoption and refinement.

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Chapter 15
Developing an Engineering Degree Apprenticeship with a Pathway in Infrastructure Asset Management

James Mackay and Hana Cadzow

Abstract This chapter is intended to provide insight into the design and early piloting of Aotearoa New Zealand's (NZ) first degree-level apprenticeship. Despite the growing need for engineering technologists nationally, current enrolments for this polytechnic degree nationwide are declining. This trend, along with the critical shortage of infrastructure asset managers both worldwide and nationally are the two main motivating factors for the development of this degree-apprenticeship.

Drawing from current literature and international practice (particularly in the United Kingdom), an industry-led curriculum design approach was used that resulted in the creation of an infrastructure asset management pathway within each major of the Bachelor of Engineering Technology (BEngTech) degree. This included a strong work-integrated learning component, supported by classes given by the workplace professionals who act as mentors to the apprentices in the programme.

The development of specific curriculum features aimed at ensuring continued industry engagement and support, includes a partnership with industry experts in the design, delivery, assessment, and evaluation of the curriculum, as well as the integration of professional body micro-credentials into the courses we have co-designed.

The evaluation of the pilot draws on frameworks used in other curriculum analyses (Brown, J Technol Educ 20(2):8–22, 2009; Thornton, Curriculum consonance in United States history classrooms. Doctoral dissertation, Stanford University, 1985). The various foci of this evaluation include the impact the programme has on Māori and Pacific students, women in engineering, and the industry that has supported the initiative. Finally, we outline some of the challenges faced in setting up the programme as well as some of the projected long-term goals of the project.

Keywords Engineering education · Degree apprenticeship · Industry co-design of curriculum · Curriculum development

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_15

Introduction

In the trades, where there is an emphasis on practical skills development, apprenticeships have been a well-accepted form of training worldwide. The development of higher degree apprenticeships demands a closer reliance on theoretical knowledge, as work-based academic education is combined with vocational training. Such work integrated degrees have been fairly widespread in countries like Germany, Austria and Switzerland since the 1960s (Graf, 2016), but in the United Kingdom (UK), degree apprenticeships have only really become a strong feature of the national education platform in the last five years (Rowe et al., 2016). This is directly attributable to the increased demand for a skilled workforce and the changing nature of the skills needed in a modern economy, with employers wanting to have a stake in the education and training of their own employees. In Europe and the United Kingdom, the concept of apprenticeship, has been expanded to include even master's degrees.

According to Bradley et al. (2019), apprenticeship reforms in the UK have paved the way for Higher Education (HE) providers, including universities, to create new work-based HE pathways for people who are currently in employment. One aim is to generate a new cohort of skilled individuals deemed necessary for the growth of the economy in the future. This requires the direct involvement of employers in the design and delivery of Degree Apprenticeships, which has resulted in a change in employer attitude in the past few years (Powell & Walsh, 2018).

Apart from developing a better and more appropriately skilled workforce for industry, degree apprenticeships have also been found to provide greater opportunity for social mobility and the representation of women and minorities in those occupations where they have been traditionally underrepresented (Clarke, 2018). In her research, Clarke (ibid) provides evidence that higher-level apprenticeships can improve social mobility, by making access to HE affordable to all, irrespective of societal standing. For mature learners wanting to develop or change their career, or who need to continue to support themselves or their family, degree apprenticeships are an obvious solution. This is true even in comparison to more traditional "part-time models" where learning is undertaken at a slower pace but still outside of the workplace. The ability of apprenticeship models to identify, guide and develop workplace activities as learning enables people to develop skills from mentors who are experts in the field and in the long term 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 & Barker, 2018). Bradley et al. (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.

While workplace mentoring is widely recognised as valuable and while Aotearoa NZ government policy documents over the last decade have committed to

supporting Māori and Pasifika learners in this regard, there has been 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.

Allowing industry to lead both the development and delivery of the curriculum transfers ownership of the apprentice education to the employer. Research shows that this leads to consistently high standards of training and development embedded in the workplace, which lasts long after the training phase until after the apprentice has graduated. Thus, high levels of collaboration between employers and educationalists deliver better balanced individuals (Goodyer & Frater, 2015).

From a socio-cultural point of view (Vygotsky, 1978), the creation of learning relationships between more knowledgeable mentors and apprentices, allows the apprentice to learn the tools of the profession while under guidance from an expert, who can mediate the work so that it is at the correct level for learning. The apprentice in this case is also inducted into a social community within the workplace. Critical to this curriculum is Vygotsky's concept of the *zone of proximal development* and the role of the *more knowledgeable other* in the development of the apprentice. The careful balance of the kind of learning opportunities provided with the needs of the apprentice, allows us to scaffold the apprentice's learning within the workplace environment in a way that makes sense to both the apprentice and the organisation. This approach 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-centered 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 task is not too difficult so that they feel out of their depth, but it is difficult enough so that they feel that they have accomplished something once it is learned. The benefit to the employer is twofold, they can influence the direction of their employee's education in a way that is desirable for the organisation. While apprentices would develop key skills and knowledge that are useful to the companies employing them, the intention is that they would also be independent critical thinkers and eventually capable of making important infrastructural decisions on their own, drawing on both their technical knowledge as well as their knowledge of the various societal and cultural drivers that influence infrastructure planning and development. Secondly, employers would benefit from any mentorship training that was made available and so the professional development of the mentors through the experience of mentoring and learning to mentor would in the long term make for an organisation that was more open to learning. This reciprocity, while not being a key objective of the project, is an added benefit to participating organisations.

This application of social constructivist ideas aligns well with the way learning occurs in traditional Māori society. In the tuakana–teina relationship, 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). This is a learning environment

that recognises the value of ako, and 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 than the traditional engineering degree and diploma offerings.

From the outset, the intention of this project was to have an employer-led design approach to curriculum development. This was based on the Trailblazer approach, where a "Trailblazer group" is a group of employers drawn from an industry with the responsibility of developing a description of the occupation for the degree apprenticeship, developing the degree standard and end point assessment plan, and then promoting it within the industry. This approach was pioneered by Manchester Metropolitan University and introduced to the Aotearoa NZ project by Jane Goodyer (Goodyer & Frater, 2015). Manchester Metropolitan University is the largest single provider and arguably the most successful provider of degree apprenticeships in the United Kingdom, and so it made sense to draw on their experience and expertise. This approach can be broken down into five separate steps as listed below:

1. Specification and delineation of an occupation within the broad field of Engineering.
2. Creation of an industry reference group.
3. Development of a degree standard.
4. Development of an end-point assessment plan.
5. Alignment of the degree standard and end point assessment plan with the existing curriculum

This is different to most curriculum development processes undertaken within the engineering community in Aotearoa NZ, where development is carried out primarily by academics, who might draw on industry experience to confirm changes to programmes, but not place industry centre stage in the development process. In the process undertaken in this project, industry lead the initial development, are involved in the teaching and assessment, and will continue to lead curriculum development initiatives throughout the degree's lifespan.

Selecting the Occupation

There were two reasons why we selected asset management as a suitable pathway within the field of engineering. The first is that Aotearoa NZ has a shortage of infrastructure asset managers, with nearly one third expected to retire in the next decade. Councils around the country have felt this shortage most acutely. Secondly, most degree apprenticeships in the UK rely on large industries for support, such as Jaguar and Airbus (who has approximately 50 degree-apprenticeships across fields ranging from Engineering to Information Technology and even Accounting). Aotearoa NZ does not have such large industries able to absorb degree apprenticeships, but the combination of councils and their contractors and consultants, constitute a large

enough body of engineers (and engineering related occupations) that could support a degree apprenticeship. There are approximately 1200 such people in Aotearoa NZ, all members of the Institute for Public Works engineering, Australasia (IPWEA).

Creating an Industry Reference Group

Choosing the occupation of Infrastructure Asset Manager came with considerable support from IPWEA, who have been working towards increasing the pool of asset managers in the country. Using their networks, 35 engineers involved in asset management were approached and they were all initially interviewed to identify in detail, exactly what an asset manager did. This then defined the occupation and was followed by interview questions on what attributes they would want from a young recruit. These engineers then formed a reference group to drive the curriculum development in the short term and the implementation of the degree apprenticeship in the long term.

Developing the Degree Standard

As outlined in Goodyer et al. (2017), initial interviews were followed by workshops that brought asset managers together to reach consensus regarding a key set of outcomes (knowledge, skills, and behaviours) that they would like to see in their new recruits. Once these outcomes were agreed, they were included in a degree standard, a short document outlining the qualification.

The development of the degree standard was followed by two separate processes. The first was the mapping of the set of outcomes with other asset management qualifications at both higher and lower levels to the degree as well as with the internationally recognised 66 requirements of ISO55001, the worldwide standard in asset management. There was a continual adjustment (adding to and streamlining the set of outcomes), with constant reference back to the reference group as well as important experts identified by the reference group. This process ensured that the defining set of outcomes for the degree was determined by the asset management reference group and that they had an active part in that determination. It was also evident from this process that the set of outcomes chosen for the degree standard would require ongoing revision as the asset management needs of the country shifted with time, both in terms of climate change as well as the ongoing advances in technology and data handling. Already, the advent of COVID-19 has placed new demands on the asset management industry and consequently some assessments have already been changed to address this. Having a close relationship with industry means that through our industry reference group, we can change and introduce new courses to address current industry needs.

In this particular instance it was identified that the degree standard, as developed by industry with support from academics, closely resembled the existing Bachelor of Engineering Technology (BEngTech). The BEngTech is a level 7 engineering degree delivered throughout Aotearoa NZ with 3 major strands; Civil, Electrical, and Mechanical Engineering. (see Chap. 14 for detail and discussion of the development and delivery of BEngTech). The full process of aligning the degree standard with the BEngTech is described below.

Developing an End Point Assessment Plan

The completion of the degree standard finalized what industry expected from their graduates. The next task was to develop an assessment plan that would ensure a strong partnership between the HE providers and Industry. For this *end point assessment plan*, a similar process of consultation and allowing the industry to drive the process was used. The endpoint assessment plan includes a detailed project report on a capstone project, a presentation of a portfolio of work outlining how the graduate profile has been met, as well as a technical interview with a panel of experts drawn from both industry and academia. This annual process is duplicated for students coming to the end of any block of work in a smaller version we have called the gateway assessment.

To develop this plan, members of the reference group were asked to identify ways in which the set of outcomes listed in the degree standard could be assessed in the workplace. Those outcomes not possible to assess in the workplace, were placed to one side for the final step in the curriculum development process, that is, the alignment with the then current BEngTech. Again, the process of developing an end point assessment plan was driven by consensus and led by industry.

Constructive Alignment with the Existing BEngTech Degree

The final part to the process was the alignment of the outcomes with those of the BEngTech in each of the majors, civil, electrical, and mechanical engineering. This part of the process was driven by the academics attached to the project and familiar with the BEngTech. Some outcomes of the degree standard, in particular those specific to the asset management field, were not present in the existing BEngTec qualification. These ‘left-over’ outcomes were grouped together into three new courses focused on asset management and which together constituted an asset management pathway, or specialisation within each major. Once the new subjects had been proposed, they were then returned to the reference group for ratification.

The penultimate stage of the constructive alignment process involved accreditation with Engineering NZ (ENZ, Te Ao Rangahau), the umbrella engineering association accrediting degrees and diplomas in engineering in Aotearoa NZ and bestows

chartered status on engineers working in their various fields. Accreditation with the NZ Qualifications Authority (NZQA) for the degree to be offered to students was the part of the constructive alignment stage. Accreditation is discussed in a separate section below.

The Degree Structure

Part of ensuring a qualification continues to meet industry's needs requires ongoing participation in the delivery of the qualification. This allows the tertiary institution delivering the teaching component of the qualification to also remain at the cutting edge of the industry and draw on real industry experience in the teaching.

The degree developed was a three-year Bachelor of Engineering Technology Degree, which is offered by ITPs in Aotearoa NZ and accredited internationally by the Sydney accord. This must be differentiated from the four-year professional engineering degree offered by universities and accredited worldwide through the Washington accord. The original plan was to have most of the degree delivered and assessed through the workplace and for there to be a separate major in Asset Management. For this plan, the accrediting body for the Sydney Accord (Engineering NZ), indicated that they were not comfortable with the introduction of a fourth major and after considerable negotiation, a compromise was reached. What transpired in the end, was a much more structured degree with a pathway in asset management within each of the majors (Civil, Electrical and Mechanical) and just less than 50% of the degree delivered and assessed in the workplace. In hindsight, this has given us as much status as a major, as it is the only pathway that is offered across all majors. This is an important point as assets and therefore asset managers exist in all fields of engineering.

This structure of the degree was eventually accepted for accreditation by both NZQA and Engineering NZ. While the exact pathway of individual apprentices is variable based on their workplace requirements and opportunities, the initial programme structure is outlined in Fig. 15.1.

Originally a three-year full-time degree, there are now several structural differences listed below:

1. Three blocks of study replace 3 years of study, making it more flexible for apprenticeships
2. Related courses are grouped so that they can be embedded into work-place projects.
3. Gateway assessments between blocks of work ensure that none of the necessary outcomes of the work-integrated courses are lost and that the graduate profile is met.
4. The end-point assessment will evaluate the final synoptic project.
5. A new asset management pathway has been created in each existing major
6. Industry short course micro-credentials have been integrated into the degree.

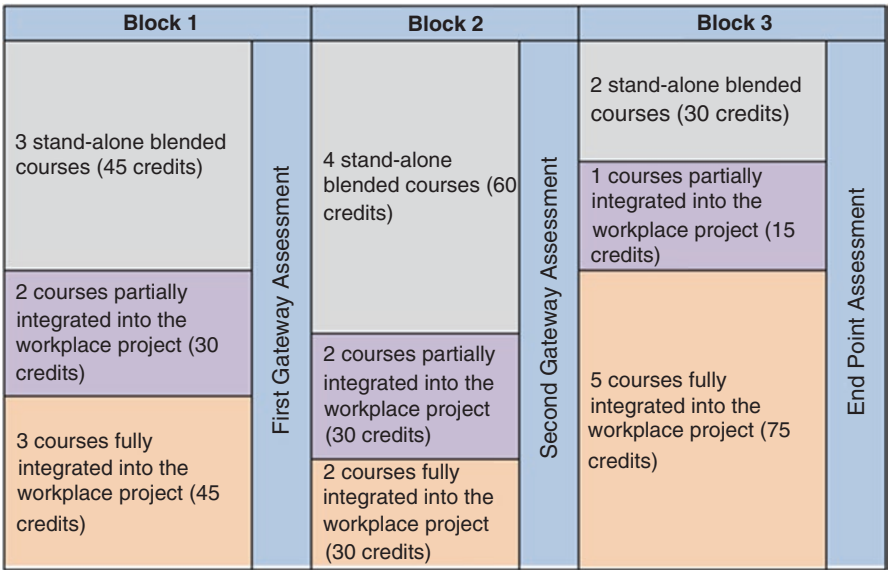

Fig. 15.1 Structure of the proposed BEngTech (asset management pathway with apprenticeship mode of delivery)

Table 15.1 New and existing asset management courses

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)

Table 15.1 shows the courses that together comprise the asset management pathway. Some courses such as communication are integrated into the pathway and while they do not deal with asset management specifically, they are taught and assessed in an asset management context. For example, the specific assessment tasks usually given for communication, such as report writing and giving a presentation have all been adapted to focus on asset management and are assessed alongside the asset management knowledge at a gateway assessment event. At the gateway assessment event, apprentices are required to present a portfolio of the year's work and be interviewed by industry representatives on the work completed in the year. This summative assessment event is supported by ongoing formative assessment tasks that feed

into their portfolios. At the end of their degree, apprentices will undergo a more rigorous process similar to the gateway assessment, the end point assessment where they have to present a major asset management project they have undertaken and be assessed against the graduate attributes for the degree.

After the introduction of the asset management pathway, the second issue 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.

Stand-Alone Blended Learning Courses

Some courses are difficult to realistically integrate into the workplace. Typically, these are core engineering courses such as Mathematics and Engineering Mechanics. These courses are offered as a combination of online, day-release, and block courses and are assessed separately from the workplace project, using more traditional assessment plans.

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). Standardisation of learning is moderated through the provision of additional block courses and at the end of each year, standardization of assessment is accomplished at the gateway assessment, which is also externally moderated. These courses comprise all courses listed in Table 15.1, as well as the final year's synoptic project.

Courses Partially Integrated into Workplace Projects

Some courses cannot realistically be fully integrated into a workplace project and so while some of the assessments for these courses are drawn from project work, other parts of the course might need to be taught and assessed more traditionally This could take place either online, in the laboratory, the classroom or through fieldwork. 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.

There is the potential for the exact number of courses in each of the above categories to vary across apprentices depending on what projects are available for them to engage with at an appropriate level in their workplace. The creation of employment "HUBS" where the various stakeholders in and around the asset management industry can work together to support the regional cohort of apprentices has been allowed for, to help provide a wide range of learning opportunities to learners through participation in and exposure to projects outside of their workplace. The HUBS model is outlined below in Fig. 15.3.

The Use of Industry Micro-credentials

One of the ways in which we have tried to ensure that up-to-date industry knowledge and practices are embedded into the asset management courses, is through the integration of industry micro-credentials into the curriculum. Industry micro-credentials can be considered as 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 Fig. 15.2.

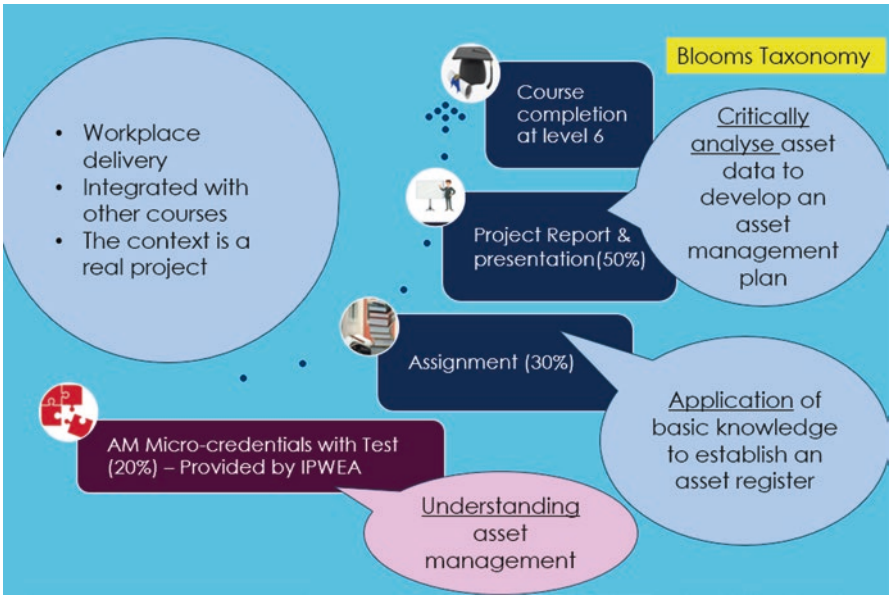

Fig. 15.2 Integration of industry micro-credentials

Integration of Industry Professional Development Courses into the Degree

In addition to using micro credentials developed and delivered by industry, we have also aligned the block course content with 1 day courses offered in industry to align with industry practice. This means that one course (introduction to Asset Management) would have the following structure, as shown in Table 15.2.

The course is divided into four parts. Before each of the block courses students will need to complete the micro-credentials that are related to each block course. Block courses are then taught by selected industry professionals who are members of IPWEA. These block courses are also open to other industry professionals, who

Table 15.2 Structure of the Introduction to asset management course (level 6)

Teaching Unit (Face to Face)	CORE content of each unit (aligns with IPWEA block course structure)	Associated Micro-credentials offered by IPWEA (prework - online)	Work to be done by students in their own time/in industry
Block course 1 (February)	Overview of asset management	AM101 Understanding asset management	1. Complete micro-credentials in own time & complete test 2. Set up industry project 3. Start portfolio of work
Block course 2 (April)	Understanding requirements Levels of service Setting up data structures	AM202 Developing & reviewing levels of service measures	1. Complete micro-credentials in own time & complete test 2. Assignment given: (post COVID-19 analysis of an asset management plan)
Block course 3 (July)	Lifecycle planning Risk Demand management Finance	AM 203 Making effective infrastructure decisions	1. Complete micro-credentials in own time & complete test 2. Final project given: Develop an AM plan for the change to the town Centre.
Block course 4 (September/ October)	Enablers Data systems Benefits	AM 204 Asset management enablers	1. Complete micro-credentials in own time & complete test 2. Prepare interim report & presentation 3. Review portfolio
Gateway assessment camp (November)	1. Project report 2. Final project presentation 3. Portfolio presentation 4. Technical (panel) interview		

pay an industry related fee for these courses to IPWEA. This allows our students to be taught by industry professionals and means that our students interact within their classes with asset management professionals, helping to induct them into the asset management community. At the end of the course, there is a final assessment camp where a panel of academics and industry professionals assess the students' work so that both the institute and industry are satisfied by the quality of work produced, thus building closer alignment between the two parties as to what exactly is required from our graduates.

It is worth noting that this is one way the programme has been delivered (at the WelTec site) and that we are also trialing a more sustainable approach where there is less reliance on industry developed material at the Otago Polytechnic site.

Delivering the Workplace Projects Through Industry Hubs

Collaborative industry hubs include rotation of apprentices between different companies working on the infrastructure in a particular region. This enables apprentices to gain a broader experience of asset management. This model of learning is an innovative aspect of the degree apprenticeship. It allows for intercompany collaboration on the education of apprentices from a range of employers for the common good of the region. Typically, the hubs include asset owners (councils), consultants and contractors. Gaining experience in all three types of company is seen to be beneficial not only to the apprentices, but also for employers. The hub model of delivery is a further device used to ensure continuity of industry influence in the degree delivery. The partnership between the asset owners, contractors and consultants within the industry is key to the way this degree is expected to work. This relationship is shown in Fig. 15.3. The opportunity for apprentices to gain experience in the three different environments will benefit both the apprentice and the employer. It is

Fig. 15.3 The hub model

hoped that apprentices develop a wider identity and being part of an inter-organisational team that looks after the infrastructure of a region rather than the narrowly focused engineer who is responsible only to their company.

Industry Controlled Gateway and Endpoint Assessment Processes

Finally, the gateway and endpoint assessments are annual events where students, academics and industry experts convene to assess and "sign off" students either for progression to the next block of work (gateway assessments) or as completed and ready for the workplace as an engineer (end point assessment). At these events, students present their portfolios, their project work, and submit to a rigorous technical interview. With the focus on asset management, these will be industry-led sessions allowing for industry input into the quality assurance of the graduates. For these assessments, rubrics drawing on key outcomes from the degree standard are used. The first panel assembled at the end of 2020 and comprised five assessors, the hub coordinator, an external examiner from an Aotearoa NZ University, the then head of IPWEA, one academic from the ITP and one other industry representative.

Training Industry Mentors

As part of the implementation of the curriculum in the workplace, it is necessary for industry mentors to be trained. In addition, the workplace assessors and gateway and end point assessors all require training. This industry training plan will be implemented using three channels. The first is through a formal online course accessed by anyone of the participating organisations. Secondly face-to-face workshops for mentors will be run every year, and thirdly through the constant interactions with the hub coordinator, who is also one of the assessors, the mentors will be mentored. As mentioned earlier in the chapter, there is a reciprocity between the mentor and apprentice, where the process of mentoring is beneficial to both.

Accreditation

Accreditation of the degree apprenticeship in the Aotearoa NZ regulatory environment took a long time and required considerable stakeholder management and lobbying. There was plenty of support from the asset management community, but support was slow in coming from the BEngTech management group, which in turn had an impact on the acceptance by Engineering NZ. NZQA would only accredit

Fig. 15.4 The accreditation pathway

the degree once all stakeholders, particularly Engineering NZ, were happy with the proposal. Figure 15.4 shows the accreditation pathway. Accreditation was finally received in December 2019.

Curriculum Evaluation

The pilot phase of the project started in earnest in February 2020 with initially no funding and limited marketing and the first cohort of five students. Unfortunately, 1 month into operation COVID-19 hit the planet. This prevented us from liaising more intimately with industry and caused one of the five students to lose their job. Fortunately, because the focus of the degree was asset management, which was deemed a critical skill, the other four were able to continue working, but we were unable to recruit more students, as companies were laying off workers and so were not inclined to recruit apprentices.

There were however two positive effects of the pandemic. The first was that we moved more quickly to blended online learning and so the development of these resources was initiated early. The second was that due to travel bans worldwide, Councils and those consultants and contractors in the asset management industry found it difficult to fill positions from abroad. This has meant that there is now renewed interest in growing our own asset managers. 2021 has seen a threefold increase in recruitment as a result.

Curriculum developers and researchers have long known that what is written down as a set of outcomes and what is intended, is not always what we end up with. Brown (2009) in his study of high school technology curricula in the United States, differentiates between four major curricula; the official curriculum as idealised by the field and represented in official curriculum documents, the intended curriculum

as the official curriculum is interpreted and planned by the teachers who are delivering it in the classroom, the enacted implemented curriculum, as it is actually taught by the teachers and finally the experienced curriculum as encountered by the students. This is a development on Thornton's (1985) simpler view of the curriculum which only differentiates between intended, actualised and experienced curricula, here, the differences between what the teacher plans and what the teacher actually delivers, that Brown sees as two different curricula, is not addressed. In our study, we are in the main, tasked with looking at the impact that the implementation of a pathway in asset management through an apprenticeship degree, has on the industry. This is of course determined by the level of consonance between the curriculum intended by the industry reference group and the curriculum experienced by the students.

Unlike many curriculum studies of the implementation of curricula in schools where there is a clear delineation between what is intended and what the teacher delivers as well as the fact that there is only one teacher involved, this curriculum has multiple players who have an influence on what is being taught and these players differ from student to student depending on the apprenticeship they are in. To simplify this issue, we have decided that it is easier to encapsulate our curriculum consonance/dissonance issues within the following framework, which has been compared in Table 15.3 to the frameworks used by Brown (2009) and Thornton (1985):

To "know" whether the curriculum meets the needs of industry would mean that we would need to compare the outcomes first articulated by the reference group with the knowledge, skills, and behaviours of those achieving the qualification. To ensure that this happens, several features have been built into the teaching and learning plan as well as the assessment plan for the programme as discussed in the section below.

Table 15.3 Frameworks for curriculum evaluation

Earlier frameworks E.G. Thornton (1985)	Brown (2009)	Our model	What this represents
The intended curriculum	The official curriculum	The intended curriculum	A set of outcomes predetermined through discussion with an industry reference group
		The official curriculum	A set of outcomes written down and accepted for accreditation
The actualised curriculum	The intended curriculum	The taught curriculum	A set of outcomes determined from what is actually taught in the coursework part of the curriculum
	The implemented curriculum	The industry project curriculum	A set of outcomes determined from what is learned through workplace projects
The experienced curriculum	The experienced curriculum	The experienced curriculum	The actual outcomes of the programme as reflected by the knowledge, skills and behaviours that the students actually have

Evaluative Objectives and Questions

There are several objectives of this pilot, and each objective has evaluative questions attached to it, which in turn need to have appropriate evaluation methodologies.

At a concrete curriculum development level, we are interested in documenting course and project development for the purposes of ongoing adaptation and improvement. For this level of curriculum analysis, an action research methodology is most suitable. This would allow us to continually improve our programme, while we are busy teaching it and can be viewed as having short term outcomes.

The curriculum is expected to have an impact in two major areas. The first and most obvious is on the industry that has helped develop and supported it. This impact can be seen as being measurable in the intermediate term, but also in the longer term. To evaluate the impact the curriculum has on industry, we need to take at least two research approaches. The first is to use a series of case studies focussing on the impact of the curriculum over a two-year period and the second would be a longitudinal (5–10 years) study documenting the longer-term impact the degree has on the asset management industry in Aotearoa NZ. For this area of research, we would need to ask three questions.

1. Does the experienced curriculum reflect the intended curriculum?
2. Does the apprenticeship model meet the needs of stakeholders (including learners, employers, mentors, wider industry, regulatory bodies, and delivering institutions)?
3. What has been the impact of the degree apprenticeship model on the asset management industry in NZ?

The second area where we expect an impact, is on the development of improved outcomes for Māori and Pacific students, as well as on women, entering engineering. This would require a mixed methods approach to evaluate these outcomes, drawing on both hard statistical data as well as rich contextual data of a qualitative nature.

1. Are there improved outcomes for Māori and Pacific students?
2. Are there improved outcomes for Women?

Concluding Remarks

In the United Kingdom it has been shown that degree apprenticeships can be used to address historically underrepresented groups in technical fields including women in ICT and engineering, and poorer students who cannot afford a university education without simultaneous work (Clarke, 2018). In Aotearoa NZ, this curriculum has the potential to increase the number of Māori and Pacific students in engineering, as well as the number of women. Finally, we have identified seven major benefits of this Degree Apprenticeship in Asset Management to Aotearoa NZ.

A New BEngTech Pathway in Asset Management

The lack of formal degree level pathways in asset management has been seen by our industry group as having a direct connection to the shortages of asset managers in the country. Currently, there exists a single master's degree in asset management and a lower-level diploma that is not taught, but rather awarded through the recognition of prior learning (RPL). Developing a new pathway in asset management allows for two new qualifications, a Bachelor of Engineering Technology as well as a graduate diploma in infrastructure asset management for those who already have a bachelors degree, but want to attain only the asset management component.

Industry Engagement

There is now a move from government in Aotearoa NZ to push HE providers to interact more with industry. It is hoped that this model of an industry-led curriculum development will be able to help providers set up degree apprenticeships in many other disciplines.

Improved Enrolments/Completion Rates in ITPs

Despite a growing need for engineering technologists in Aotearoa NZ, current BEngTech enrolments are declining across the country. We hope that the apprenticeship nature of the degree will attract more enrolments.

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.

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 Pacific students.

Improved Participation by Women

The participation of women in engineering is an issue worldwide. Here in Aotearoa NZ, less than 10% of typical enrolments in ITP engineering degrees are women. There is a better participation rate for engineering study at university, but it is still well below 50%. 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).

Addressing Changes to Delivery Resulting from COVID-19

The lockdown due to COVID-19 in 2020 has forced the ITP sector to seriously address the way courses are delivered and this has resulted in expansive development of blended learning materials, which now have found use not only in teaching apprentices in a flexible manner but have allowed us to operate and teach engineering courses outside of Aotearoa NZ.

Acknowledgements We would like to acknowledge the support and hard work of our industry reference group and in particular, IPWEA for their continued support and promotion of this degree apprenticeship. Also, we would like to acknowledge the Tertiary Education Commission for their substantial funding and support in getting this project off the ground.

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Part V
Digital Learning support for Vocational Education and Training

Chapter 16
Distance and Online Education for VET in Aotearoa New Zealand

Mark Nichols

Abstract Vocational Education and Training (VET) has been a feature of Aotearoa New Zealand (NZ) education since the 1880s. Around 110 years later, a dedicated sector of institutes of technology and polytechnics (ITPs) provided all regions with access to VET. One polytechnic, the Open Polytechnic of New Zealand, provided students nationwide with an additional, correspondence option. Since the turn of the millennium, online education practice has blossomed across the ITP sector. The additional reach of online education has formed a core element of strategy for regional ITPs seeking to provide more flexible access to their students. The Open Polytechnic has also applied online education to better serve distance VET students.

This chapter begins with an important observation: online and distance education are not the same thing. The differences between them are foundational for two very different sets of practice across instructional design, teaching, and flexibility. Online education as expressed through VET in Aotearoa New Zealand has its starting place in one of two traditional forms of practice: on-campus, and distance. The online forms of both provide quite different student experiences based on very different educational assumptions, and so ultimately reflect different operating models. As the Aotearoa New Zealand ITP sector becomes one collaborative organisation, the opportunity exists for the two models to coexist and extend VET provision still further.

Keywords Distance education · Online education · Vocational education and training (VET) · Equity of access · Institute of technology and polytechnic (ITPs) · Industry training and learning

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_16

Introduction

Distance education has a very important place in the foundation of the Aotearoa New Zealand VET sector. The very first stand-alone technical institute was the Technical Correspondence School (TCS) in Wellington, started in 1946 (Dougherty, 1999).[1] Some 70 years later in 2016, I was privileged to attend the celebration of the TCS under the name it has had since 1990: the Open Polytechnic. As I write in late 2021, Open Polytechnic is Aotearoa New Zealand's largest polytechnic by student number (approximately 40,000 learners) and has a significant equivalent full-time student (EFTS) volume. This makes it one of the largest ITPs. Since its inception, the Polytechnic has demonstrated the opportunities for a scalable, flexible, and open education for learners right across the country.

Aotearoa New Zealand's small, distributed population and difficult terrain across regional areas necessitate some form of correspondence education. Opportunities for VET require at least some scale for courses to be locally viable and it is not possible for adult students with life commitments, be they related to employment, family, or personal circumstance, to conveniently attend a polytechnic campus. From the early days correspondence education was a popular and effective form of tuition capable of providing access to a broad range of study options to anyone seeking to benefit.

The historical associations with the term 'correspondence' likely conjure images of booklets and course packs delivered via post. In contemporary times paper-based tuition is exceptional; distance education is now almost exclusively provided online. What began in the mid-to late-1990s as a series of online experiments toward more flexibility in education is now firmly established as the expected means of tuition by students and staff alike. Critically, though, 'online' education is not the same as 'distance education'. This point is fundamental for considering the future of distance and online education for Te Pūkenga, and for ensuring the broadest possible access to VET is maintained across Aotearoa New Zealand.

The Problems of Terminology

Distance education has an extensive, historical, and global community of practice. The International Council for Correspondence Education (ICCE, now the International Council for Open and Distance Education, ICDE) was founded in Canada in 1938; in 1950 the Council held its third global conference, in Ōtautahi (Christchurch), Aotearoa New Zealand. The transition from 'correspondence' to 'distance' education to describe the field took place around 1970 when Charles Wedemeyer, an American scholar whose work was contemporary with TCS in

[1] The TCS itself had roots in the Wellington Technical College, which started offering correspondence courses in the late 1930s (ibid.).

Aotearoa New Zealand, became President of the ICCE. The timing coincided with the development of the UK Open University in 1969, which Wedemeyer assisted.

The work of Charles Wedemeyer (2010; Wedemeyer & Childs, 1961), in particular his book *Learning at the Back Door* first published in 1981, is considered foundational to the field of distance education. In his 1981 book, Wedemeyer draws attention to the potential of individual learning for autonomous learners – the so-called 'back door learners' – who do not have the opportunity for whatever reason to attend classes (Burton, 2010). Wedemeyer's work across the 1950s and 1960s was instrumental in solidifying distance education as a global community of practice; his 1981 book serves as a record of his vision and effort.

The inconsistent use of terminology used to describe forms of education that differ from the traditional, face-to-face classroom model of tuition has long been problematic. Terminology has long been debated in distance education circles (Keegan, 1996; Lewis, 1990; Nation et al., 1990; Rumble, 1989, 1990). In 2011, I sought to bring some clarity to what was becoming, even in Aotearoa New Zealand, a complex and rather confusing application of terms in use across the ITP sector; I provide my attempt here.

These are designed to be indicative, not dogmatic.

> **Open**: Education that is specifically designed to be accessible for learners, typically through open enrolment periods but also through relaxed entry criteria. 'Open', like 'flexible', is always relative.
>
> **Flexible**: Education that provides learners with more choice over where, how, and when they learn. Flexibility is always a relative feature of formal study; however, particular techniques that are usually applied to enhance flexibility over traditional on-campus learning make the term appropriate. Distance learning tends to be flexible by nature.
>
> **Distance**: Education that does not require a learner to attend on-campus or contact classes. Stated positively, distance education enables a learner to study from the location of their choice for the duration of their formal enrolment.
>
> **Blended**: Education that deliberately mixes the features of classroom contact and online or distance learning experiences. Typically, a blended course makes online resources and experiences available to learners to make their learning more flexible.[2]
>
> **Online**: Education that emphasises the use of online (internet) technology for study.
>
> The definition of 'online' is particularly broad because the great variety of potential online platforms, user devices, and pedagogical approaches makes anything more specific unhelpful (Nichols, 2011, p. i).

Again, distance education has a long scholarship and international community of practice. 'Distance' is a key element of the ODFL cluster ('Open, Distance, Flexible Learning'). The 'O' does not stand for 'Online', and neither is it likely a further letter will be added, primarily because 'online' is a *means* by which ODFL might be expressed. Stated again, 'online' is best considered a *means* and not a model of education.

That 'distance' is different to 'online' education was largely settled in 2005, at least to those familiar with distance education literature. In response to the terms 'e-learning' (the then term for online education) and 'distance education',

[2] I would add now that 'blended' can also include on-job learning across its mix.

Guri-Rosenblit writes, "Many policy makers, scholars and practitioners in higher education use these two terms interchangeably as synonyms… [however] e-learning in most universities and colleges all over the world is not used for distance education purposes" (2005, p. 467). There are serious consequences for this misunderstanding because online education as practiced by face-to-face providers is far from the same thing as practiced by distance education providers based on the traditional community of practice.

Modes of Education in the VET Sector

So, if 'online' is not a useful category for modes of education, what is? Earlier in 2021 the Learning and Teaching Advisory Group (LTAG), formed as a means for education advocates across the ITP sector to form a common voice while Te Pūkenga established itself, addressed this very point. Drawing on the charter of Te Pūkenga and its requirement to "offer in each region a mix of education and training, including on-the-job, face-to-face, and distance delivery that is accessible to the learners of that region and meets the needs of its learners, industries, and communities" (Education and Training Act 2020, Schedule 13, s.3, (a)), the LTAG drafted the following definitions:

> **On-the-job**: Education that takes place in the workplace, drawing on experience-based activities, discussions, activities, simulations and with an emphasis on assessment.
>
> **Face-to-face**: Education where students are provided with on-campus opportunities for learning, usually in the form of lectures, groupwork, seminars, simulated workplaces and workshops.
>
> **OFL distance**: Education where students are free to study at any place and under flexible time allowances, with a bias toward asynchronous study.
>
> **'Virtual campus'**: A form of online delivery extending the synchronous education experience to students wanting flexibility of location or time allowances.

The LTAG modes of learning draft paper adds that "The terms 'blended' and 'online' are open-ended and, while they do propose something different from purely on-campus and correspondence (paper-based) distance, they are not descriptive of specific modes" (LTAG 2021, p. 3). The distinction between 'OFL distance' and 'Virtual campus' above is intentional and helpful, in that it recognises Guri-Rosenblit's distinction; it removes the perception that 'online' is something distinctive in itself. It is helpful to consider 'OFL distance' as traditional distance education expressed online, and 'Virtual campus' as traditional on-campus education expressed online. The term 'online' in isolation is unhelpfully vague, its meaning in any circumstance usually reflecting those preconceptions a teacher or institution brings to the term.

Getting 'Online' Wrong

Confusing 'distance' and 'online' education is understandable enough. Both provide more flexibility for students through the use of digital education techniques, and both facilitate more asynchronous forms of teaching and learning. This confusion, though, hides a missed opportunity for education that becomes obvious when deeper issues are explored. Our terminology has the potential to limit our thinking into what might be possible through applying digital technologies to education.

There is substantial risk of missed opportunity, because of clumsy terminology, that going 'online' *within the bounds of how things are already done* might be perceived as bringing about the sorts of transformative benefit to the end-user experience so evident in other sectors. However, digital technologies have the potential to both transfer (or extend) and transform practice (Nichols, 2022). For example, there is nothing in digital or online functionality that challenges the lecture. Lectures can be transferred into the digital world through recording and streaming; lecturing is easily *transferred* into online practice. There is nothing about technology that forces a shift toward how teaching takes place or how a university (or polytechnic!) must operate. In other words, 'online' can be safely harnessed by educators to simply extend what they already do. Teaching practice and the end-user experience need not fundamentally change. Face-to-face providers of education going 'online', then, tend to extend their education methodology in ways that provide some flexibility to learners even though more might be done to broaden access to education.

Contrast this with the considerable potential possible for distance educators through transformed practice.

The Potential for Distance Education

Distance education in its classic sense has always provided a primarily asynchronous (different time) model to tuition. For teaching and learning to occur, there is no imperative for learners to be studying the same thing at the same time. For distance educators, long used to thinking of tuition as intermediated by learning resources and of students as independent learners, going 'online' provides considerable opportunity to further education as a *more* flexible and individualised pursuit. Open Polytechnic, for example, is currently using its 'online' expertise to explore any-day enrolments; personalised assessment due dates; assessment-only courses; and a very rich, dynamic approach to learning analytics permitting scalable prioritised intervention at the level of course materials in real-time.

The real difference between 'online' as a means applied by 'face-to-face', 'virtual campus' and 'OFL distance' educators, to draw on the LTAG modes, lies in the underlying operating model that these modes work to. An operating model is "a visualisation or series of visualisations showing how all elements of a[n education provider] work together" (Nichols, 2020, p. 147) to provide education to its

learners. The operating model of a face-to-face and distance education provider of education can be remarkably different. Not only are the starting places of these operating models different, so are their loci of control and respective opportunities for further development. A face-to-face provider might extend its reach through online education, but it will always struggle to improve its flexibility beyond the point where synchronous learning opportunities, or a fixed timetable are challenged. A face-to-face provider is limited by classroom sizes, timetabling, and high variable costs. By contrast, a distance education provider – primarily because of its distributed teaching activity, which involves both pre-developed courseware and its focus on independent learning – has the opportunity to fully redefine itself toward promoting the success of learners *on their own* timeframe.

The Open Polytechnic was able to reorientate itself toward increasing levels of flexible and open learning through its 2017 transformation, which aimed to situate the polytechnic as a 'learner-centric' organisation promoting convenient, relevant, connected, and smart digital education. That it was able to achieve this shift rested on its vision for the potential of ODFL and the systems approach typical of distance education providers worldwide, which views "all of the component processes that make up distance education, including learning, teaching, communication, design, and management, and even such less obvious components as history and institutional philosophy" (Moore & Kearsley, 1996, p. 5). Distance education providers are used to understanding their ways of working in terms of an overall institutional *system*, where the locus of teaching and learning rests centrally rather than distributed across each academic unit.

The potential for distance education facilitated online – which I term digital distance education (Nichols, 2020) – is well articulated in the Open Polytechnic's own 2020–2022 strategic plan:

> OPNZL is committed to a digital and networked future and is well progressed on a journey of transformation that uses education technology and digital expertise to drive innovation in the design, development and delivery of Open, Distance and Flexible Learning (ODFL). Its ODFL model and pedagogy are distinct both from face to face/blended provision and also from other types of distance education. These enable a flexible, learner-driven approach, allowing self-directed distance learners to start study at anytime and proceed through study at their own pace. The model is financially flexible and can be scaled up or down quickly in response to changes in the level of demand.
>
> Furthermore, its disaggregated value chain, in which different parts of learning have been unbundled so that they can be provided in flexible ways to respond to the needs of learners and employers, supports a collaborative, partnership approach across multiple delivery modes (2020, p. 4).

The concept of a 'disaggregated value chain' perhaps needs some explanation. The term acknowledges the quotation from Moore & Kearsley (1996) earlier; namely, that the end value to the student consists of *all* of the component processes making up the education provider. Most significantly, the *teaching* function in ODFL is made up of more than an academic staff member (or the academic staff member teamed with an instructional designer). Courseware, tutorial assistance, external markers, student mentoring systems and analytics-informed intervention are all essential and inter-linked components. The configuration of the teaching function in

this way ensures a flexible, scalable, student-success-driven and highly efficient education system.

So, while 'online' is broadly characteristic of education modes of all stripes, it is very clearly not a useful term for imagining the potential of vocational education. The unsubstantial meaning of the term should also explain why so-called 'online education literature' is often tangential to the concerns of distance educators in that it often assumes a face-to-face starting point; perhaps this is the equivalent of trying to fill an electric car with fossil fuel.

The same might be said of the term 'extra-mural' as an indicator of provision across the ITP sector. Figure 16.1 below shows the volume of extramural EFTS across the ITP sector, and the Open Polytechnic proportion of those EFTS from 2005 to 2020.

Since 2013 the Open Polytechnic proportion of extra-mural students has slightly declined, as the number of extramural EFTS increased by about 1000. It is clear that more extramural education is taking place across the ITP sector. The difference between intramural (on-campus) and extramural depends on how individual ITPs choose to view and categorise their provision. Growth of extramural provision outside of Open Polytechnic reveals a sector responding to its student demographic, largely made up of those over the age of 25, seeking flexible learning options that are off campus. The trend does not automatically indicate that the sector is embracing anytime access (breaking from a semesterised model) or a fully scalable approach. Extramural and distance education as measured in the sector are likely not the same thing, either. Finding more effective means of distinguishing between different forms of tuition will likely be an important exercise for Te Pūkenga.

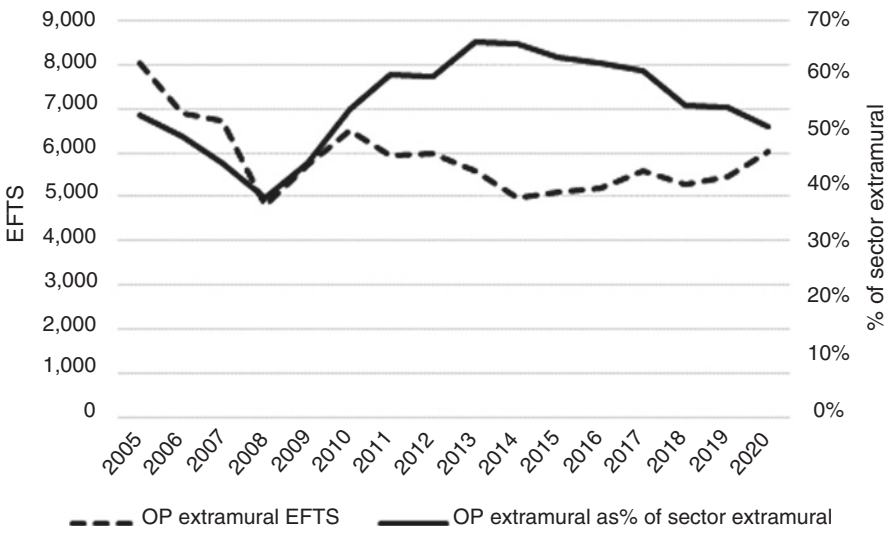

Fig. 16.1 Open Polytechnic provision as a % of total extramural provision, 2005–2020

The potential for distance education is perhaps clearest in the iron triangle, as described by Daniel et al. (2009). The iron triangle is the trade-off across access, cost, and quality that most models of education are constrained by; seek to improve access, and the risk is that you must choose between cost and quality. Seek to improve quality, and you must choose between access and cost. If your objective is to optimise cost, you likely improve access but compromise quality. The challenge posed by the iron triangle is the limitation it places on educational systems; there is an international need for a model that is "readily scalable (wide access), academically credible (high quality) and affordable (low cost)" (2009, p. 34). Well-designed distance education systems – be they online or not – have traditionally provided benefits across *all three* sides of the iron triangle. Significantly, not all online education modes can be said to do so.

Innovation in Digital Distance Education

Ultimately, we are concerned in this book with innovation. Online education is rife with innovative learning approaches; rather than exploring individual cases, it is useful to consider principles for innovation as it might apply to an accessible, scalable, and personalised digital education system that extends the iron triangle. With reference to some classic ideas in distance education, I offer three principles that ought to be foundational to digital distance education across vocational education.

Distance Education as a Coherent System

Central to distance education practice is a systems approach, as already disclosed; see also Peters (2007), who outlines the industrialised approach to distance education. Systems thinking recognises the reality that all processes and functions influence one another; innovation, then, is not an isolated activity. Any innovation will disrupt the systems and processes that surround it, even if it genuinely improves the learning experience. As such, *not all innovation is desirable*. Any new approach must be evaluated in terms of its ability to uphold accessible, scalable, and personalised practice. Defining a core and custom approach to tuition – the core being the standard set of elements common to all courses, the custom being the exceptions to the core on a case-by-case basis – helps to preserve accessibility, scalability and personalisation while also extending the iron triangle. The coherent systems required for distance education are also complex enough to best suit a consolidated, rather than distributed, organisational approach. A single distance provider is much more coordinated and cost-effective than a distribution of distance providers.

Learning Design as a Coherent Narrative

Literature and conversation tend to refer to online course materials as consisting of 'content'. The impression is that knowledge is made up of 'stuff', and so courses can themselves be made up of bits and pieces assembled together for students to learn from. Practice often reflects this understanding, as online students are exposed to one linked resource after another with little contextualisation linking the 'content' together. By contrast, Holmberg (1977) proposed the concept of the *guided didactic conversation*, the postulates of which are best given in his own words:

1. That feelings of personal relation between the teaching and learning parties promotes study pleasure and motivation.
2. That such feelings can be fostered by well-developed self-instructional material and two-way communication at a distance.
3. That intellectual pleasure and study motivation are favourable to the attainment of study goal and the use of proper study processes and methods.
4. That the atmosphere, language, and conventions of friendly conversation favour feeling of personal relation according to Postulate 1.
5. That measures given and received in conversational forms are comparatively easily understood and remembered.
6. That the conversation concept can be successfully translated for use by the media available to distance education.
7. That planning and guiding work, whether provided by the teaching organization or the learner, are necessary for organized study, which is characterized by explicit or implicit goal conceptions (1977, p. 97).

Holmberg's contention is that distance education course materials ought to be prepared in a register that imitates the tone of a caring, involved, conversational subject expert. The warmth, patience and engagement of this approach stands in contrast to the often cold, bullet-list riven and frequently random 'content' that an 'online' learner might confront. Designing course materials in the form of coherent narrative is the core function of the Open Polytechnic's Learning Design and Development team.

Teaching as a Distributed, Coherent Activity

Finally is the principle of disaggregation, whereby teaching is viewed not as the sole domain of the teacher but as the joined-up series of efforts by specialists across the educational value-chain (Seelig et al., 2019). Again, citing Peters (2007, though the observation dates back to 1967), distance education combines the activities of multiple experts in the form of a division of labour. At Open Polytechnic, for example, a course will be prepared by a learning designer working with a series of subject matter experts (usually active in industry), under the supervision of a principal learning designer. Peer review and bicultural perspectives are also important elements of each course's development. Courses are delivered by academic staff

supported by markers and learning mentors. Teaching is a distributed activity; leave any one of the aforementioned roles out, and distance teaching suffers.

Across these three principles there remains ample scope for innovation, albeit shaped by the overall objectives of accessible, scalable, and personalised education that extends the iron triangle. Importantly, the distributed, coherent teaching model for distance education has different cost dynamics than does face-to-face education, in that the former has higher initial costs (for courseware development) and a much lower delivery cost (cost per learner).

The Need for Distance Thinking in Online Practice

What I have attempted in this chapter is a separation between synchronous and asynchronous online education, the former extending the face-to-face model of education (in the form of the 'virtual campus') and the latter extending the benefits of traditional distance education into the online world. There is one further benefit to the distance, asynchronous model of online education for improving the reach of vocational education.

A significant promise for Te Pūkenga is *breaking the iron triangle as it relates to vocational educational opportunities across the entirety of Aotearoa New Zealand, across all modes of education*, which would be a systematic innovation of international note. If digital distance education is placed at the centre of educational development, access, cost, and quality at scale can become the hallmark of vocational education. It is much easier for a national network of provision to be based on digital distance education than on any of the three other modes of delivery proposed by the LTAG. Table 16.1 describes the role centrally developed course materials – developed in ways consistent with the three principles described earlier – might be applied across all four education modes.

The application of distance thinking through asynchronous online education has further benefits. One of the objectives of Te Pūkenga is to enable "learners to move between workplaces and other educational offerings and locations as their needs

Table 16.1 Suggested role of centrally developed course materials across four education modes

On-the-job	Face-to-face	OFL distance	'Virtual campus'
Learners can access course materials designed to address all learning outcomes alongside their apprenticeship and work-based experiences.	Lecturers and tutors can provide their traditional teaching, building on standard course materials designed to address all learning outcomes.	Course materials designed to address all learning outcomes are built to complement the systems approach of the OFL distance provider.	As with face-to-face, with lecturers and tutors also able to further supplement the course materials designed to address all learning outcomes.

change."[3] To make this possible, work is already underway to develop unified programmes made up of educational products – standard programme documents and course descriptors, along with standard learning resources. Placing distance thinking as foundational to courseware development maximises the flexibility of learning opportunity: the same resources can be made available to learners studying in semesterised, face-to-face environments *as well as* in start anytime on-the-job contexts. That the resources are common and centralised does not mean they cannot be locally customised, on the understanding that only the central version is centrally maintained. Centrally maintained resources would reflect the latest developments applying the teamwork of learning design and subject matter specialists.

Further, the development of online courseware applying distance thinking has the potential to extend the face-to-face reach of specific qualifications. For example, a Bachelor of Social Work degree may be non-viable for smaller ITPs. Courseware developed for OFL distance might make regional clusters of learners viable for a local specialist – rather than an entire academic team – to support learners studying at a distance. Such a model would be a natural extension of the accessible, scalable, and personalised approach of online distance education and a further extending of the iron triangle.

Conclusion

This chapter has sought to emphasise the understanding shared by distance education specialists that 'online' and 'distance' are not the same, and that the benefits many assume are possible through online education are best achieved by applying the principles that distance educators have known for decades. The difference is fundamental to Te Pūkenga achieving the objectives of the Reform of Vocational Education and providing accessible, scalable and personalised vocational tuition across Aotearoa New Zealand. Practiced well, digital distance education provides ample scope for innovation while also reducing cost, increasing access and improving quality in on-the-job, face-to-face, OFL distance and virtual campus settings. Online distance education, according to distance education theory and proven across international practice, is key to improving vocational education and training across Aotearoa New Zealand.

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Chapter 17
A Lean Model to Support the Design of Learning Systems for Practice-Based Learning

Tim Thatcher

Abstract In practice-based learning educators and learning designers seek to create engaging and relevant learning experiences. They deploy resources, tools, and environments to meet the needs of diverse learners. They develop a system to provide the optimum conditions for learning and individual growth. In doing so educators integrate learning design models, strategies, and ways of working. In this chapter I acknowledge the complexity of this challenge and offer a schema as a point of reflection for educators. To arrive at a lean model, I demonstrate how the principles of ecosystems as a means for critiquing a complex system, and user stories for ensuring learner centeredness could be synthesized. Each of these is described before being integrated into the schema. A short case study of User Stories being applied is provided as an example. Additionally, a short exploration of holistic education models is used to add depth to the User Stories component and two popular education models (Universal Design for Learning (UDL) and Education 3.0) are used to illustrate how educators can utilise purposefully selected approaches within the schema.

Keywords Learning design · Learning ecosystem · User stories · Universal design for learning (UDL) · Practice-based learning · Online learning

Introduction

The late Sir Ken Robinson was a passionate advocate of authentic learning in which educators are responsible for providing the optimum conditions for growth. He often spoke about education through the analogy of gardening in that "the gardener does not make a plant grow. The job of a gardener is to create optimal conditions for growth" (Robinson, 2010). Robinson suggested that applying an agricultural

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_17

analogy to education prompts us to consider how education could be revolutionized. In this holistic approach to teaching the educators role is to optimize conditions for growth. He goes on to say that "great teachers know what the conditions are, and bad ones don't" (Robinson, 2010). While this is a simplistic critique it does raise the issue that not all learners are consistently experiencing the optimum conditions for growth and learning.

An industrial model of education focused on standardization and compliance does not provide optimal conditions for growth for all and, Robinson argues, authentic, relevant and learner-centered education can meet individualized needs more successfully. For educators this poses a worthwhile yet complex challenge; how do or how can, educators create optimal conditions for growth in authentic and relevant learning experiences?

In this chapter I will outline how this challenge is pertinent to practice-based learning and consider how it is met through the purposeful design of learning systems. In the process I propose a schema which supports this practice. I will provide a case study of how aspects of this schema are being utilized within Aotearoa NZ's tertiary education system. The inherent challenge with creating optimum conditions for growth is the complexity of the contexts and modes which educators must 'design' learning across. This is a high stakes operation in which learning can have negative impacts on both educators and learners. I will therefore first outline this complexity and the impacts of it.

A Complex System

An educator's practice is an evolving system containing a multitude of elements. Educators gather insights, adapt, and respond in ways that best meet their learners' needs. For a traditional learning situation in which the educator is the 'sage on the stage', the contents of lectures can be refined, questioning strategies evolved, and resources adapted. However, this model of education is increasingly irrelevant, and educators are adopting education models such as practice-based learning to facilitate authentic and relevant learning experiences. Kennedy et al. (2015), describe a key driver for practice-based learning as:

> The provision of experiences that are authentic in terms of the kinds of activities and interactions that comprise those occupational practices and, wherever possible, the positioning of the students to engage in the kinds of thinking and acting that practitioners engage within those occupations. Certainly, in the past two decades it has been realised that the physical and social circumstances in which individuals engage in activities and interactions make important contributions to people's learning. (Kennedy et al., 2015, p. 1).

In a practice-based learning situation the educator is faced with a much more expansive set of environments and contexts with which they must develop optimal learning conditions.

Practice-based learning is in fact a key pedagogy of vocational education and training (VET) in Aotearoa NZ. Practice-based learning involves 'learning by

doing' "as learners are required to "hone skills, connect theoretical knowledge to work tasks and attainment of the specific occupational dispositions to maintain productive and fulfilling work" (Chan, 2021). The effective facilitation of practice-based learning can require the design of a complex system whereby learners are supported to engage with the modelling of practice, make learning or thinking visible, and undertake guided practice (Chan, 2021). The learning can take place across a range of physical and digital contexts such as workplaces (work-integrated learning), workshops, clinics, lecture theatres, learning management systems and digital communication channels etc.

Educators and learners are required to develop, exist in, and navigate a complex system to capitalise on the rich learning opportunities presented by practice-based learning. In Fig. 17.1, a model of a complex system of practice-based learning is roughly sketched so that it can be visualised as containing multiple 'nodes' or instances of learning.

These models do not truly capture what a learning system or environment might look like, but they do show us that learning is a system of connected or interconnected parts and that practice-based learning is particularly complex. When we add in variables such as learner engagement, diversity etc., we see that the system is required to pivot and adapt. Learning systems are necessarily complex and dynamic. This means that they are challenging to develop or design for educators. To facilitate effective learning, educators are tasked with designing a complex system which functions across multiple contexts and deals with change and variables. In this context educators are learning system designers and within this chapter this is viewed as a pivotal role of practice-based learning educators and one that can impact the effectiveness of practice-based learning. While some training organisations employ specialised learning designers to support this task, educators themselves are the key learning designers within their own practice. Educators design learning in that they are engaged with developing and creating optimum conditions for learning – They

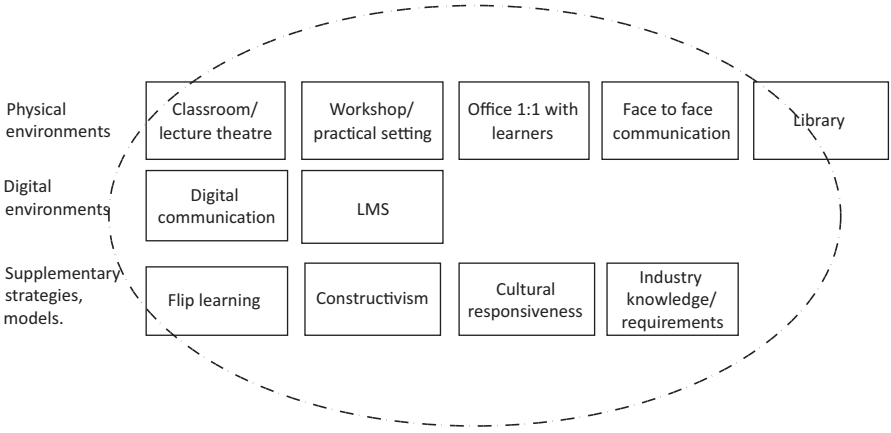

Fig. 17.1 A sketch of the potential complexity of a practice-based learning system

are learning designers, curating and orchestrating multiple modes and nodes in response to diverse learner and curriculum needs. In the process of designing, educators create or design an intricate system of resources, environments, and relationships.

Designing Learning vs. Designing Learning Systems

Before addressing the impacts of this necessary challenge of designing learning systems, it is important to distinguish between designing learning and designing learning systems, while acknowledging an interrelationship between the two. Within practice-based learning, 'designing learning' can refer to identifying the objectives, skills, tasks, and outcomes required to reach and demonstrate mastery. Designing a learning system involves identifying the modalities, contexts, tools, and communication channels supporting the realisation of the learning design. The design of the learning system can be done within the parameters of available resources such as tools, access to space, expertise, time and much more.

Educators have some control over what some elements of the learning system entail and other elements they have little actual or perceived control over. For example, an educator may wish to utilise a particular educational application within their learning system, however their organisation may not support access to this application therefore excluding that element from the educators' and learners' system. The elements of a learning system are dependent on available resources, perceived and actual requirements and many other variables. Educators can make decisions about what their learning systems entails through purposeful selection, or they may 'inherit' or be prescribed a system. Either way, a learning system can be defined by parameters and requirements.

In this chapter I will be focusing on designing learning systems not designing learning. Although it is difficult to separate these interrelated components, I will endeavour to support the purposeful selection of nodes of learning to optimise the learning experience and support the learning design. Within the context of practice-based learning I will analyse the learning system which consists of elements, contexts, and tools which enable practice-based learning, not the pedagogical, andragogical and heutagogical models and strategies which allow us to identify what the learning should be. An educator does design both simultaneously, however the design of the learning system is not as supported by models and strategies that designing learning is. This requires educators to adapt and synthesise disparate concepts to provide themselves some guidance and parameters for how they design a learning system. In this chapter I will hypothesise how this practice can result in a schema which can guide the purposeful development of effective learning systems.

The Impacts of Learning System Design

The effects of educators and learners existing and moving within a complex system with unnecessary ambiguities can be detrimental to learning (Taipjutorus, 2014), the lowering of educator and learner self-efficacy being a primary effect (Kundu, 2020; Bates & Khasawneh, 2007). Self-efficacy derives from:

> …. Bandura's social-cognitive theory of behavioural change. It refers to a teacher's (or learners) belief in his/her ability to successfully cope with tasks, obligations and challenges related to his/her professional role (Barni et al., 2019, p. 1645).

A primary focus of practice-based learning is the development of mastery and educators or learners with high levels of self-efficacy are better placed to support or achieve this. However, educators can undermine learning and the learner's judgement of their own abilities (Pajares, 2002). For example, a study of midwifery students self-efficacy surrounding intensive skills simulation, showed the quality of educator's feedback significantly affected the learner's self-efficacy (Gudayu et al., 2015). This potentially inhibited learners' ability to reach mastery with the intensive skills and is an example of how one element within a learning ecosystem can impede learning. While quality feedback is a learning design element it is supported by learning system design because quality feedback is supported by learning system components such as exit tickets[1] or technology that adds efficiencies to the feedback loops.

The quality of a learning ecosystem can also affect the educators self-efficacy (Corry & Stella, 2018) however there is insufficient research (Corry & Stella, 2018) or guidance to support the development of a quality learning ecosystem particularly for those that entail online or digital learning modalities. Some research identifies learning design elements which can negatively affect a learner's self-efficacy such as lack of support, agency, and digital competency as being detrimental to learner self-efficacy (Taipjutorus, 2014, p. 145). All these components can be supported by learning system components such as communication protocols, collaborative tools, and authoring tools.

Each element, design or modality within a learning eco-system presents risks to both educators and learners' self-efficacy. As developments in technology, the personalisation of learning and the need for cultural responsiveness progress, so does the potential for risks and negative (and positive) impacts on learners and educators. To facilitate effective practice-based learning educators actively develop, iterate, and reflect on learning systems and as the complexity of these has evolved, so has our understanding or perception of the role of an educator.

[1] Used as a form of formative assessment. See https://ziplet.com/exit-ticket-ideas for examples.

Designing Learning Eco-systems

The term learning ecosystem has been used to describe the collection of modalities, contexts and connections that are required for authentic and relevant learning (Barron, 2006). The emergence of terms such as learning designers, learning architects, and learner experience designers are also an indicator of the increasing complexity behind developing and managing a learning design or system. These terms suggest that we perceive educators as professionals who manage and design complex systems or rather, learning ecosystems.

Describing the interconnected elements of teaching and learning as an ecosystem identifies it as a complex, networked system but does not necessarily offer us any clarity on how to develop an effective learning ecosystem nor what an effective one might look like. There is also a distinct lack of recent research on best practice for learning system design and implementation, resulting in the amalgamation of disparate models and strategies to approximate best practice.

While the form of learning ecosystems can vary greatly between educators, learners and within and across learning organisations, we can use the features of a biological eco-system to help define whether learning ecosystems are effective as a system or not. The effectiveness of a system is not simply whether it has a positive impact on learning but also how it holds up i.e. when there is a change in the system does it fall over? When a problem in the system arises, such as the disengagement of learners, does the system adapt and pivot? Is it a resilient and sustainable system?

Hecht and Crowley (2020) analyse the ecological framework for education through the lens of the adaptive management of ecosystems. They summarise the elements of ecosystems through this lens as being:

- the decentring of the individual
- ecotones
- keystones species
- disturbance and resilience

These elements are used to offer educators a deeper insight into the features of an effective learning eco-system (Hecht & Crowley, 2020). Before we attempt to see what an effective ecosystem looks like, we can extrapolate some success criteria for these systems so that we can gauge their effectiveness as systems. Each of these elements is summarised below in terms of practice-based learning.

The Elements of Ecosystems

Decentring of the Individual

In the adaptive management of ecosystems, the individual within the system is not the focus. In view of Te Pūkenga's focus on 'the learner at the heart of everything', this might seem to be the antithesis of how we might view the success of a learning system. In this context the decentring of the individual references individual

elements or components of a system. The decentring of the individual algin's with the Māori concept of kaitiakitanga where every living thing is interconnected. In kaitiakitanga, the environment, including people, have a life force (mauri) which flows through them. When one element is in a poor state its power (mana) must be restored. Within a learning ecosystem the decentring of the individual element allows us to critique the system holistically as all elements are in focus. Within practice-based learning this allows us to consider elements such as the authenticity of environments, the relevance of modes, and the quality of experiences or even communication protocols, as being equally important to learner's success.

Ecotones

An ecotone is a transitional boundary between two biological communities such as the shoreline where the sea and land meet or 'transition'. In a learning system, ecotones can be the places between key learning activities or environments. For example, an online, social forum where learners are discussing concepts covered in class and experiences in practical workshops, is a place where discussions can take place which support the learner's sense-making. A chance discussion in a library or a study group organised and led by learners are also examples of possible ecotones as are communities of practice. If we take the concept of kaitiakitanga again and we observe sand dunes being eroded, we know that this has an impact on the other key environments, so we actively address the issue of that ecotone. In learning ecosystems, we recognise that the spaces between key learning elements are important.

Keystone Species

While the spaces between key learning elements are important so are the key elements or keystone species of an eco-system. Keystone species have a large effect on their natural environment and can define the entire environment. If a keystone species is removed the ecosystem is dramatically affected.

Within learning ecosystems, a keystone species might be quality feedback (Hattie & Timperly, 2007) or effective learning objectives and these are supported by processes, technologies, and tools within the learning system. Keystone elements are reliant on other elements but overall have a stronger influence on the system than other elements. For example, we might have highly capable educators and passionate learners but if the mechanisms for effective feedback are removed perhaps learning will cease all together. Keystone species are highly valued, protected and supported.

Disturbance and Resilience

Learning like natural environments is dynamic. In learning knowledge, environments and relationships can add or ease pressure causing reactions and effects which the educator and learner respond to by adapting the system. In learning

Table 17.1 The elements and principles of ecosystems

Element	Principles	Example
Decentring of the individual	All elements are important.	When pinpointing an issue with a learning system all components are analysed.
Ecotones	All environments are important.	An online forum is purposefully designed and facilitated to support effective casual conversations between learners.
Keystone	Some specific elements are critical.	Practical workshops are seen as a keystone element. Other elements are developed to support this keystone.
Disturbance and resilience	There are systems for managing and responding to disturbances.	Communication channels and feedback loops are purposefully deployed.

systems there are constants and there are changes. An ecosystem can cope with disturbance because it is resilient, and it may require specific mechanisms to support this. A large-scale example of the way a learning system can manage disturbance is through the collection of learner feedback and the identification of improvements to be made to the system, supported by technical solutions such as data dashboards.

To efficiently apply these elements and their principles to the context of learning I have used them as a basis for a learning system design schema (Table 17.1) from which educators can design and critique learning ecosystems. Within this schema I have provided examples of these within learning systems to identify the essential elements of a learning system or what an effective learning system might 'look' like.

A schema identifying the important elements of a learning ecosystem might be useful for educators when purposefully designing and critiquing their practice. If an educator can identify how these elements are apparent in the learning system that they have developed, they might feel confident that their learning systems is purposeful therefore increasing their self-efficacy.

If learners were to be familiar with the overall design and purpose of key elements of the learning system, their self-efficacy may be maintained or improved, increasing their chances of reaching mastery within their programme of study. These two points are the key objectives of supporting the purposeful design of learning systems.

User Stories for Learning Ecosystem Design

Viewing a learning system through the lens of adaptive ecosystem management and its elements outlined above, can help us develop or critique a learning system to identify whether it facilitates effective learning. Commonly in education, learner feedback and assessment data are analysed to identify the effectiveness of the system. Educators can then iterate or redevelop their learning system with this data.

However, to undertake the initial design of a learning ecosystem an interdisciplinary design approach can help identify what components the learning system should or could consist of.

One design approach or method that is beginning to be used by educators is User Story mapping, a method used within the Agile methodology, which is a method for rapid software development. In Agile software design, systems are purposefully designed before being deployed. The term Agile references the method's focus on rapid and dynamic development of solutions. This method can support designers to map the journey of a user through a system, extrapolating the requirements of the system to meet their needs. It supports the customisation of a system to meet the needs of multiple users. While User Story mapping is not widely used with learning system design it may offer us some additional insights as to what an effective learning system might 'look' like and support a purposeful approach to it. In this section I will define how User Stories are created before using them to add depth to the ecosystem schema.

User Stories commonly follow a specific process using particular methods. Before creating User Stories the types of users are identified. Within education this may entail developing learner profiles based on ethnicity, prior knowledge, neuro diversity and even digital fluency. Once the main user types are established their requirements of the system can be mapped. User Story 'cards' are created which align the users' needs with their requirements and this is done by stating the user ('As a…') their need ('I want….') and then the benefit of this need being met ('So that….'). In Table 17.2 an example of what this might look like for a Level 3 learner is shown.

Once the requirement has been identified the User Story can be mapped (User Story Mapping). This allows educators to consider how a learner might move through a learning system and what elements might need to be developed to support them.

> User stories help to define user needs and to design the system responding to their needs. But the response product, the system or virtual space for implementation of users' needs, have two kinds of needs: - user requirements, or organisational requirements to implement…or… technical requirements (Rutkauskiene et al., 2006, p. np).

A short User Story map is provided in Fig. 17.2 for the card in Table 17.2. This is an adaption of an Agile development User Story where the user card is extrapolated into goals for the learner then requirements. The requirements then guide the identification of tools or subsystems which support the learner to meet their goals.

Table 17.2 An example of a User Story card

User Story card example
As a *level 3 learner who has little experience with learning online.*
I want *consistent support with using the platform and finding my way around it.*
So that *I can use the platform for learning, am not impeded by not being able to locate information and I feel confident in what I am doing.*

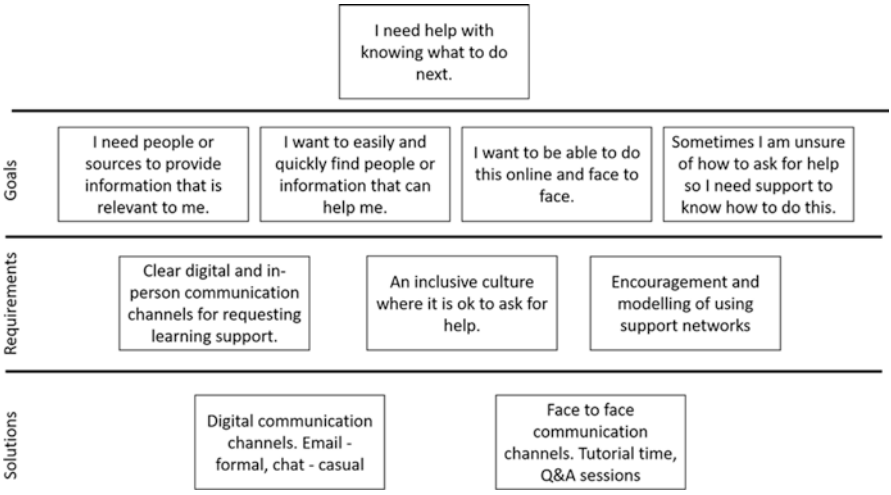

Fig. 17.2 An example of a User Story map

In this example, it has been identified that communication systems and protocols may meet the learner's goals. There will be cultural and andragogical strategies that also surround this system but in terms of technical or resource solutions, digital and face to face communication tools and strategies will benefit the learner. User Story mapping allows the educator to purposefully identify solutions which will form part of the learning ecosystem.

By applying the ecosystem elements to this User Story, we can deduce that communication channels are a keystone for meeting this learners' requirements. An inclusive culture might be the ecotone which connects keystone elements. There is no individual element which is more important because formal, casual, digital and face to face components may be equally important to this learner.

As practice-based learning occurs throughout a variety of digital and physical spaces this User Story can also be applied to these spaces. Specific tools or strategies can be assigned to specific environments depending on their suitability. For example, utilising a casual messaging solution such as Microsoft Teams might allow learners to ask questions while moving about a clinic or workshop. While in a lecture theatre, mini plenaries may be a more suitable method for facilitating question asking. This example is illustrated in Fig. 17.3 where the user's goals have been removed and solutions are assigned to specific environments. The casual messaging solution is seen as relevant to both environments, meaning this could be a keystone element for this particular learning system.

Because this system has multiple modes of communication and opportunities for learners to seek support, the learning system's ability to manage disturbance might be high. The system is purposefully designed around the user's needs and if learners are supported to purposefully utilise the various communication modes, the opportunities for maintaining or improving the learner's self-efficacy are high (Taipjutorus,

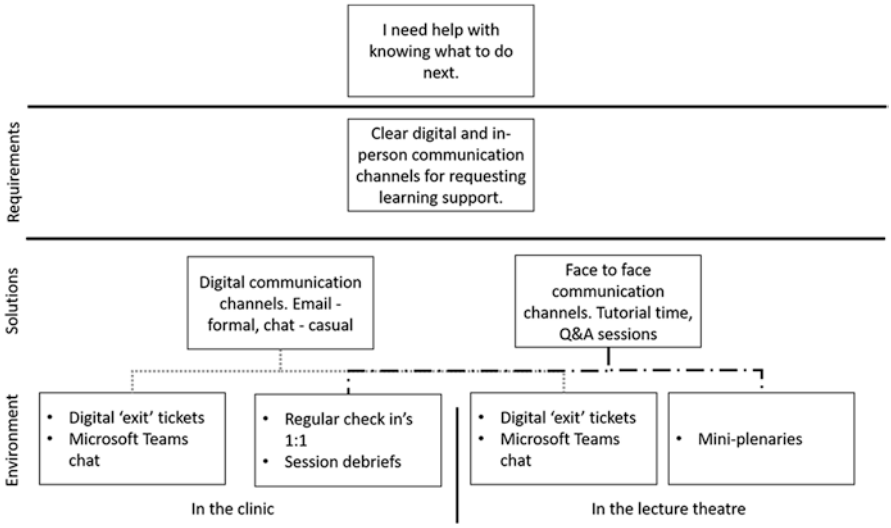

Fig. 17.3 User Story mapping across two learning environments

2014). Educators map their learners' needs to requirements and solutions while planning programmes of study as well as dynamically in the day to day of facilitating learning.

The application of the User Story methodology in an educational context can support educators to purposefully identify elements of a learning system through extrapolating the user goals, identifying requirements and then solutions. This can also be mapped across various environments or contexts to meet the demands of practice-based learning. This purposeful approach to designing learning systems may also maintain or increase the educator's self-efficacy (Corry & Stella, 2018).

The purposeful identification of requirements and solutions is commonly known as instructional design, whereby an instructional system is developed to meet the needs of the programme of study and learner profiles. Charles Reigeluth identified a need for flexible guidelines supporting educators to design new approaches to instruction. He suggests that traditional instructional design models and paradigms do not support educators to decide which learning variables are best suited to different users/learners, learning models and learning environments (Reigeluth, 1999). He further explains that "there is a shift from Industrial Age to Information Age thinking" and "there is the move from standardisation to customisation: designers are increasingly attempting to make possible a unique learning experience for each learner, rather than trying to produce a single, clearly-defined outcome for all learners" (Lisly, 2006, as cited in Rutkauskiene et al., 2006, p. 3). To address this challenge some educators are utilising methods such as User Stories as they support the design of learning systems which are customised to multiple learners, accounting for variable learning environments, learning theories and eco-system elements such as the need to manage disturbance.

Table 17.3 A schema which combines Ecosystem elements and User Story Goals

Eco-System	User Story Goals
Decentring of the individual element *All elements are important.*	**Multiple users are accommodated.** Goals Requirements Solutions **Multiple environments are accommodated.** Contextual requirements *Optimal level of customisation*
Ecotones *All environments are important.*	
Keystone *Some specific elements are critical.*	

The User Story mapping method can add depth to the ecosystem schema so that the two concepts can better guide the development and critique of learning ecosystems. In Table 17.3, the user story goals emphasises that the objective of the learning system is not to purely meet learning needs but to also ensure the system is optimised for variable learners and variable environments. The schema has evolved into a series of objectives for the learning eco-system and this may allow educators to undertake purposeful design of learning ecosystems thereby increasing or maintaining their own and their learners, self-efficacy.

This schema is now suggesting that designing a learning ecosystem is a complex activity in itself and this is perhaps an unnecessary process for educators who are already engaged in complex processes. Educators develop cognitive schemas (Kibler, 2011) for how they design and manage learning ecosystems. They develop these over many years of practice, and these are informed by prior experiences with education, research and the active assimilation of learning methods and strategies. Schema's such as the one presented here, can be internalised, or assimilated by educators and used to inform their day-to-day decision making. They can also be used as a directive process or point of critique as well as a means of communicating designs and sharing practice.

User Story Case Study

To see how the User Story method is applied I will provide an example used by eCampus. eCampus provides flexible, online, tertiary courses for distance learners. They re-design face to face courses into digital, online courses by partnering with seven of Aotearoa NZ's ITPs. To do this they use information provided by Subject Matter Experts (SME's) and identify the most effective way to deliver this to online learners.

At eCampus, the User Story method is used in two contexts. Firstly, it has been integrated into their Learning Design Framework (LDF) (see Table 17.4), a curriculum document of sorts which identifies the learning design principles of eCampus. The User Story element of this seeks to ensure outcomes are learner-centric and guides Learning Designers to identify strategies and solutions which meet the identified learner needs.

Table 17.4 An excerpt of the eCampus Learning Design Framework showing learners statements which were developed using the concept of User Story Mapping

	Learner Statements	Requirements
Engage me	I want to learn and see content that will help me in the real world. I want the learning journey to inspire me (hope). I want to be able to learn on the go—Anytime, anyplace.	Learning is authentic to the real world and delivered in a situational context through narrative and storytelling. Media and learning modalities are highly relevant and authentic to the context. Beautiful and simple design which takes the learner on a journey. Learning is intuitive and seamless through clear navigation and progress. The learner is engaged at an emotional level. Accessible from any device, learning on the go. Learning accommodates learner's life.

Table 17.5 An excerpt of User Story Mapping for identifying requirements and solutions that might meet learners' needs

1	As a learner who wants to access information when I need it, I want to know where I can find information when I am ready for it.	1. Reminders of key information at key stages – Just in time information/ nudge learning.	Develop patterns of reminders of how and where to access help and support.
			Provide 'breadcumbs' to locate key information when in course.
2	As a highly organised learner, adept at learning, I want to find out about what I need to do and some of the general requirements before the course begins.	1. Key information provided and presented at beginning of course.	Ensure key information is clearly organised and written in plain English.
	When I have begun the course, I want to be able to revisit this information for further clarifications.	2. Ability to access information when course has begun.	Note the 'about this course' page title may confuse some learners as it is, the title does not suggest the nature of the content. Suggest a title change to 'essential information' or 'course guidelines' or similar.

Secondly, eCampus uses the User Story method to identify technological and andragogical requirements for learners. When a new course is developed there are often technological requirements which learners will either need to use to meet the learning outcomes of the course or to meet industry requirements. As the courses are hosted on a learning management system there are also requirements for that system. The requirements are things like site navigation, mobile access etc.

An example of how the User Story method is used within eCampus is when there is learner feedback identifying a potential issue with the learning management system. Before identifying a solution, User Stories are created and then the requirements and solutions are identified. In Table 17.5, User Stories are listed for a specific

issue identified in learner feedback, and then a range of possible solutions are identified. For eCampus, the User Story method provides a way to design learning systems that are learner-centred.

User Stories and Holistic Education Models

One challenge with using User Stories for learning system design is empathising with the learner. Creating User Stories requires the designer to know or predict who their user will be and what they will need or want. As mentioned earlier it is common practice to use learner analytics to inform the creation of User Stories however, when it comes to self-efficacy this may not provide sufficient empathy for the user. Holistic education models can provide a useful and genuine scaffold for creating educational User Stories within the context of Aotearoa NZ. As an example of this, when developing their Learning Design Framework, eCampus utilised Mason Durie's, Te Whare Tapa Whā (IEAG, 2021) framework to guide the User Story Mapping.

For learners, self-efficacy to be maintained or improved if they need to feel a sense of belonging and have agency and control over their learning (Taipjutorus, 2014). Being in control of learning can entail the ability to select material or navigate it in a personalised manner, organise and make decisions about learning and have choice about what and how they are learning (Mercer, 2012). There are specific solutions that can support this within a learning ecosystem. For example, the tone and nature of written content as well as how the content is presented can affect how the learner may engage with it. Therefore, when it comes to creating a sense of belonging, the learning ecosystem can have a direct effect. Using holistic education models such as Te Whare Tapa Whā,[2] guides the development of User Stories to support the purposeful design of a learning ecosystem which holistically engages and supports the learner. This approach to learning system design is focused on not just on success in practice-based learning contexts, but also learner wellbeing.

As depicted in Table 17.6, the schema for purposeful learning system design utilises holistic education models to inform the User Story Mapping.

It is worth mentioning that educator wellbeing is also a high priority when designing a learning ecosystem and specific components can have a direct effect on this as well. Some examples such as self-marking knowledge checks for learners, automated learner analytics, basic learner Q & A chatbots, and clearly organised information can all free up substantial amounts of time for educators. User stories can also be used to consider the educators needs for a learning ecosystem.

[2] A model used to better understand and support Māori health, developed by Sir Mason Durie – see https://www.careers.govt.nz/resources/career-practice/career-theory-models/te-whare-tapa-wha/ for details.

Table 17.6 The schema with holistic education models added

	Holistic education models e.g. Te Whare Tapa Whā
Eco-System	**User Story Goals**
Decentring of the individual element *All elements are important.*	**Multiple users are accommodated.** • Goals • Requirements • Solutions **Multiple environments are accommodated.** • Contextual requirements *Optimal level of customisation*
Ecotones *All environments are important.*	
Keystone *Some specific elements are critical.*	
Disturbance and resilience *There are systems for managing and responding to disturbances.*	

Guided by Models

In the previous sections I explored the concept that a learning ecosystem has components and elements which work together to meet learners' needs. Educators select things and integrate them into their system. They also trial things, making decisions about their effectiveness and then edit them out of the system if they do not sufficiently fulfil a requirement.

How does an educator know what components or elements they should integrate into the system? How do they know what is available and whether it is fit for purpose? When do they know to edit something out of the system if it is not effective?

Educators use strategies, models, and theories to help them identify how they will facilitate learning. They use tools such as video, presentations, literature, modelling and more to aid learning. Some educational models in particular, help guide educators as to what tools they could use to meet particular requirements of their learners. Educators are able to interpret models to guide the identification of solutions. To illustrate how this occurs I will summarise two popular models and clarify how an educator might use aspects of these models to purposefully design learning ecosystems.

For the design of practice-based learning ecosystems I will analyse The Universal Design for Learning (UDL) and Education 3.0. These are by no means the most popular models or necessarily the most relevant models to practice-based learning,

however they are models which offer some guidance as to how educators select components or elements for a learning ecosystem because they elaborate on user requirements and connect with possible solutions.

Universal Design for Learning

UDL is a rubric guiding the design of learning which maximises inclusiveness. The goal of inclusive learning is for all learners to access learning, it is bidirectional with accessibility (Patiniotaki, 2019) and is a key objective of learning system design. UDL, personalised learning, differentiation, and learning analytics are all methods used to design inclusive learning ecosystems. UDL's detailed guidelines are organised under three key goals in a rubric. These are: provide multiple means of engagement, provide multiple means of representation, and provide multiple means of action and expression.

As a resource the UDL guidelines offer educators some suggestions as to what an effective learning ecosystem might include if its objective is to be inclusive. By focusing on a particular grouping of UDL guidelines, we can analyse how these guide learning ecosystem design. In Table 17.7, the guidelines for 'Providing options for expression and communication' are shown. In the second item, 5.2, educators are prompted to support and facilitate learners to use multiple tools for composing and constructing learning. This can involve the provision of tools that aid learning such as sentence starters or notation software, but it can also involve industry specific software, as well as brainstorming or planning tools.

If an educator observes that learners need support with constructing or composing learning, they may integrate a variety of tools into the learning ecosystem. The UDL guidelines offer educators an extensive set of principles from which they can design the learning ecosystem and as the guidelines are focused on accommodating diverse learners, it can also optimise learner agency. By designing the learning ecosystem around UDL guidelines, educators are able to create an inclusive learning experience which optimises learner agency. Thereby improving or maintaining learners' self-efficacy which in turn improves their ability to reach mastery within practice-based learning contexts.

Table 17.7 The guidelines for section 5 of Provide multiple means of Action and Expression from the Universal Design for Learning guidelines

Provide options for expression and communication
5.1 Use multiple media for communication.
5.2 Use multiple tools for construction and composition.
5.3 Build fluencies with graduated levels of support for practice and performance.

Education 3.0

Education 3.0 is a set of ambitions for education. It is commonly presented in rubric form to help distinguish the differences between Education 1.0 (An industrial education model), Education 2.0 (A minor improvement on Education 1.0) and Education 3.0. In Education 3.0 the conditions for an education that is highly collaborative and relevant are established. While there are different interpretations of Education 3.0, the one in Table 17.8 identifies some elements which can be supported within a learning ecosystem such as in the 'student behaviour' row.

Here the emphasis on "co-creation of resources and opportunities, active choice" can have a sizeable impact on the design of a learning ecosystem. This might prompt an educator to design a subsystem of collaborative discussions and documents with which learners actively co-create learning resources or opportunities. The Education 3.0 ambitions are another example of how models can guide the design of a learning ecosystem.

By analysing how these models offer educators guidance I am suggesting that educational models are an essential aid in purposeful learning ecosystem design.

Sometimes educational models can be applied or directed across a learning organisation and used as an ideological or evidence-based framework for the design of learning ecosystems. They can also be used by educators independently, within

Table 17.8 An example of an Education 3.0 rubric (Keats & Schmidt, 2007)

Characteristics	Education 1.0	Education 2.0	Education 3.0
Primary role of educator	Source of knowledge	Guide and source of knowledge	Orchestrator of collaborative knowledge creation
Learning activities	Traditional essays, assignments, tests some groupwork.	Traditional assignment approaches transferred to more open technologies. Increasing collaboration in learning activities; still largely confined to institutional and classroom boundaries	Open flexible learning activities that focus on creating room for student creativity; social networking outside traditional boundaries.
Student behaviour	Largely passive absorptive	Passive to active, emerging sense of ownership of the education process	Active, strong sense of ownership of own education, co creation of resources and opportunities, active choice
Technology	E-learning enabled through a learning management system and limited to participant within one institution.	E-learning collaborations involving other universities, largely within the confines of learning management systems but integrating other applications	E-learning driven from the perspective of personal distributed learning environments, consisting of a portfolio of applications

Table 17.9 The schema with educational models added

Guiding components of learning ecosystem design	**Holistic Education Models** e.g. Te Whare Tapa Whā	
Eco-System	**User Story Goals**	**Educational Models**
Decentring of the individual element *All elements are important.*	**Multiple users are accommodated.** • Goals • Requirements • Solutions **Multiple environments are accommodated.** • Contextual requirements *Optimal level of customisation*	Principles
Ecotones *All environments are important.*		Solutions
Keystone *Some specific elements are critical.*		Critique/ Insight

their own practice in response to their specific learner or contextual needs. This means that an educator's learning ecosystem might be influenced by externally directed and/or internally self-selected educational models. Either way, how do learning models fit within the ecosystem, user story and holistic education components? What role do they play in the design of learning ecosystems?

In Table 17.9, educational models are nested alongside the User Story component because they play a crucial role in both the identification of learner's requirements and the identification of solutions. Educational models can form the basis for the driving principles behind a learning ecosystem. For example, a key principle of UDL is inclusivity and if the model is adopted by an educator this principle will be an explicit or implied value for the learning ecosystem. This principle-based approach to learning ecosystem design can be a useful method of integrating or editing out things in the learning ecosystem.

An example of this might be that through applying the key principle of inclusivity and the guiding specifics of the UDL framework an educator identifies that their ecosystem's heavy focus on written evidence of learning is not inclusive. This then prompts them to integrate video and audio alternatives which are more inclusive for their learners. In this example the educator is guided by both the principles of the model and the specifics of it. In the schema, solutions and critique/insights have also been included because the use of educational models can offer solutions, such as 'provide multiple means of expression' and in the act of considering of the

appropriateness of solutions, educators are gaining insight into the effectiveness of their learning ecosystem.

Learning models will evolve over time and new ones will be developed and become relevant. Learning organisations and educators will self-select models to meet their learners' needs so while I have analysed two specific models it is not my intent that these are the models used to guide the design of learning ecosystems. It is my intention to state that learning models in general can offer educators clarity and purpose in the process of designing or critiquing learning ecosystems. In the schema I have placed the learning models off centre so that the User Story element and holistic education are keystone elements of learning ecosystem design for practice-based learning. Therefore, a hidden value of this schema is learner centeredness with the intent of being culturally responsive and highly personalised.

A Lean Model

The schema for guiding the purposeful design of learning ecosystems now contains four components; Ecosystems, User Stories, Holistic Education Models and Educational Models. Each of these components plays a different role, each of which has been outlined in this chapter. But what is the sum of the parts? And what insight does this offer us about how learning ecosystems are designed for practice-based learning? Are there more components to be added or is this enough?

Practice-based learning is complex as it necessitates multiple nodes or contexts and modalities in which learning happens within and across (Chan, 2020). It requires a network or system to be created so that learners are supported to reach mastery with work tasks and specific occupational dispositions. Educators who design learning systems for practice-based learning are designing complex systems and the ecosystem component offers a method by which to manage the ecosystem. It offers insight as to what the dependencies and risks are with a learning ecosystem, without adding too much complexity to the schema itself.

Learner-centred practice and learner self-efficacy is a key driver for the inclusion of the User Story component as it supports educators to design and consider the goals and necessary solutions to meet multiple learners' needs. The objective here is to optimise the learning ecosystem thereby increasing opportunities for learner and educator success within a complex system. The holistic education component provides a necessary culturally responsive lens to the creation of the User Stories.

The educational models component accommodates any relevant model but does exclude educational theories and strategies on the basis that models provide readily available graphic prompts or aids in the design of learning ecosystems. Educational theories and strategies can aid the design of learning ecosystems, however their application can require extensive extrapolation and, in this point, I reveal that the schema of guiding elements is a 'lean' model which is a point of clarity from which the more complex activity of designing learning systems can be approached from.

As educators might design or develop learning ecosystems rapidly, a 'lean' approach can provide expedited insight. By applying the term 'lean' I am referencing the Lean start-up methodology which aims to speed up product development by iterating faster and shortening development cycles (Blank, 2013). In learning ecosystem design, educators can reference a schema such as this to quickly think through their identification of problems and solutions, allowing them to efficiently amend elements. Experienced educators might already have developed a cognitive schema which allows them to undertake the process internally and further empirical research could reveal whether such external schemas can improve the self-efficacy of new educators by offering them clarity and purpose when designing learning ecosystems. While this schema is lean it does offer insight as to what elements educators use when designing learning ecosystems for practice-based learning. It is an example of how some educators are undertaking the design of learning systems to optimise conditions for learning.

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Chapter 18
A Networked Distributed Model for Midwifery Education

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Abstract This chapter explores the design of a blended learning Bachelor of Midwifery programme based at Ara Institute of Canterbury (Ara) in Ōtautahi (Christchurch), Aotearoa New Zealand (NZ). Students are recruited from across the upper half of Te Waipounamu (South Island). The programme prepares students for registration as midwives and therefore must meet the standards of midwifery education set out by the Midwifery Council of New Zealand (MCNZ). In 2007, the MCNZ updated the standards which required that midwifery preregistration education providers ensured that students could access programmes in provincial and rural areas. This model was recommended by the World Health Organization (WHO) to improve recruitment and retention of health workers outside of main urban areas (2010). The design of the Ara midwifery programme illustrates the success of a networked distributed approach, itself an innovation, with support from a range of pedagogical approaches (including the application of Kaupapa Māori and Pasifika values, eportfolio assessments, and simulation and virtual reality), to ensure excellent programme completion rates and graduate destination outcomes.

Keywords Midwifery education · Networked learning · Distributed learning · Kaupapa Māori · Pacific pedagogy · Eportfolio · Simulation training in health · Virtual reality

Introduction

Networked learning involves learners collaborating as a ‘learning community’ with time to build relationships, share resources, knowledge, and experiences. Critical reflexivity is an integral part of the learning process. This approach promotes an

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_18

emphasis on communication technologies and enabling connection between people across time and space (Networked Learning Editorial Collective, 2021). Distributed learning enables flexibility with respect to where and when the learning takes place. It uses a wide range of information technologies including interactive media to create online collaboration supported by teacher facilitation to shape the learning experiences of those involved (Dede, 2004).

The authors of this chapter are all lecturers in the midwifery degree programme at Ara and have each chosen to share an aspect related to the distributed and networked approach to midwifery education. Mary outlines the background and historical account that led to midwifery regaining autonomy and midwifery education moving into the polytechnic environment where direct entry degrees were established. Rea explains the design and establishment of the midwifery degree programme based on a blended model which enables students to stay and gain experience within their own communities. Kathleen shares her personal journey and experience of tertiary education and incorporates her strategies for integrating Māori and Pasifika values into midwifery education. Michelle led the development of the student e-portfolio within our programme, and she outlines here the journey, incorporating why an e-portfolio is a valuable tool and integral to network learning. Melanie discusses the use of simulation within health education and the introduction of an innovative virtual reality simulation for birth within the programme. This final part on simulation is an example of a new, innovative, and rapidly developing interactive media that has the potential to enhance and futureproof networked distributed learning.

Background

Mary Kensington

Since 1904, midwifery education in Aotearoa NZ has undergone several transformations, from learning by observing in the home environment, to training in a hospital setting, to education in a tertiary (polytechnic and university) environment. Over this time midwifery practice shifted from a position of relative autonomy to dependent practice under medical supervision to full professional autonomy following the 1990 Nurses Amendment Act.

Midwifery regulation in Aotearoa NZ began in 1904 with the introduction of The Midwives Act. This marked the end of the informal apprenticeship-style of learning through observation and first-hand experiences that had been the only way of becoming a midwife. The 1904 Midwives Act established midwifery registration and provided formal training of midwives, by establishing state maternity hospitals (these were later named St Helens hospitals with the first opening in 1905) as facilities for midwifery training (Donley, 1986). The Act specified the practical and theoretical requirements for student midwives and the requirement of passing a midwifery examination as a legal requirement if wanting to practice as a midwife (Midwives Act, 1904).

By 1925, midwifery was brought under the auspices of nursing and medicine with the Nurses and Midwifery Registration Act. This began the gradual erosion of midwifery training that resulted in the direct entry route to midwifery being phased out, nursing registration become a pre-requisite to midwifery and the creation of the nurse-midwife (Donley, 1986). The final blow culminated in the 1971 Nurses Act where the word 'midwife' was removed from the title of the legislation altogether and the right of midwives to practice independently of medical supervision was removed by law. It would take another two decades of enormous political pressure from women and their families, consumer groups and midwives plus bureaucratic and political support for changes to occur. The Nurses Amendment Act 1990 restored the right of midwives to practice independently of medical supervision and provided midwifery options for maternity care. Midwifery was once again established as a profession separate to nursing and medicine.

Background to Polytechnic Education

In 1970, the NZ government invited Dr. Helen Carpenter a Canadian nurse and WHO consultant to review the country's nursing education system. In her report she observed that the education remained outdated and unsuited to the needs of both the students and health services. She stated that students were "trained to undertake activities in a certain manner rather than taught to think through the application of principles to different situations and to apply these in an appropriate manner" (Carpenter, 1971, cited in Allen, 1992, p. 31). One of Carpenter's recommendations was that nursing and midwifery education shift from being hospital-based to a tertiary institution and that midwifery become a post-graduate nursing specialty in maternal and infant nursing (Allen, 1992).

Midwives continued to be trained in a hospital service setting within the St Helens hospitals until 1979. Student midwives training and experience was within the context of a single hospital setting. Therefore, when a student registered, she was already known and accepted within the hospital setting so transition to a practising midwife was usually a supported process (Kensington, 2005).

The move in 1979 to the tertiary education provider (Polytechnic/ITP) saw the end of the hospital training. At this time, the only way in Aotearoa NZ to train as a midwife was to complete the Advanced Diploma of Nursing (ADN) in Maternal and Infant Health with midwifery option (Donley, 1986). Student midwives were now taught in a classroom setting and their clinical experience (reduced from 6 months to 10–12 weeks) could be in a variety of settings. The education of the student midwives now placed greater value on the knowledge acquired from research findings, textbooks, etc. than the knowledge gained from their practical experience (Gilkison et al., 2013). Now, when a graduate midwife made the transition to practice within a maternity facility, she could experience conflict as the old informal networks of support provided by colleagues that had been part of the original hospital training, were not readily available to midwives graduating from these new programmes (Kensington, 2005).

The change to midwifery education turned out to be problematic and resulted in fewer midwives being trained in Aotearoa NZ (Donley, 1986). The 6-month St Helens hospital- based courses had trained between 157–185 midwives per year, whereas in the 7 years of the ADN only 179 midwives in total qualified (Guilliland & Pairman, 2010). Whilst some nurses chose to complete their midwifery education overseas, ultimately this led to a shortage of midwives in Aotearoa NZ.

During the 1980s there was increasing pressure to establish a separate one-year midwifery programme for nurses to train as midwives. Finally in 1989, a separate one-year post- registration midwifery programme commenced at polytechnics (ITPs) in Auckland, Wellington, and Dunedin. Christchurch and Waikato were approved to provide the one-year course in 1992. At the same time, there were more radical challenges from some midwives and maternity groups (for example Parents Centre, Homebirth Association) to increase the midwifery scope of practice, so that midwives could restore their legal right to practice independently of medical care and provide midwifery options for maternity care (Kensington, 2005).

Further changes were made in 1990 with an amendment to Section 42 of the 1977 Nurses Act. The amendment enabled midwives to take full responsibility and claim payment for maternity care. Under a contract with the Ministry of Health, midwives were now able to provide midwifery care throughout pregnancy, labour/birth and postnatal up to 6 weeks to a caseload of women. Caseloading midwives can provide the labour/birth care at home, in a birthing centre or maternity hospital. They refer women and babies for specialist obstetric and/or medical care if required. Midwives now have a choice to either work in birthing centres or maternity hospitals doing shift work or take on a caseload in the community.

The legislative changes enabled the Nursing Council of NZ and the Minister of Health to approve direct entry into Midwifery Education through a three-year programme. The re-establishment of direct-entry midwifery was a major change in the education of midwives. The challenge then for the midwifery profession in 1990 was to develop midwives who could provide the kind of service women wanted and on their own professional responsibility. In 1992, Auckland and Otago polytechnics were approved to provide the first three-year direct entry pilot midwifery programmes. Wellington and Waikato commenced 1996 and Christchurch in 1997. The 3-year degree programme was based on a total of 3000 h (1500 h theory and 1500 h practical) (Guilliland & Pairman, 2010).

In 2003, the establishment of the Health Practitioners Competence Assurance Act (HPCAA) allowed for the formation of a separate MCNZ responsible for approving undergraduate midwifery education programmes and registration requirements for midwives. In 2006 the MCNZ undertook a review of midwifery education (MCNZ, 2007a). The review's recommendations resulted in revised standards for approval on pre-registration midwifery education programmes (MCNZ, 2007b). The redesign was driven by

- workforce shortages and the need to increase student numbers and graduating midwives especially in the rural and provincial areas of Aotearoa NZ

- the need to increase practice opportunities for students and thereby strengthen the competence and confidence of graduates.

The most significant change made was increasing the degree programme to 4 years, which resulted in a total of 4800 h (2400 h theory and 2400 practical). There was also a requirement for the programme to use flexible modes of delivery, to enable students from diverse geographical areas to access the programme. 'Learning and teaching processes' should promote for example- self-responsibility, critical enquiry, collaboration, integration, contextual understanding, and lifelong learning (MCNZ, 2007b, p. 15).

This led to Ara, in collaboration with Otago Polytechnic, in 2009 introducing an innovative Bachelor of Midwifery programme using a blended model approach to enable students to study and gain practice experience within their own communities. In the intervening years the Ara and the Otago Polytechnic programmes have developed in some different directions especially with regard to online platforms. Hence, this chapter only relates to the Ara midwifery programme.

The Bachelor of Midwifery at Ara – A Blended Learning Programme

Rea Daellenbach

Distributed Learning

The Bachelor of Midwifery programme at Ara is based on a distributed model of blended learning. Dede defines distributed learning as "educational experiences that are distributed across a variety of geographic settings, across time and across various interactive media" (2004, p. 16). The programme is distributed across the upper Te Waipounamu, with satellite students and lecturers/ kaiako from across Canterbury, as well as Nelson, Marlborough, and the West Coast. Also, it is distributed in the diversity of learning settings for each student. The distributed model enables students to complete most of the programme in the areas in which they live and only come to Christchurch for wānanga[1] and some specialist practice placements.

The programme is based on the integration of both online and face-to-face modes of learning which include the following (see also Fig. 18.1):

[1] (Māori) To meet and discuss, deliberate, consider. In our programme the word refers to the block week of face-to-face classroom sessions.

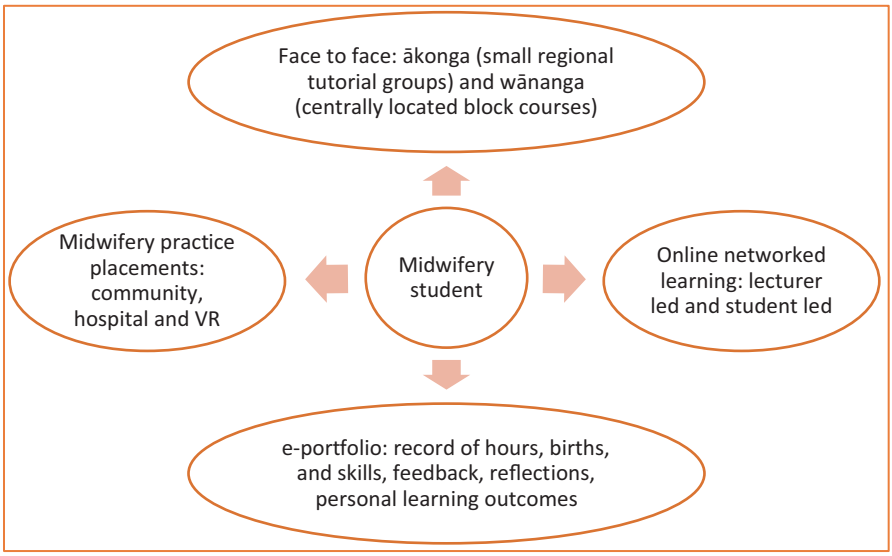

Fig. 18.1 Blended learning model of the Bachelor of Midwifery programme at Ara Institute of Canterbury

- online learning resources accessed through the learning management system (Moodle),
- synchronous online tutorials,
- face-to-face small group tutorials (which are referred to by the Māori term 'ākonga'),
- face-to-face Christchurch-based intensive block courses (which are referred to as 'wānanga'),
- midwifery practice placements in a variety of settings including working on shifts in maternity hospitals, and birthing centres, working alongside community caseloading midwives, lactation consultants and well-child service providers, and through virtual reality experiences,
- student e-portfolios.

Prior to the changes in midwifery education in 2009, Bachelor of Midwifery programmes were only offered in the main centres. People who wanted to study midwifery who lived outside the main centres had to move to one of these locations to study. Subsequently many did not return to the regional areas they had originally come from. Many people who want to become midwives already have children and for those from outside the main centres, the challenge of moving a family posed a major barrier to accessing midwifery education (Gilkison et al., 2016). The Ara collection of graduate destination outcomes statistics indicates with the new programme, most of the students have remained in their home areas after graduation. This has made a significant difference in rectifying midwifery shortages in the regional and rural areas of the upper Te Waipounamu. This supports the WHO

recommendations for improving the recruitment and retention of rural and remote health workers (2010). The WHO advocates that schools for student health professional education need to be located outside of major urban centres and that urban-based educational institutions can provide this education through distance, e-learning approaches. This is the programme design adopted by Ara which includes local midwifery practice placements supported by a local kaiako, and online learning coordinated from the Christchurch-based centre. Another benefit of this distributed approach is that it has increased the opportunities for midwifery practice placements, and therefore the numbers of students accepted into the programme.

Networked Learning

The midwifery programme at Ara is based on a networked learning approach in its curriculum and design of learning opportunities. Networked learning focuses on using digital communication technologies to facilitate learning through interpersonal relationships and collaboration (Networked Learning Editorial Collective, 2021; Trentin, 2010). These technologies are used to network learners with other learners, with lecturers and experts.

Our desire to adopt a networked approach to facilitating students' learning is most evident in the theory component of the midwifery programme, using a web application called OB3 by Oceanbrowser. Most of the theory is made available to students online so that students can access the materials from their own homes and work through these in their own time. OB3 enables lecturers to create: "media-rich documents … with embedded discussions [which] take the form of curriculum content or student assignments and are created as part of asynchronous collaborative activities such as wiki-style co-written documents, templated group activities, e-portfolios and group projects" (Gomez et al. 2017, p. 1).

Prior to adopting OB3 as the primary web application for theory content, students consistently identified that they felt isolated on their study online and many felt they were not confident that they were learning effectively. Using OB3 has opened up whole new possibilities for learning. The role of lecturers has shifted from creators of passive content to interactive content. Lecturers are now also facilitators of networked learning. They create content that includes embedded resources (e.g., links to videos or articles) with questions and activities for students to complete. These are placed in the context of the content, rather than being in a separate forum, and students can respond to each other's posts. Students cannot edit the content put up by the lecturers or by other students.

Using principles of andragogy (Knowles, 1970), prompts for students often ask them to share their own experiences as a starting point for understanding new information and reflection. As they move through the programme and gain more practice experiences, prompts ask students to apply the information to midwifery scenarios. Lecturers respond in the discussions to encourage more discussion, answer questions, and add to the knowledge being shared. Students have expressed that they

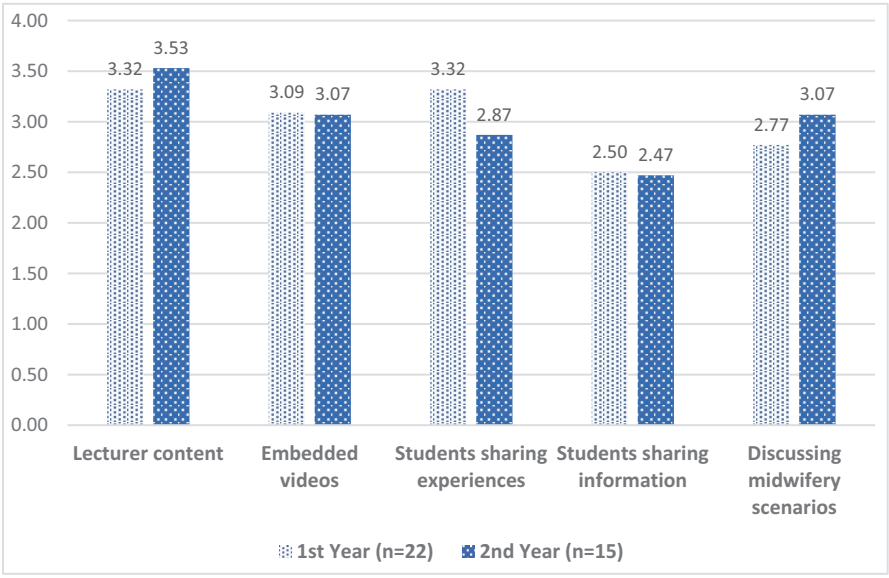

Fig. 18.2 Preference for type of resources/ activities in OB3 ranked 5-1 (5 as first preference): Average ranking

really appreciate how much they learn from this approach, from each other as well as from the lecturers. As part of a participatory action research project (see Daellenbach et al., 2014; Kensington et al., 2017) students across the first 2 years of the programme were asked to rank in preference the different approaches to learning that are included in OB3 (note this was coded as 5 meaning most preferred and 1 being least preferred). As shown in Fig. 18.2, the first-year students ranked sharing their experiences equally with the lecturer created content, while in the second year, students ranked discussing midwifery scenarios and viewing videos only marginally behind the lecturer created content in supporting their learning.

In response to the open-ended questions about OB3 in the study, students indicated that the online discussion in OB3 helps them feel more connected to the other students in the class as they work through the online materials at home. The value students placed on sharing their experiences and information with each other (as shown in Fig. 18.2), suggests that students are engaged in networked learning and able to form and sustain communities of practice.

Practical hours make up half (2400 h) of the midwifery programme. Each student has their own individually assigned timetable of community placements and hospital-based shifts. Practical hours also include simulation (which is discussed below) and debriefing. When the blended programme was designed, there was concern that the combination of students working in the clinical settings and studying the theory online would intensify the theory – practice gap where students struggle to align the theory (ideal) with what they actually see in practice (Lange & Kennedy, 2006). This led us to include small groups tutorials/ ākonga, based on a modified

version of the Oxford Tutorial model, as an integral part of the programme (Kensington, et al., 2017).

The Oxford Tutorial involves a small group of students (three to five) meeting weekly with a tutor to discuss and debate topics related to their study (Palfreyman, 2008). Each student in the first and second years of the Ara midwifery programme is assigned to a local ākonga group with a kaiako who meet face-to-face for 3–4 h each week. Groups sizes vary according to region but are generally between three to a maximum of ten students. The focus of the ākonga is on students' debriefing of their midwifery practice placements to collectively learn from each other's experiences. The kaiako facilitates students to engage in critical inquiry, draw links with the theory, and discuss ethical dilemmas related to midwifery practice. Learning also includes developing communication skills and respect for diverse positions which are essential for midwifery practice. The ākonga instantiates what Smith (1996, 2000) terms as "curriculum as process" where the learning is created through the interactions between all the ākonga members as a community of inquiry.

The research that we conducted indicated that some students feel challenged by the variation between different ākonga in terms of the content of discussions and the way the groups are conducted (the culture) (Kensington et al., 2017). This has been addressed in the Ara midwifery programme to some extent through closer networking between all the kaiako who facilitate the ākonga via regular online meetings. It has also demonstrated the importance of ensuring kaiako have the necessary knowledge and skills to facilitate small groups. In relation to "curriculum as process", Smith notes that: "The major weakness and, indeed, strength of the process model is that it rests upon the quality of teachers" (1996, 2000, para 42). This insight also applies to the Oxford Tutorial model (Palfreyman, 2008).

The ākonga structure has the flexibility to adapt to meet the specific needs of the students within that group. In the participatory action research study we conducted in developing the programme, students have consistently noted the vital role that the ākonga plays in providing social connection and the tangible support they give each other to help manage the competing demands of study, placements, families/whānau, and life (Kensington, et al., 2017). This responsiveness to meeting the learning needs also applies to meeting the cultural needs of students. As Kathleen discusses in the next section, ākonga provides a space for her to apply Pasifika and Te Ao Māori values to enrich learning for midwifery students.

Applying Kaupapa Māori and Pasifika Values in Midwifery Education

Kathleen Maki

Introduction

I have always believed that midwifery care can enrich childbirth experiences for wāhine, pepi and whānau. It has been my passion for midwifery that has led me to study and work many years as a midwife across Aotearoa, in all care settings, as an educator for the New Zealand College of Midwives (NZCOM) and now, as a lecturer in the undergraduate midwifery degree and the diploma in Childbirth Education at Ara.

Of the 3274 midwives in Aotearoa (MCNZ, 2020) I am one of 47 midwives who select Pacific as our primary ethnicity, a small handful of 'Pacific Pearls' working within the midwifery profession. My whānau whakapapa back to the Polynesian Islands of Aitutaki Manahiki, and Bora Bora.

As I have matured on my journey as a midwife, I have cultivated a passion for Mātauranga Māori (Māori knowledge) and Te Ao Māori (the Māori world) and its connection to wāhine and whānau, hauora (health) and whakawhānau (childbirth). My Ngāti Porou husband, our tamariki and our Ngāi Tahu whānau here in Ōtautahi demonstrate the world of māoritanga and this has naturally become embedded in my teaching. The gravitational pull toward this world may also be because of the many familiar aspects that connect me back to my own cherished upbringing.

Upbringing and Learning

I was born in Wellington. Being the first grandchild, I was raised by my grandparents, predominantly by my grandmother. The transmission of cultural knowledge from my grandmother to me ensured that she grounded me with her wisdom and through her I was gifted the richness of Cook Island culture. My learning was immersive; if I wanted to learn a recipe, I had to observe, if I wanted to learn a song, I had to listen and if I wanted to learn to dance, I had to follow. This was my introduction to learning.

My own journey to becoming a midwife and navigating the world of tertiary education was challenging. Not only did I have to learn to become a midwife, but also understand *how* to learn at a higher level. I had recognised, what my strengths were when it came to retaining information and I used every tool I could to make sense of, organise, and compartmentalise my studies. These strategies were applied

to my postgraduate studies and proved to be incredibly successful, allowing me to graduate with honours.

The Role of Lecturer

Since becoming a lecturer, the converging of my Pasifika worldview and my appreciation for Te Ao Māori is the foundation I teach from and feel these perspectives naturally align with the holistic nature of midwifery. What my experiences have given me is the understanding of the importance of a curriculum, based on teaching *through* Māori and Pasifika values and how this can be integrated into a blended learning programme.

The first value is *manaakitanga*. This is about recognising that the programme has its own protocols (or tikanga) that tauira (students) are not necessarily familiar with. The role of a lecturer is to extend manaaki to tauira, welcome and guide them to enable them to feel comfortable and at ease within the programme. Manaaki involves developing a teaching plan that is cognisant of the diverse learning needs of the tauira, ensuring that spaces, whether in the classroom or online, are conducive to learning and that preparedness and responsiveness enables effective learning. I invite tauira to show manaaki to each other, for example, by making an offering which is a gift to the ākonga. The offering promotes the act of giving and receiving and can be whatever the tauira feels inspired to share. By allowing the tauira to choose the gifts that they contribute they can express their own understanding of manaaki.

Another important concept that is integral to manaakitanga is *whanaungatanga*. This is the authentic connection between the tauira, to their kaiako, and to the wider programme. Enabling space to practice this skill for tauira strengthens how to engage in a meaningful way with whānau when they begin practicing as kaiwhakawhanau (midwives). Whanaungatanga needs time to develop, like the roots of a plant growing into the earth. It is important that time is given in the ākonga for this practice. One way this can be done is through pūrakau, which is sharing personal stories of one's own whakapapa and whānau. In return the kaiako also needs to share their own experiences and stories. Debriefing midwifery practice experiences is also encouraged allowing an enrichment of each other's knowledge through shared learning. At a wider level, engagement with the learning support services available at Ara is something I highly encourage. Equally it is also important that tauira identify their own strengths and use this to enhance their learning.

Finally, *kaitiakitanga.* The principle of kaitiaki (guardian, protection) is a natural calling for a midwife, therefore complements and aligns with my teaching. I love bringing Te Reo into my face to face and online teaching. It is the familiar cadence of my tipuna's native language, the intriguing duality of the word, and the holistic nature of reo and how it gives a richer perspective on seeing the world. The use of Te Reo can facilitate versatility in understanding different points of view and again. This can only serve to enrich one's midwifery practice. The preservation of

midwifery knowledge, Mātauranga Māori and Pasifika values are vital to the well-being of whānau within these communities. Taking an active role in protecting this through education and transmission of midwifery skills ensures that this precious knowledge for whānau endures.

Whakakapinga (in Closing)

The complexity of the Ara blended midwifery programme can be likened to a Tivaevae. A Tivaevae, is an artistic expression in the Cook Islands. It is large vibrant textile that has been sewn together often amongst the busy hands and chatter of the elder women. Tivaevae is a taonga (treasure) in my culture and used for very special occasions. What makes Tivaevae so valuable is not only the intricate designs or majesty of these quilts, but the imbuement of patience, love, and community. The careful threading together of my Pasifika and Māori values applied to midwifery education also symbolises my own tivaevae, as my taonga to the next generation of midwives in Aotearoa.

Developing the e-Portolio Within the Bachelor of Midwifery Programme

Michelle Prier

The implementation of an electronic portfolio (e-portfolio) is integral to the Ara midwifery programme. If we accept 'networked learning' as meaning connections made between students, lecturers, information/knowledge and technology, and 'distributed learning model' as the action of learning taking place in a variety of settings across communities utilising technology in the provision of access, then the implementation of an e-portfolio interweaves all of these elements. It also includes the personal and reflective dimension of learning:

> NL [networked learning] places much emphasis on collaborative learning …. Nevertheless, among the many ICT-mediated dyads (learner-learner, learner-tutor, learning community-learning resources, and others), an important dyad is forgotten: the dyad which connects the learner to him or herself, to his or her mechanisms of acquisition, appropriation, and regulation of knowledge (Networked Learning Editorial Collective, 2021, p. 329–330).

The use of a portfolio is an established practice for midwives to demonstrate professional development, experience, critical thinking, growth, reflection, competence, and goals (New Zealand College of Midwives, n.d.). It is also a mandatory requirement of MCNZ to meet one of the conditions of the annual recertification programme to attain an annual practicing certificate (MCNZ, 2018). In undergraduate midwifery education, all these elements, and more, are relevant to the progression

towards midwifery registration. The function of the portfolio continues to exist beyond registration to support the midwife's ongoing reflection, professional development, professional reviews, and philosophical understanding of her practice (Baird et al., 2016).

In the midwifery school at Ara the portfolio forms an assessment in each year of the programme. The original paper version of the portfolio was deemed fit for purpose at its introduction in 1997, and beyond. However, with the advancement and integration of technology, limitations in the portfolio were revealed. A move to electronic portfolio (e-portfolio) was mooted. Developing an e-portfolio was a natural progression following the blended learning systems already embedded for the delivery of most of the theory within the programme. In 2018, the midwifery team decided to instigate a review of the portfolio.

Firstly, the midwifery team took the opportunity to review what we needed from a portfolio. It needed to be fit for purpose, relevant, and manageable for student and kaiako. It would still need to meet assessment outcomes and the MCNZ requirements to record hours, births, and skills. We also recognised the unique relationship the e-portfolio offered for student and kaiako, to become more interactive, dynamic, and contemporaneous, and with the anticipated outcome of improved engagement. As Pincombe et al. note in relation to e-portfolios: "[W]ithin nursing and midwifery education, it is important that this learning journey has its basis in reflective pedagogy, encouraging students to actively participate and direct their own learning" (2010, p. 95).

Secondly, an investigation of what web-based platforms were already available was undertaken. The team began by investigating ICT options and found other teams at Ara (nursing, medical imaging) already utilising platforms such as WordPress (a blogging tool), OneNote (an electronic notebook) and Mahara (an eportfolio platform). But none were quite the right fit for midwifery. As the portfolio is an assessment, we needed to be able to 'close' the portfolio at the due date, a function not easily achieved in the other portfolio platforms. As described above, the midwifery programme uses a web-based interactive platform, OB3 to deliver most of the online material. Security is an important component of e-portfolios and OB3 security is maintained through passwords linking courses, and accessibility via the internet rather than institution held files. Another feature was we were able to close the portfolio when required through settings controlled by the kaiako.

Thirdly, we decided to collaborate with the OB3 team to investigate the development of an e-portfolio for the midwifery programme. The final e-portfolio product has now been integrated into all 3 years of the programme. This means that students can now access all files associated with their study, including their e-portfolio on the same platform.

The migration of the portfolio from paper format to electronic was managed in stages. We introduced the e-portfolio to the first-year cohort in 2019 and provided education to guide students' development of their portfolio in the new electronic version. At the same time kaiako were also upskilled to engage with the e-portfolio. Throughout the process, we recognised that the e-portfolio needed to meet the following requirements: student and kaiako friendly, met curriculum standards, was

accessible, provided a repository for a broad(er) range of evidence, had flexibility for future development, and promoted interaction between student and kaiako. Pincombe et al. (2010) signal the move to an e-portfolio must remain student-focussed, user-friendly, and with emphasis on the content, not use of the technology. Utilising the already familiar OB3 platform has enabled this to be achieved in the programme.

The e-portfolio and supporting resources are accessible to students wherever they are (e.g., in placements, at home etc.) and this has been noted as a significant advantage compared to the paper-based portfolio. It is exciting to encourage students to think beyond traditional written forms of evidence, and through this electronic format, evidence could include a wide variety of media (voice memo, video clips, images). This fits with recognising different styles of learning and expression, and with the digital natives we currently work with amongst the younger members of the student cohort. Kerr and Averill (2021) identified in their research that Māori student success in assessment was influenced by the student having autonomy over their assessment submission and the e-portfolio is a positive step towards this. The benefits of an e-portfolio accommodating a wide variety of evidence supports this position of a culturally appropriate and holistic approach to student-led learning strategies.

Benefits of integration of the e-portfolio exist. They include:

- supplementing face to face contact with the ability to regularly check in with students online on their progress, thus increasing the opportunities for formative feedback "…that when a learning environment fosters dialogue and partnerships between students and teachers, space is created to approach learning in new and innovative ways" (Gilkison et al., 2016, p. 31)
- moderation of marking e-portfolios is much easier with all kaiako, including those working remotely, able to access material via OB3
- recording of clinical activities to meet the requirements of the New Zealand Midwifery Council is simultaneously accessible for students and kaiako. Students are now more inclined to regularly update their records, making the tracking of meeting programme requirements for hours and clinical contacts more contemporaneous
- greater autonomy and flexibility for students and a more holistic approach as afforded by the format
- sustainability as currently a high priority. The e-portfolio can sit comfortably in this concept with reduced consumption of paper materials, and improved time management for both student and kaiako.

The Use of Simulation and Virtual Reality in Midwifery Education

Melanie Welfare

As previously described, networked distributed learning takes place in a variety of settings across midwifery education communities and uses 'various interactive media' (Dede, 2004). Another form of interactive media (apart from those mentioned in previous sections) is the use of a wide variety of medical simulation to enhance students learning. The use of advanced technologies will enable educators to futureproof this learning and one of the ways this has been accomplished at Ara is the development of a virtual reality birthing woman. This section will provide a history on the use of simulation in healthcare education and then discuss the development of virtual reality technology to support the students learning.

The use of simulation in health care education has been recorded for over 1500 years to enhance student learning (Owen, 2016). An early midwifery example was 'the machine' developed in France in the 1740's. This was made "from the bones and skeleton of a woman and an artificial womb" (p. 3) and was used by students as a means of understanding the movement of the fetus through the pelvis during the birth process.

As Mary discussed in the opening section, healthcare education has changed over the years from apprenticeship-style learning to degree programmes where students need to demonstrate competency, skills, and knowledge acquisition prior to registration with regulatory bodies (Elliott, 2011). Simulation has needed to change and adapt synchronously to support learning in the healthcare environment. This can be demonstrated by the changes from the use of cadaver and animals in the seventeenth century (Owen, 2016) through to the development of task trainers[2] to computerised mannikins for example, Resusci-Annie® or SimMan3G®.

Simulation in healthcare education has been shown to increase the acquisition of skills, knowledge base, and decision making (Frost et al., 2020; Woon et al., 2020). A formal literature review conducted by Coffey (2015) into the use of simulation as a learning tool for midwifery education questions the widespread introduction into midwifery education. The review highlights several points, firstly that student's confidence increases using simulation, but skill acquisition is dependent on the lecturers teaching, facilitation, and debriefing skills. Secondly that more evidence is required to determine if the use of simulation in healthcare education correlates to improved outcomes for mothers and babies, prior to simulation hours being used to

[2] Task trainers/ Part task trainers - A model that represents a part or region of the human body such as an arm, or an abdomen. Such devices may use mechanical or electronic interfaces to teach and give feedback on manual skills such as IV insertion, ultrasound scanning, suturing, etc. Generally used to support procedural skills training; however, they can be used in conjunction with other learning technologies to create integrated clinical situations (Lopreiato, 2016).

replace clinical placement hours. Finally, that there needs to be further research to understand pedagogical approaches in midwifery education (Coffey, 2015).

The use of technology is advancing rapidly and one of these advances is the use of virtual reality (VR). Once the exclusive use of gamers, this is now an easily accessible, home-based and user-friendly resource (Shorey & Ng, 2020). VR is widely used in other education settings, for example, the military for naval and submarine warfare exercises and aviation in the form of flight simulators. There were proven benefits in using simulation in these fields with a reduction in the cost of lost equipment and reduction in the loss of lives (Iserson, 2018). However, in health care education the use of VR has been adopted slowly. In 2016 Owen compares the use of VR in aviation and health education and states that "… [VR] simulation in healthcare has not routinely been used in education … despite ample evidence that the amount of preventable error and harm from medical care makes admission to hospital many times more dangerous than air travel" (p. 10).

Within the midwifery programme at Ara, several different types of simulation are employed. These range from using a simple part task-trainer of a sponge to inject when learning about intramuscular injections, to the use of computerised mannikins when learning new-born resuscitation. The simulations differ in the level of fidelity – how well the simulation replicates the real world situation - and realism – the creation of an environment that enables the student to fully engage and be immersed in the scenario (Lopreiato, 2016). Within the programme there are a range of mannikins, part-task trainers, task trainers and mannikins available to use as means to support the students' learning.

Exploring the use of new technology and its use within midwifery education has led to the recent development of a virtual birthing woman. In brief the build is a woman who arrives at a primary birthing unit in advanced labour, and she is supported by her partner. The woman has a normal physiological birth and births in an upright active position. The student is immersed in this VR scenario by wearing a head mounted display unit, accessing haptics via hand controls and audio via ear buds.

Students from across all 3 years of the programme can use the VR in a variety of ways. They work through the VR scenario with the support of their kaiako, but they can also practice in the VR on their own. In the first year, the students are socialised into the birthing environment so that they can learn essential skills for midwifery practice, for example to measure and record baseline observations, palpate the woman's abdomen, and auscultate the fetal heart rate. Second year students who are starting to explore the complexities around birth can stop the scenario at various points and explore what would happen if the woman experienced a shoulder dystocia or post-partum haemorrhage. In the third year the students take on the role of the midwife and bring all their knowledge and practical skills together to maintain the safety of mother and baby throughout their time in the VR. They can facilitate and support a woman birthing her baby and placenta physiologically, whilst also planning for the possibility and management of emergency situations. The students integrate their clinical, assessment, decision making, and communication skills while immersed within the scenario.

Simulation has been shown to aid in skill development and bridge the theory/practice gap (Dochy et al., 2012; Frost et al., 2020), however building new technologies needs to be tempered with the cost of development, building and implementation by healthcare educators. Interestingly, many new educative VR technologies have been built with little consideration of pedagogical approaches (Radianti et al., 2020). However, in a post-COVID-19 world where education was disrupted across the world, adapting to, and using innovative technology may be a way to minimise these disruptions. Using VR within midwifery education programmes could enable every midwifery student in the world with a smart phone, to have access to a birthing woman in their living room 24 h a day.

Conclusion

Midwifery education is relatively new within the tertiary environment in Aotearoa NZ with the first Bachelor of Midwifery degree starting in 1992. By the mid-2000s it had become apparent that the degree needed to be extended with regard to hours, in particular practice hours, plus be more accessible to potential midwifery students from all over the country. In response to this the Ara midwifery programme in 2009 adopted a distributed model of learning, which has opened opportunities for students to study midwifery from across the upper part of Te Waipounamu. To support students and enable them to feel they are part of a community of practice, a networked approach has been carefully designed. This includes theory taught online that encourages communication between students, both through the asynchronous modules and online tutorials. However, the small group ākonga have remained pivotal within the programme, providing students that essential support from their colleagues, helping them to manage the complex demands of the programme and enabling them to learn to bridge the theory practice gap. Honouring the values of Pasifika and Te Ao Māori (manaakitanga, whanaungatanga and kaitiakitanga) within the midwifery curriculum enriches the curriculum for all students and in particular for Māori and Pasifika tauira.

The introduction of an e-portfolio and the development of technology with the creation of the virtual birthing woman are further key aspects that support students within a networked approach. The e-portfolio provides students with the opportunity to work on their portfolio at anytime and anyplace and supports their different learning styles by encouraging them to incorporate evidence that moves beyond the traditional written form and also includes the personal and reflective facets of learning. The virtual birthing woman has taken the use of simulation to another level within our programme. Students' learning has been scaffolded across the 3 years through being immersed within a scenario that sees the first year being socialised to the birthing environment and by third year able to fully integrate clinical assessment, decision-making, and communication skills as they work through the scenario.

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Part VI
Professional Development for Vocational Education and Training Teachers

Chapter 19
Teacher Education for a VET Teaching Workforce in Aotearoa NZ

Lisa Maurice-Takerei and Helen Anderson

Abstract This chapter focusses on the evolving role of VET teachers, trainers, and educators in Aotearoa New Zealand (NZ) with particular reference to the opportunities provided in the current VET reforms. VET educators in Aotearoa are a largely invisible and variously named workforce, with diverse roles across the gamut of industry training and education, indeed, they are barely viewed as an education and training workforce. The authors consider the position of VET educators to respond to the changes outlined in legislation and the working documents associated with the current reforms. With reference to international literature there is a call for the professionalisation of the sector which may provide a basis for a changed VET. The chapter provides an historical and contemporary context for educators in the current VET reform process and provides suggestions for a way forward that includes workforce considerations in the renewal of VET in Aotearoa.

Keywords Vocational teacher education · VET system · VET history · Te Pūkenga · Professionalisation of VET teaching · VET reform

Introduction

Vocational Education and Training (VET) has been a common and established aspect of Tertiary and Higher Education in many countries since the Industrial Revolution. It has been a consistent and formal part of Aotearoa NZ post-school education since the 1900s and has gone through many iterations (Abbott, 2000). This chapter focusses on VET as a system with a focus on the evolving role of

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_19

teachers as we move into another era of change. Part A provides the background to the newly enacted 2020 legislation and its implications for teachers and Part B looks ahead, providing a map of how VET may renew itself as a vital and effective contributor to the economic and social future.

Part A – A VET System

The environment where novices gain the required skills, knowledge, and capabilities to work in a trade or technical role has undergone many and significant changes in Aotearoa NZ. Changes continue in 2021 through a reform of VET (RoVE) directed by the Education and Training Act 2020. This repealed the Industry Training and Apprentices Act, 1992 and set the plan for RoVE. Only recently has the term VET been used in legislative documents in Aotearoa NZ to refer to a range of training and education provision including trade training, technical education, industry training, workplace learning, polytechnic education (ITPs), apprenticeships, or any post-school non-university training and qualification.

In various forms, policy settings and accountability settings in education and training have functioned both to serve the needs of industry and also play a role in addressing equity issues where participation rates in tertiary education for previously under-represented groups (Māori and Pacific peoples) are moving closer to population proportions in VET (Education Counts, 2019). The role of VET in providing access to Higher Education is noted in a recent UNESCO study (Field & Guez, 2018). However, it may be argued that while there is an element of access equity, the structure of the tertiary system and its marketized underpinnings has narrowed choices for less privileged groups (Strathdee, 2011).

For the first time in Aotearoa NZ, the Education and Training Act, 2020 formally introduces the concept of a 'VET system' and thus provides an opportunity to bring together some of the parts of what has been a disparate sector. The disparate nature of the sector has occurred from standard setting through to teaching and assessment where occupational expertise, standard setting, and education and training have, at times, worked in competition or at least without collaboration. In 2021, where a named and identifiable VET apparatus has been sanctioned, there is the opportunity to arrange the complex set of roles and responsibilities, standards, qualifications, requirements, and strategies needed for equitable and high-quality skills-based training and education. This is an opportunity to bring coherence to an often-incoherent environment and to create a strong basis for developing VET successfully in line with future needs. While there is very little mention of Private Training Establishments (PTEs) and Wānanga, there is still much promise.

A 2021 OECD report on teaching and leading in VET identifies 4 key policy recommendations for strengthening VET teaching and leadership, these are: ensuring VET teacher supply through a variety of mechanisms including by providing flexible pathways; innovative pedagogy; VET teacher training; and a strengthened leadership (OECD, 2021). This 2021 report builds on a range of reports of studies

undertaken in several countries and follows on from an earlier report (OECD, 2015), that strongly suggests that central to any successful VET system is a skilled and knowledgeable vocational teaching workforce, one with an Aotearoa NZ balance of teaching skills and 'up-to-date industry experience'. Just how a VET system in Aotearoa NZ plans to support the suggestions for VET teaching and provide a basis for the development of a knowledgeable and skilled teaching workforce will be critical to the success of the newly formed system. Identifying the VET workforce and the accompanying skills and knowledge required will be crucial. At the outset it must be acknowledged that standards and assessments do not provide a basis for effective VET, rather it is the expertise of educators. Highly skilled occupational experts and their knowledge and experience of learning and teaching are vital to a healthy VET system.

Reassembling a Sector – A VET Workforce

Determining just what the VET teaching workforce is in Aotearoa NZ and what support it needs will be essential. At its most rudimentary, the current VET teaching workforce is that group of people charged with passing on the disciplinary knowledge and skills for which the sector has responsibility.

In Aotearoa NZ, VET work has been undertaken in a range of settings and in a number of guises. While some in the VET teaching workforce might be termed lecturers or academic staff members in ITPs there are also industry trainers, workplace trainers, or tutors in PTEs. At the same time, the responsibility for standard and qualification development, assessment and moderation has sometimes been separated from the process of teaching and has been undertaken in other organisations by people in largely administrative roles. Noting also that in some cases locally designed programmes have been developed in collaboration with teachers and industry advisors. Educators and those involved in the educational process for VET, cross a range of fields; within industry, in tertiary education organisations (TEOs) and within Industry Training Organisations (ITOs). Within this chapter they are referred to using a range of terms including occupational or workplace experts for those in industry, teaching professionals, vocational educators or practitioners for those employed in educative and training roles.

During the 1990s and 2000s, vocational learning was largely based on produced, common unit standards (competency-based standards and assessments) that were collated into qualifications. Under the Industry Training Act of 1992, the tasks of devising, administering and moderating standards and their assessment were passed to ITOs. These organisations assumed responsibility for occupational and technical-based unit standard development and their aggregation into qualifications. In many ways during this period ITOs became arbiters of training through the setting of standards and the moderation of unit standards.

During this period there was a burgeoning of ITOs as well as standards and qualifications such that there developed a whole industry. During this time the role and

visibility of occupational experts was diminished almost to invisibility as they became the 'deliverers' of standards devised by others. In some cases, occupational qualifications were developed, set, and monitored by administrators without trade or occupational 'know-how' and the role of signing off standards was handed over to a range of people including employers with other vested interests. This contributed to fragmentation and alienation of the VET teaching workforce, tasked with the delivery of material provided by others (Maurice-Takerei, 2016a, b).

Overall, VET teaching professionals have reported a growing disquiet in terms of the lack of cohesion between the development, provision, and monitoring of standards (Maurice-Takerei, 2015). Noting the vulnerability for VET in reform settings, Schmidt (2020) warns of the reductionist curriculum evident in industry-based qualifications and the part this has played in the de-professionalisation of the VET teaching workforce. Schmidt identifies that the structural oppression of VET is emergent from its working-class roots and suggests that without recognition of these structural processes, the flourishing of VET will be limited, and the issues associated with curriculum, professionalism, and teaching quality will remain. Certainly, the move to separate standard and qualification development from those with occupational knowledge has sent a strong message to VET teachers that they are the deliverers of standards but not partners in the knowledge and skill making enterprise that is part of the learning and teaching. The interesting question is how or indeed will the Workforce Development Councils (WDCs) developed under RoVE address the dual pressures for current and future proofed curriculum and sound pedagogical practice to ensure students benefit from the learning in their chosen industry as valuable and sustainable employees. There is certainly potential under a systems approach such as RoVE proposes to strengthen and re-professionalise the VET teacher workforce but this is not yet evident.

ROVE in Aotearoa NZ through the Education and Training Act, 2020 is an opportunity to reintroduce knowledgeable and skilled education practitioners to the VET standard setting and moderation landscape. Along with the implementation of learning and teaching based on the dual capabilities of successful VET teachers as industry and teaching experts, knowledge from standard setting through to assessment and moderation will provide a strong basis for VET. It is acknowledged that industry current teachers who have also acquired pedagogical expertise can provide the most effective learning to their students. This relieves industry of the pressure to set and monitor standards in which they have a vested interest. The responsibility would then go to those with direct knowledge and expertise and whose major focus lies not in operating a business but in facilitating high-quality, sustainable, occupational knowledge and capability for their students and in the interests of their discipline for the future.

Developing a joined-up system for education and training acknowledges that the devising, administration, and supervision of standards for a given occupation does not sit separately from the teaching and learning of the skills and knowledge required for an occupation. The attainment of occupational skills and knowledge will not happen merely through the presentation of standards and assessments. Occupational experts, those tasked with identifying the necessary skills, knowledge, and

capabilities that represent a given occupation and its future development are vital to ensuring the effective induction of novices into the complexities of learning, relationships, skills, and responsiveness to change that are built into an industry and its specific roles (Anderson, 2002).

As Guthrie and Clayton (2019) state in their work on VET stakeholders, it is important to draw on the expertise in VET-based educators as occupational experts throughout the range of processes that contribute to vocational education and training. We are remiss if we consider that their expertise is limited to the transmission of unit standards. Instead, we need to garner their understanding of how sustainable, future proofed learning occurs in their industries. They contribute strong understandings of the skills, knowledge, and capabilities that are essential to the development, assessment, and moderation of standards, and to the implementation of innovative pedagogical approaches.

Strategy, Policy, and Responsibility

In Aotearoa NZ, the Ministry of Education is responsible for defining national higher education goals through the Tertiary Education Strategy. Previous Strategies, 2007–2012, 2010–2015 and 2014–2019 made plain and explicit links to the economy and the 2014–2019 Strategy was a combined undertaking with the Ministry of Education and the Ministry of Business, Innovation and Employment. This partnership linked tertiary education very closely with industry and the economy. The Strategy signalled 'vocational' education as a segment of education as distinct from higher, foundation and community education and as one that fills the skills needs for industry (Ministry of Education, 2014, p. 22).

While the new Education Act 2020 named for the first time a VET sector, there is not an attempt in the most recent Tertiary Education Strategy to define the sector as distinct from other areas of education. It does however, link tertiary education to the wider education community. The Tertiary Education Strategy is set out alongside the National Education Learning Priorities (NELP) aligning Tertiary Education with all other sectors of education and making direct links to overall education goals.

One of the five objectives identified in the NELP is for 'quality teaching and leadership'. Tertiary Education Organisations (TEOs) are called on to 'identify gaps in teaching capability and invest in opportunities for educators and staff to strengthen teaching, leadership and learning support' (Ministry of Education, 2020, p. 12). Government actions to support this objective include quality assurance processes such as monitoring and review as well as actions to 'incentivise and support TEOs to develop and strengthen teaching capability and excellence' (p. 12). It is this objective that sits at the base of the ideas raised in this chapter.

It is clear that the Aotearoa NZ education sector has paid little attention to vocational education over the past decades. While much focus has been on completion numbers, unit standards, the location and content of education and training, notions of quality in teaching have been remarkably absent, except as these link to

outcomes. Little research has been undertaken in terms of the quality of teaching or the nature of VET teaching. What limited research that has been undertaken has focussed on areas where funding has been available such as in literacy and numeracy. Research focussed on the longer term and broader goals of vocational education is notably absent.

Unlike Aotearoa NZ, Australia has a strong VET research community. The National Centre for Vocational Education Research (NCVER), established in 1981, is a national entity responsible for the collection, management and analysis of research and statistics on the VET sector in Australia and for the communication of research and statistics. The NCVER undertakes and commissions research. This non-profit, national organisation has thus had a hand in building knowledge in the field of VET teaching research.

VET Teacher Education, Qualifications and Requirements

While we may consider recommendations from our Australian neighbours, we might also heed the lessons where attempts to professionalise and support the VET teaching sector has had mixed reported outcomes. The introduction in Australia of a certificate at level 4 (Certificate IV) as a requirement for VET teachers has had mixed reviews. While it reportedly provides some background knowledge required for the teaching role it may also have had a "deprofessionalising" impact on the sector because of its low level and reported poor quality of delivery (Guthrie & Clayton, 2019).

Notably, however, a recent Australian publication, 'How can VET teacher education and development be improved?' (Guthrie & Jones, 2019), reviews a range of qualifications and approaches to VET teacher education and development since the certificate (widely known as the Cert IV) qualifications were mandated for teachers in VET in the early 2000s, and contend a broadening of qualifications would better suit the developmental needs of the VET teaching workforce.

Historically, there have been no legislated requirements for teacher education or training in the post-compulsory environments in Aotearoa NZ including for VET except in individual institutions. Unlike the compulsory sector, post-compulsory education is weakly regulated. The workforce for VET in particular has tended to come from industry directly into teaching. A 2016 review of Adult and Tertiary Teaching qualifications through NZQA saw the redevelopment of a range of qualifications at level 4–7 on the qualifications framework and uptake has been modest.

Overall, vocational teacher education and professional development in Aotearoa NZ has received little attention. Decisions relating to employment qualifications have been left to individual organisations. The idea that if a person is a good industry practitioner, they will be an adequate instructor fails to recognise the demands of contemporary teaching and education. While workplace trainers may have a minimal qualification in assessment, few have had an opportunity to consider the nature of innovative teaching or the future of learning.

An Aotearoa NZ study focussed on ITPs (Maurice-Takerei, 2015) indicates that formal teacher preparation or education prior to taking on a VET teaching role is rare with new VET employees undertaking a level 5 certificate or similar within the institution where they are employed following their initial employment. While much has been said in previous Tertiary Education Strategies about the importance of teaching quality for VET, little has been done to really understand the components of quality teaching in VET. Indeed, there is work relating to the university sector (e.g. Suddeby, 2019) and to the compulsory sector however, we note that quality teaching in the VET sector has dimensions that do not exist for other sectors: hands on technical skill; the fast moving changes in skills; the complexity of ensuring both the development of the current expertise needed of a worker on, for example, today's building site, and ensuring the sustainability of skills under rapid change in materials and techniques; the apprenticeship model that offers the high stakes reality of paid work while training, and survival skills for the "trade culture". While there is certainly an academic element that may sync with university and the compulsory sector, the reality of VET is a paradigm away from the classroom or lecture hall, and the implications for adequate development of a VET teaching workforce. While some organisations provide a basis for teacher education within their environment this is not always mandated or comparable to a full degree with multiple supervised practicums contextualised to VET.

Recognition of the complexity of the VET teaching role and the importance of support to master the role are factors that are well researched both globally and in Aotearoa NZ (Chan, 2012; Maurice-Takerei, 2016a, b; Wheelahan, 2016). Watt (2017) describes the milieu as layered, complex, and highly contextualised to region and country. Guthrie and Clayton (2019) suggest that VET teaching should be recognised as a field of education with distinct pedagogical approaches and that VET teachers be seen as a legitimate teaching workforce. Further, they call for 'institutional and political cultures that value and commit to real professional development' and which include educators in the solutions (Guthrie & Clayton, 2019, p. 13).

Teacher education that acknowledges the multi-layered nature of the teaching environment is important. The work of the vocational teacher has tended to be reduced to the act of training and assessing against standards. The traditional transmission model seen in action in many vocational contexts provides immediate technical skill but does not ensure worker agency or future relevance (Holland, 2004). The specific knowledge required to teach a discipline effectively has not so far been adequately explored in Aotearoa NZ.

Unlike Australia, the fact that Aotearoa NZ has not had mandated requirements for technical or VET educators may mean that the sector is in the advantageous position of being able to start at the beginning, draw on the experience of others and consider the kind of VET teaching community they wish to build. However, as with Australia, funding is essential to identify the kind of education and training that is needed and must include considerations around induction, support, teaching qualifications, industry currency, and high-quality professional development.

There have been some calls, however, to consider the unique pedagogies associated with technical and vocational education, for example, in the United Kingdom.

Lucas (2014) has delved into the notion of vocational pedagogy and there has been some considerable scholarship around the notion of Pedagogical Content Knowledge or PCK (Berry et al., 2016; Shulman, 1987, 2005; Grossman, 1990) as that aspect of educator knowledge needed to transform a particular subject matter for effective learning. Pedagogical Content Knowledge is closely linked to quality teaching (Maurice-Takerei, 2015). A VET teaching workforce with the knowledge and skills associated with the pedagogies of their own discipline will be in a strong position to create quality learning experiences and be actively engaged in the advancement of their industry and its associated pedagogies.

Linking teacher education opportunities to include teaching and instruction skills but also the mechanisms through which standards are devised, developed, assessed, and moderated provides an opportunity for VET teachers to be 'skilfully involved' (Dreyfus, 2004) in a consolidated and connected environment for the teaching of their discipline. This skilful involvement draws on the notion of expertise defined by Dreyfus' (2004) model of skill acquisition where an expert is defined as one who is 'involved' or 'immersed' in the world of their 'skilful activity'. It is acknowledged that while new VET teaching practitioners are experts in their field, they are novices in the educational environment and new to the many educational processes that make up VET in their discipline. However, through the involvement in and understanding of the full range of educational processes, novice educators are more likely to move more quickly and skilfully from novice to expert understandings while having the opportunity to apply their skills and knowledge to the process. Similarly, Misko et al. (2021) suggest development based on a staged approach and with a range of activities leading to a master teacher model and where generic teaching skills progress to contextual understandings provides a basis for strong teacher education. Further, professional learning that accompanies the practicing VET teacher in their career as an educator is an essential part of reaching the goal of occupational and educational experts who can provide VET leadership.

Professional Development

It is proposed that professional development for educators should be undertaken throughout the career of a VET teacher and that these opportunities should support the maintenance of industry currency and the building of vocational pedagogical skills (Misko et al., 2021).

In Aotearoa NZ, VET educators may have had a range of opportunities to upskill or extend their skills through professional learning opportunities available through professional development units within ITPs or through ad hoc offerings in other areas. However, professional development opportunities for VET educators are sporadic and of questionable quality. Much professional development is focussed on quick fix and short-term solutions to immediate problems or is focussed on specific areas where pockets of funding are placed, for example, literacy and numeracy in the workplace. Much continuing professional development is determined by

individual organisations and largely focus on organisational goals. As stated in an Aotearoa NZ study by Duignan et al. (2016), professional learning is most valued by VET educators when it is linked to practice, is purposeful, and leads to further learning and insight.

There is considerable talent and potential in our emerging VET system in terms of the crucial work required to successfully prepare and support a VET teaching workforce, but there is little in the way of guidance, planning or impetus to identify the steps that need to be taken to make the 2020 legislation relevant to learning and teaching in VET.

Part B – VET for the Future

While the Aotearoa NZ VET system under the 2020 legislation is in its early days, there is much to learn from others and much to be done to create an effective and uniquely contextualised VET workforce. TEOs in Aotearoa NZ have a unique position in an overall education strategy. Organisations are required to show how they contribute to the goals and priorities set out in the Tertiary Education Strategy (TES). As a strategic document the TES links government funding for organisations with education priorities and thus shapes the work of educators in the sector. The Tertiary Education Strategy (Ministry of Education, 2020) document also provides a basis for understanding the nature of the teaching role in an Aotearoa NZ environment and offers opportunities to be strategic in the provision of VET teacher learning (Anderson & Maurice-Takerei, 2016). Further, the strategy lays out a unique Aotearoa NZ context in terms of biculturalism, Te Reo, and the tradition of public education in Aotearoa NZ as an opportunity to increase equitable conditions.

Within this context, it is proposed that a national model of teacher education for VET teachers that responds to international progress, the financial realities of VET provider organisations, and much understanding of learning and teaching from VET and other sectors in the education system, may provide a framework for policy and practice development that fits within the strategy (Ministry of Education, 2020). Such a model may identify key parameters and priorities to guide future research and policy designs. It may also provide an opportunity for the Aotearoa NZ VET workforce to position its work as legitimate educational work within the context of an emerging VET sector.

It is acknowledged that while attracting high quality practitioners is an essential component of a strong VET sector it is not sufficient for high quality VET teaching. The provision of good initial and ongoing support for teaching and ensuring strong industry opportunities for continued currency is seen as essential by VET researchers and practitioners alike. Beginning with strong industry practitioners, a planned programme of learning and progression may provide the opportunities for a VET career that is attractive to industry professionals considering a career change.

International publications refer to a range of factors important for quality VET teaching. These include: adequate induction for teachers/trainers, entry level

qualifications and higher-level qualifications, high quality professional development, a formal nationalised VET professional body, and the adoption of standards to register and evaluate VET teachers. Ongoing research is also proposed to consider the notion of the specific pedagogical knowledge associated with teaching/training in the different disciplines (see Guthrie & Clayton, 2019; Wheelahan & Moodie, 2010; Misko et al., 2021).

A Model of Quality VET Teacher Education

The table below offers some possibilities, informed by Australasian and European research and the unique context of Aotearoa NZ. Each principle is followed up with a short discussion and with a research base. The new VET environment in Aotearoa NZ provides an opportunity to consider policy settings and conditions that may ease the financial and time restraints experienced by individual organisations when looking to implement practices that lead to high quality teaching (Table 19.1).

Preparation for a Teaching Role

It is well accepted that industry-based expertise is vital for a credible VET teaching workforce. For the role to be seen as an attractive and viable career option for industry experts, a range of conditions are required including attractive remuneration, initial and ongoing support to master an educative role, and opportunities for advancement within the new role.

Opportunities for VET teacher learning and development in the tertiary sector have not been widely available in Aotearoa NZ. Offerings are often ad hoc and are tied to the decision making of individual organisations. Very often, due to budgetary constraints such opportunities are at the prerogative of individuals or individual departments within organisations. While some organisations will build the attainment of an education-based unit of learning into an employment contract, these are rarely followed-up and in an environment of limited resources are seen as having low priority. Moreover, adult and tertiary teaching qualifications at level 4–6 on the NZQF have not been expansive and the status of such learning has remained low.

There have indeed been efforts towards identifying and promoting quality teaching in VET. However, what this paper points to is the general lack of consistency and an overall lack of a coherent plan which recognises the importance of well-trained educators as a basis for VET.

A tertiary education sector in Aotearoa NZ might consider the quality and range of initial and continuing teacher education opportunities available to VET educators in Aotearoa NZ to identify the practicality of linking these to employment arrangements which are monitored and adjusted to suit individual learning needs. Good models do exist. There is an opportunity to develop a research informed VET-based

Table 19.1 A model of quality VET Teacher Education

Principle	Example	Policy/Conditions	Research
I. Preparation and induction for teaching	A two-week (60 hours or equivalent) induction/ preparation programme introducing key concepts associated with tertiary VET teaching. To be completed prior to teaching or within first semester of teaching (linked to a formal qualification possibly at degree level)	No teaching without induction and progress towards a qualification Induction credits towards the qualification Induction support continues through the first year	Wheelahan and Moodie (2011)
II. Teachers are qualified	A degree level qualification (level 7–8) in VET and adult education that recognises adult career changers and the complexity of the teaching environment	An approved and accepted degree level qualification that recognises VET and adult teaching as complex and developmental. Linked to employment Flexibility in qualification delivery Flexibility from organisations regarding release professional development (PD) time	Guthrie and Clayton (2019)
III. Teachers engage in continuing professional development (CPD)	Minimum 20 h per year and 120 h over 3 years/or equivalent) formal teacher professional learning linked to teaching for first 3 years (linked to a formal qualification)	High quality opportunities and following a national CPD strategy in-situ. Time allowance and funding provided in employment contracts	Wheelahan and Moodie (2011), Guthrie and Jones (2019), Andersson and Kopsen (2015) and Duignan et al. (2016)
IV. Teachers maintain industry currency	Approximately 30–60 h annual industry placement/experience focussed on maintaining and building industry currency. Could be built into qualifications in VET	Develop a shared view of what is acceptable industry release (IR) and formalise a 'sign-off' process	Dymock and Tyler (2018), Misko et al. (2021)
V. Practice and policy are evidence based	Linked research centres located in VET delivering TEOs	Funded and part of a policy driven research agenda	Lucas (2014), Wheelahan and Moodie (2011, 2016)

qualification suitable for novice teachers (see Dreyfus, 2004) which could serve as a basis for initial teaching and pathway to higher education qualifications which are more contextualised (Wheelahan, 2013) and linked to continuing professional development.

Formal Qualifications in VET Teaching

While the idea that teacher induction learning opportunities for new tertiary teachers may have a generic base, Wheelahan and Moodie (2010) argue that differentiated qualifications are necessary for VET teachers beyond the initial induction period. The importance of VET teacher preparation within the context of the specialist field and beyond generic training is highlighted in the UK and Europe. There are opportunities within the Aotearoa NZ context to provide for such opportunities.

Where possible these offerings are likely to have more effect if they are linked to higher education qualifications that provide for advancement, funding for qualifications, and salary increments. A time allocation currently built into some employment contracts in ITPs is rarely monitored or overseen and could form the basis for follow-up in terms of advancement.

Continuing Professional Learning and Development

It is notable that teaching practitioners place a relatively high value on developing teaching expertise (Dymock & Tyler, 2018; Kopsen & Andersson, 2015). In general, it is ranked as of equal importance to maintaining industry currency of occupational skills and knowledge (Kopsen & Andersson, 2015). However, in Aotearoa NZ (Duignan et al., 2016) as in Australia (Dymock & Tyler, 2018) requirements for both tend to be ad hoc and vary in effectiveness. Overall, vocational educators report their disappointment with learning that goes nowhere and is not linked to qualifications, salary, or opportunities for career advancement.

Continuing professional development associated with teaching is more likely to be attractive to vocational educators if it leads to something further. This idea, as identified by Duignan et al. (2016), is particularly relevant to the Aotearoa NZ context since few educators in VET have higher education or degree level qualifications. A flexible degree level qualification offered by skilled providers who recognise the multi-faceted dimensions of VET teaching work (Maurice-Takerei, 2016a, b) may provide an opportunity for meaningful study linked to pedagogical extension.

The value of mentoring and the effect of workplace learning on the pedagogical development of VET educators should not be underestimated (Smith, 2019). This aspect is widely noted by researchers especially where less experienced teachers strongly voiced their need to actively engage with more experienced educators, (Dymock & Tyler, 2018).

Ongoing pedagogical learning and development for teachers could be more systematic and linked more appropriately to qualifications that provide opportunities for advancement while also offering flexibility in terms of choice. A well organised series of offerings, linked to qualifications where appropriate, provided by skilled and well-respected organisations will support ongoing pedagogical learning.

Ongoing Industry Currency

At least of equal importance to pedagogical extension is maintenance of industry knowledge. Industry release in Aotearoa NZ is vague and casual, tending to be self-organised and at risk in terms of organisational requirements around time and funding.

Similarly, industry release in Australian VET organisations is identified as unsystematic (Misko et al., 2021). A Swedish study funded by the Swedish Research Council (Andersson & Kopsen, 2015) identified the valuable effects of ongoing industry work-based placement and activities and the importance of networks through participation in work life in the initial industry of the VET educator. However, it is noted that organisational and situational factors tend to impede the undertaking of such valuable ongoing work and connections including time release as well as organisational and financial logistics are barriers. As with pedagogical extension activities, such participation can also result in vague, compliance focussed experiences with little value to the practitioner or organisation. Nevertheless, when it is done well, it is accepted that industry currency is vital to dynamic VET education experiences and enhances opportunities for industry connections and collaboration.

Flexibility, coherence, and a shared view of what is acceptable for industry release is an important factor in successful industry focussed opportunities (Dymock & Tyler, 2018). It is suggested that following a model of other professional organisations, a time allocation is provided for industry placement annually, linked to professional recognition, and that this is monitored for relevance over time and the learnings applied effectively in teaching practice.

A Professional Association for VET Teaching

Membership of a professional association which requires adherence to a designated code of practice and mandated professional development would likely provide much needed professional status to VET teachers. Such an association might also provide a structure for professional learning. Tyler and Dymock (2017) cite the requirements for some professions to maintain continuous learning. Accountants for example are required to undertake a minimum of 20 h CPD a year and a total of 120 h over 3 years. The authors note the commonalities of professional learning associated with professionals including the mandatory nature of the learning, the link to registration, and the value of a professional body which provides approvals, lists relevant activities and audits to ensure adherence.

The argument for a professional body in Australia was outlined in Skills Australia (Wheelahan & Moodie, 2010), and Guthrie and Clayton (2012) furthered that argument through research on a potential professional body which supports VET teaching, qualifications, CPD activities, and builds professionalism. There are a range of

opportunities for a VET professional body that is focussed on initial teacher education, continuing professional learning and development, as well as the development and provision of degree level qualifications for VET educators. A register as an opportunity to support the professionalisation of the sector may have value. What is important is that any such body views VET educators as professionals within a professional network and works towards developing networks for the benefit of educators and through them their organisations and students.

The advantage of a professional body for VET educators is that it presents membership as a credible and cohesive group. Such a group, governed by a code of practice that requires professional behaviour and also mandates ongoing upskilling through professional development, provides an opportunity for the establishment of learning tailored specifically to meet the needs of individuals and their VET teaching communities. Such a professional body provides a backdrop for teaching in VET as a professional and legitimate career.

A Future Research Agenda

A well-focussed VET research agenda provides an opportunity to inform all components of the quality teaching model. For evidence-based practice to occur and result in high quality learning experiences for students, research is essential. Very little interest has been shown in Aotearoa NZ for a research agenda associated with VET except that which has been led by industry or undertaken within small pockets of research interest that has generally been unfunded. Teaching in VET is almost invisible on the research front except where educators are portrayed as requiring remedy. A VET research centre which is focussed on investigating the particularities of building productive capability (Wheelahan & Moodie, 2016) in students and teachers has much to recommend it as part of an effective and evolving VET system. A research agenda might focus on:

- Pedagogical innovation
- Organisational strategies for teacher development
- Teacher effectiveness
- Programmes for equity
- Transition to the workplace
- Workplace engagement
- The evaluation of policy
- Theory development

Such a research centre may inform policy makers, focus and organise inquiry in terms of a VET response to the NELP and the TES, and link research to priorities for learners, educators, and industry. Such a centre is vital as an opportunity for research in VET to provide a basis for ongoing policy decisions and to inform future planning.

In Conclusion

The first purpose of this chapter has been to describe and critique the current moment in vocational education in Aotearoa NZ. There has been significant legislative development that gives optimism that change may occur particularly with the ongoing failure to recognise that the goals of a VET system cannot be reached without a highly capable, well-supported, and visible VET teacher workforce. The importance of a comprehensive approach for the development of VET teachers, wherever they are based has been presented and has included a model of quality teaching from induction to higher education qualifications, maintenance of industry skills and knowledge, professional development, and a research base for teaching.

The second purpose of this chapter has been to propose ways this crucial element of the forthcoming VET system might be realised. In Aotearoa NZ we are part of a growing global awareness that VET is a vital engine part of rapidly changing economies. The extent to which we succeed in transforming our industries to survive and progress is highly dependent on the education and training of our vocational workforce; education and training that is effective, sustainable and future determined; and that is delivered by teachers who are both industry and teaching experts.

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Chapter 20
Into the Future for Aotearoa New Zealand Vocational Education and Training

Selena Chan and Nicholas Huntington

Abstract In this final chapter, we summarise key themes throughout the chapters of this volume. The innovations described, discussed, and evaluated provide a window into contemporary VET in Aotearoa New Zealand (NZ). The Reform of VET (RoVE) has presented the country with a once in a generation opportunity to review, extend and enhance VET. In particular, the formation of Te Pūkenga, the NZ Institute of Skills and Technology (NZIST), brings together the two streams of current VET provision into one organisation. In doing, Te Pūkenga has set itself goals to ensure equitable access and outcomes. This chapter overviews the themes collected in this volume and postulates the shifts required for VET to meet and exceed Te Pūkenga's aspirational goals.

Keywords Reform of VET · Te Pūkenga · VET system · Academic change management · Learner centred learning · Innovation in VET · Te Tiriti o Waitangi

Introduction

As with all countries, the importance and contribution of Aotearoa NZ's vocational education system towards economic and social wellbeing is unchallenged (Cedefop (2020); Ministry of Education (2021) referring to Education and Training Act, 2020). There is a strong need for Aotearoa NZ to ensure equitable access and outcomes for all its citizens and for VET. This access, contributes towards maintaining and developing the skills, knowledge, and attributes required to sustain

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S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5_20

employment, given the challenges presented by rapid shifts in technology and economic/social environments.

Following current vocational reforms, the VET landscape will be very different. As detailed in Chaps. 4 and 5 by Huntington on rationale and outcomes of the Reform of Vocational Education (RoVE), new entities are in the process of being established to govern and guide VET. These include six Workforce Development Councils (WDCs); fifteen Regional Skills Leadership Groups (RSLGs); Centres of Vocational Excellence (CoVEs); and the formation of Te Pūkenga, the New Zealand Institute of Skills and Technology (NZIST).

The six WDCs are tasked with developing the strategic vision for current and future skills required by industries; developing qualifications and setting standards for VET; and moderating assessments and setting (where appropriate) the capstone assessments to complete qualifications (Tertiary Education Commission (TEC, n.d.-c). The RSLGs provide information and feedback to the TEC, WDCs and VET providers on the skills and workforce needs of regions and cities (TEC, n.d.-b). CoVEs' remits include the establishment and consolidation of connections between industry and communities; and supporting the growth of excellent VET with a focus on teaching, learning, and research (TEC, n.d.-a). To date, two CoVEs have been established, the Construction and Infrastructure COVE (ConCOVE); and the Food and Fibre CoVE (FFCoVE) presenting the primary, horticultural/viticulture, forestry, aquaculture/seafood and related industries.

Support of learners will be dominated by Te Pūkenga. Where previously the lion's share of learning in the sector was spread across 27 organisations (16 Institutes of Technology and Polytechnics (ITPs) and 11 Industry Training Organisations (ITOs)), most VET will be concentrated in a single national provider – albeit one with distributed service sites. For this reason, discussing the future of VET provision means deliberating on the future of Te Pūkenga. Whilst private training establishments (PTEs) and wānanga (Māori Tertiary Institutions) will still exist in the new environment, the scale and reach of Te Pūkenga will inevitably shape the vocational learning environment. In most areas Te Pūkenga will establish a dominant baseline, and other VET providers will be presented with the option to either match this offering or react against it and differentiate themselves. Recent moves by the New Zealand Qualifications Authority (NZQA's) encouraging WDCs to focus on offering single national curricula for their programmes, may present a stumbling block for the second approach.

In this chapter, we present an overview of the themes arising from the chapters throughout this volume. The chapter continues by introducing Te Pūkenga's known direction as it stands at the time of writing in late 2021. The book's collative thematic direction is then connected to the developing strategic drivers and outcomes for Te Pūkenga and some recommendations to support Te Pūkenga's aims, and objectives are postulated. We conclude the chapter with some proposals going forward. To ensure innovative practices, VET models, and frameworks need to align well with Te Pūkenga's visions and aspirations; and continue to contribute towards an effective, equitable, and uniquely Aotearoa NZ VET system.

Themes Arising Across the Chapters

Thematic analysis processes were applied to the content, arguments, perspectives, and recommendations across the chapters in this volume. These overarching themes are now reported in the following sections.

Evidence of Innovation and Excellence to Address Equity Issues Including Integration of Indigenous Values and Pedagogy

The chapters collated in this volume, evidence instances of innovation and excellence, albeit often resulting from the need to address challenges created by circumstances and context. Through the ITO sector, support for workplace learners (see Chap. 6 on supporting Māori learners, Chap. 7 for Pacific learner, Chap. 10 on understanding the languages of the trades) and initiatives to attract and mentor minority demographics into technical/trades careers (see Chap. 8 – for women into, and in, the trades), indicate the sector's willingness and action to promote, provision, and sustain equitable access.

In the ITP sector, evidence of the integration of bicultural/multicultural values abound across the volume. These include Chap. 11 on school to VET transition; Chap. 10 whereby university and ITP-based researchers deploy a Pacific 'research' methodology to derive a corpus of trades vocabulary in Tongan; Chap. 14 detailing the collaborative programme development and delivery for the Bachelor in Engineering Technology (BEngTech); Chap. 17 using mātauranga Māori concepts to augment the eco-system approach to inform learning design; Chap. 18 within the curriculum and learning and teaching approaches of the Bachelor of Midwifery programme; and Chap. 19 calling for structured initial and continued professional development for VET teachers.

As discussed briefly in the introductory chapter, equitable access and outcomes for VET are necessary due to economic, political, and demographic shifts occurring across Aotearoa NZ. The need to ensure equitable access and support for all learners to achieve equitable outcomes, are also mirrored in many other countries (see UNESCO-UNEVOC, 2021). Hence, the overall approaches documented across the chapters evidence efforts throughout the Aotearoa NZ VET sector, to address systemic inequities brought about by historical and social forces. These provide examples, which may inform the initiatives and developments occurring internationally, as countries grapple with the increasing inequalities and inequities inherent and increasing in their own systems. Of note are that many of the initiatives draw from the knowledge bases and collaborative approaches intrinsic to indigenous cultures.

Te Maihāroa, Kapa and Tarena's chapter (Chap. 6) reports on the collaborative approach between an iwi group and an ITP to provision support for the recognition of expertise learnt and honed through experience. The process is based on frameworks and co-constructed and developed to ensure candidates' knowledge, skills,

and practices are reflected on and collated to evidence learning. As Aotearoa NZ VET honours the precepts laid down by Te Tiriti o Waitangi, this chapter narrates one approach to inform future work, especially in the field of VET bicultural assessment/recognition of prior learning (A/RPL).

In the chapter by Murray and Ripley (Chap. 7) the experiences of Pacific workplace learners are drawn on to explain the reach, aims, challenges, and underpinning factors required to assure positive outcomes for all. Through the pandemic, many Pacific workers provisioned core and essential industries, keeping Aotearoa NZ functioning. Foundational VET and RPL processes, afford opportunities for Pacific peoples to attain qualifications whilst they continue work as many would not otherwise be able to afford VET or higher education (HE) as full-time students. Hence the importance of workplace-based VET is critical towards meeting the needs of the Pacific and other minority communities.

Taffard and Murray (Chap. 8) summarise the many initiatives through the decades to encourage and support women into trades work. Despite the many schemes funded by government and other agencies, the number of women employed in traditional trades have remained stubbornly low. However, as reported in this chapter, recent collaborative programmes involving schools, industry, and business organisations, and ITOs, have seen increases across several industries (notably the electrical supply and infrastructure/construction industries).

From the perspectives reported across the chapters above, the key recommendation is the need for collaboration across sectors. This is especially important for sectors who would not naturally congregate. There is a need to support the necessary patronage and drive required to ensure better outcomes for all workers, their workplaces, and their industries.

Middleton's chapter (Chap. 11) explains the evolution, challenges (including the need to undertake legislative amendment), and outcomes in setting up a school alternative at Manukau Institute of Technology (MIT). In doing, the educational outcomes of the dis-engaged and predominantly Māori and Pacific cohorts of students were improved. Additionally, the chapter by Parkinson, Coxhead, MacKay, and McLaughlin (Chap. 10) presents the work undertaken to better understand the literacy demands required for students and apprentices across trades occupations. Little work has been undertaken in Aotearoa NZ and internationally on the complexities of language requirements across trade occupations. Literacy demands of trades learning and work were found to be equivalent to university level study. Multiliteracies including visual literacies to interpret and construct building plans and electrical schema, were also identified. The chapter also reports on work undertaken to translate construction trades vocabulary into the Tongan language. This initiative provides Tongan people better access to the specialised technical language of a trade, improving their educational and employment outcomes.

Additionally, across the chapter reporting on pedagogical innovations (e.g. Chap. 9 on workplace learning, Chap. 10 on project-based learning, Chap. 13 with the development of the Bachelor of Culinary Arts programme, Chap. 17 on learning design, Chap. 18 on midwifery networked and distributed education), the ways mātauranga Māori are integrated across programmes of learning are presented and

described. Hence, the contemporary Aotearoa NZ VET sector provides many instances of organisational, institutional, and programme-based processes and collaborations, to address disparities in educational access and outcomes; and celebrate the diversity of Aotearoa NZ peoples.

Evidence of Pedagogical Innovation and Excellence

The volume also provides evidence of pedagogical innovations to meet learner, discipline-specific and industry needs. The various models and frameworks presented provide an indication of the work undertaken across the Aotearoa NZ VET sector to meet the needs of learners, iwi, communities, and industries as presented below.

Collaboration between VET sectors is exampled by Alkema's chapter (Chap. 9) which reports on workplace learning support models. Each of the models includes the ITO, a workplace/company, and a provider (including Open Polytechnic's (TOPNZ) provision of distance education). Each of the models reported are effective as all three partners share willingness to provide the necessary supports, appropriate VET curriculum, and workplace learning leading to learner success. Of note is Alkema's discussion on what now happens as ITOs cease to exist and are merged into Te Pūkenga.

Collaboration across the ITP sector can be evidenced through the shared development and delivery of the BEngTech (see Chap. 14). Birchmore et al. describe how six ITPs, through a series of initiatives and arrangements, established and continue to provision a shared programme. Despite 'market' and competitive pressure placed on ITPs across the timeframe of the programme's existence, the development and delivery of the BEngTech, stands out as an example of collaborative effort. The chapter describes how discipline-based networks (in this case Engineering NZ – the engineers' professional body and the NZ Board of Engineering Diplomas) coupled with sound relationships with industry empowers programme and academic leaders to create authentic programmes of learning culminating in rewarding outcomes for learners.

Networked-blended learning was presented by Daellenbach et al. (see Chap. 18) discussing how midwifery education is provisioned across the top half of Te Waipounamu (South Island). Students complete the four-year programme of study over 3 years with much of their learning undertaken through work placements whereby students shadow and then assist, midwives employed at District Health Board (DHB) hospitals or with 'free-lance' midwives who nurture women through their pregnancies and post-partum experiences. In doing, the rigorous degree programme serves the health needs of urban, and rural communities through the measured and innovative use of digital technologies.

Collaboration across educational sectors and local communities is a salient focus in Middleton's chapter (Chap. 11). The secondary school sector and an ITP had to continually innovate to form a 'hybrid' institution to support the seamless transition

from school to work. The institute sought to re-engage students and provide them with confidence, knowledge, and skills to attain school leaving qualifications better aligned to community and learner aspirations.

Pedagogical innovation is also exampled in three other chapters. The first in the shift of the curriculum towards learner-centred teaching and learning (Chap. 13 with the Bachelor of Culinary Arts (BCA)); the second, through project-based learning approaches (Chap. 12); and the third example, with the development of degree apprenticeship for infrastructure asset management engineers (Chap. 15). The first two (development of the BCA and the utilisation of project-based approaches) were initiatives brought about by educators reflecting on their teaching practice, drawing on their industry expertise and networks, and bringing these in synchrony to design learning programmes which engage and challenge their learners. Mitchell and Woodhouse narrate and reflect on the long journey of the BCA teaching team which eventuated in pedagogical practices applicable across many other discipline areas. The teams' empathy for their learners and their gradual incorporation of 'design thinking' to underpin the BCA, provides direction on how to support a cohesive teaching team's movement from traditional culinary education, into one which is learner-directed.

The examples from the chapter by Chan et al. (Chap. 12) of deploying project-based learning across programmes of learning are but a few of many as Aotearoa NZs qualifications at all levels; require the meeting of graduate profile outcomes (Chan, 2016). Project-based learning augmented with inquiry or problem-based learning, are well aligned with more holistic pedagogical approaches to support practice-based learning.

Innovations and pedagogy for distance, blended, and online learning are also well represented. These include the provision of networked learning, assessments of and for learning with eportfolios, and virtual reality (VR) (see discussion on networked-blended learning from Chap. 18 with Daellenbach et al.); the need to ensure distance and on-line learning are well defined (Nichols in Chap. 16); and an ecological approach to designing practice-based learning by Thatcher (Chap. 17). All provide examples of Aotearoa NZ's capability with utilising technology to enhance VET.

The many initiatives presented across this volume are especially noteworthy when as with many other countries, the recording of VET initiatives and exemplars is relatively sparse in comparison to scholarship on teaching and learning emanating from the HE/university sector. In comparison to countries like Australia, Canada, the United Kingdom, and the United States of America, Aotearoa NZ has a more promising structure to support the scholarship of VET. In Aotearoa NZ, ITPs offer programmes spanning the breadth of the NZ Qualifications Framework (NZQF). That is, tertiary learning programmes are offered from foundation level (Level 1) through to certificates (levels 2–4), diplomas (levels 5 and 6) and degrees (bachelor's degree at level 7, masters at level 8–9, and even doctoral studies at level 10). This range of educational qualifications means the sector can draw on the research expertise of teachers teaching at degree level, to undertake studies which support programmes of learning at foundation, certificate, and diploma level. There is still a

paucity of scholarship of teaching and learning across the sector but the synergies possible are there and require leadership and strategic direction to unleash. The legislative requirements in the Education and Training Act 2020 for Te Pūkenga to support research and ensure its practices are founded on a robust evidence base offer some encouragement, as does the establishment of CoVEs which have a remit to ensure excellence in VET pedagogy.

Diverse Approaches

The volume reveals the rich and diverse range of approaches towards designing, planning, supporting, and delivering VET across Aotearoa NZ. The VET sector serves a wide range of stakeholders including learners, their whānau (families,) and communities; Māori not only as individuals but as hapū and iwi; a wide range of ethnic communities' aspirations; industries, employers, and sector advisory groups; and a range of government agencies (including accreditation and funding bodies). Individual ITOs and ITPs have developed relationships and networks including regional, national, or international, to support their various initiatives. For over 30 years, until the instigation of RoVE, a market-driven mindset directed the strategies of these ITOs and ITPs (See the chapters summarising RoVE (Chaps. 4 and 5) and the role and evolution of ITOs (Chap. 2) and ITPs (Chap. 3) for background). As discussed by Doyle, Chan, and Hale in Chap. 2 (ITP history), financial stability through ensuring growth in student numbers (measured in equivalent full-time students (EFTS) or standard training measures (STMs)) was an abiding objective. As ITOs, ITPs and other providers relied almost entirely on per-student funding, they would not be sustainable if EFTS/STMs were not maintained, or funding decreased. Therefore, within and between ITOs and ITPs, specialised practices have arisen based on a market-driven funding model followed by the imperatives, as public funded organisations, to ensure accessibility to VET for all New Zealanders.

The Need to Find Common Ground

Given the diverse nature of the organisations merging into Te Pūkenga, one of the major challenges for the new entity is to establish common purpose and vision. As reported in the above section, collaborative efforts within the ITO and ITP sectors are not uncommon. Collaboration between sectors is featured across several chapters. There are some notable potentialities availed especially with the sharing of resources and capability for distance learning (Chap. 14) by Birchmore et al. reporting on the development of the BEngTech; learning design to support flexible delivery (See Thatcher's presentation on an ecological system framework for learning design (Chap. 17)); and distributed, networked, and blended learning to enable regionalised learning (Chap. 18 with Daellenbach et al. on midwifery education).

Collaborative processes to enable synthesis of the best practices/frameworks/models will be one way forward. Purposeful collaboration across Te Pūkenga will contribute to relationship building and networking, enhancing the organisation's unity, sense of belonging, and the creation and development of a cohesive VET system.

Te Pūkenga

Te Pūkenga was established through the Education and Training Act 2020. While its specific functions are set out in section 315 of the Act, Schedule 13 also sets expectations of Te Pūkenga through an organisational charter. The charter prescribes a range of required activities, characteristics, and methods of operation that must be reflected or undertaken in respect to Te Pūkenga's functions, such as "ensure that international learners are attracted to train and study in regions throughout New Zealand" (cl 3(c)), "respond to the needs of and improve outcomes for Māori learners, whānau, hapū and iwi, and employers" (cl 4(d)(iii)), and ensuring "the needs of adult and second-chance learners are afforded high priority" (cl 5(i)). Across the 29 specific obligations placed on Te Pūkenga in this schedule, some key themes can be identified. These are include the following:

- Empowering regional delivery and responding to regional needs, including through high-quality regional infrastructure;
- Reflecting the relationship between Crown and Māori, including giving effect to Te Tiriti o Waitangi;
- Embodying principles of inclusivity and equity, including providing a broad mix of education for a range of learners that is culturally responsive;
- Attaining and maintaining a reputation that attracts international learners;
- Promoting collaboration and consistency across Te Pūkenga's entire network of provision;
- Partnering with stakeholders outside the Institute, including Māori, Pacific communities, employers, and other parts of the education system;
- Providing seamless transition experience for learners, both within the Institute and in terms of education and career pathways;
- Offering high quality programmes that have academic integrity and reflect both current and future skill needs;
- Empowering staff and learners to participate in all aspects of the organisation.

Across 2021, Te Pūkenga sought feedback from its various stakeholders on their 'service concepts' (in July) and their proposed operating model (in October; Te Pūkenga, 2021d). These set out the ways Te Pūkenga will organise itself to meet its obligations to its charter and its many stakeholders (i.e. learners, their whānau/iwi/larger community, industry, employers etc.). The proposed operating model does not detail an organisational plan or structure; roles and responsibilities, or job descriptions etc. Instead, the proposal lays out the aspirations revolving around 'having the learner at the heart of learning' and details the functional and service

elements of the organisation. It details how these inter-relate and are supported through various means whereby people across and beyond the organisation, are enabled to network, collaborate, and co-construct processes and systems using 'cycles of reflective practice'. The operating model, as with the service concepts below drew from the insights and kōrero (conversations with focus groups, interviews, networks etc.) with learners (past and present); ITO and ITP colleagues; iwi; industry; and employers.

Functional Elements

The key functions relate to teaching, learning support, and 'navigation' (with reference to learner journeys), enabling, and strategy. These are then listed and assigned as either 'local or distributed delivery' or 'single hub network' function. That is local/distributed delivery functions are carried out by each 'campus' with Te Pūkenga oversight/guidance, and single hub network as nationally administered and managed. Examples of local/distributed functions for teaching, learning and navigation include enrolments, learner support services, teaching/learning delivery, supporting work-based/work integrated learning etc. Single hub teaching, learning and navigation functions include learning resource creation, Ako (teaching and learning) ecosystem designs and delivery, and Ako learning support and capability development. Informing and supporting all the functions are networks based on the six WDCs and four other strands-: equity, foundation, te reo and mātauranga Māori, and research.

Service Elements

In contrast to a product or outcome (such as a qualification), the service elements describe how learners and employers will be supported. The eight service concepts represent a mix of specific initiatives and more general directional outcomes. These were developed through processes of 'co-design' which began with finding out what people care about, followed by the development of these ideas through several iterations of consultation (Te Pūkenga, 2021c). We evaluate the 'service concepts' as being a means for Te Pūkenga to meet legislative requirements and the organisation's charter.

The service concepts presented in mid-2021 and refined/reiterated in the draft operating model (Te Pūkenga, 2021d) are:

- *A good place to work/he wāhi mahi pai* – As defined by Te Pūkenga, a good place to work means supporting and incentivising employers to hire and support diverse ākonga (learners) and to create diverse workplace environments. As part of this, Te Pūkenga proposes withholding services such as learner placements

and apprenticeship funding from employers who do not provide a supportive environment. This service concept meets charter requirements to partner with employers and to work collaboratively with them to ensure equitable and positive outcomes for all ākonga.

- *Match and mentor/rōpu mahitahi*– Refers to the networks formed to help employers and ākonga self-initiate apprenticeships informed by the service concept for pathway planning and the lifelong learning record. Te Pūkenga then supports the training arrangement and helps broker employer cooperatives and ākonga peer groups to mentor and share services.
- *Every step of the way/te hikoi tahi* – Relates to the support for all ākonga to receive immediate, proactive, and applied support not only for their learning endeavours but also to support their wellbeing.
- *Te Pūkenga community facilitator/ngā ringa toro a Te Pūkenga* – Addresses the regional delivery needs of employers and ākonga. Teams of facilitators will work with ākonga to support their learning needs, recruit employers to support training, help convene and facilitate peer communities, and advocate for ākonga.
- *Mātauranga innovation hubs/ngā pū mātaranga auaha* – Provides opportunities for Māori in VET to collaborate and innovate solutions which work for Māori. Māori-led spaces guided by appropriate tikanga and kaupapa, reflects Te Pūkenga's charter requirements to partner with and support success for Māori.
- *Pathway planning and the lifelong learner record/pūkete ākonga* – Lifelong learning records are a key aspect of Te Pūkenga's approach to preparing, and continually developing, all New Zealanders so they can participate as the future of work is impacted by new technologies, and global/economic/social change. While all formal qualifications between Levels 1–6 are already recorded on an individual's NZQA-maintained national Record of Achievement – and Te Pūkenga is only one part of some learners' education pathways – the vision of this concept is for a more holistic and interactive record.
- *Adaptive skills framework/anga pūkenga urutau* –This concept operationalises Te Pūkenga's vision to have 'the learner at the heart' of learning. The concept envisages an ākonga-designed 'skills web' arising from their goals and competencies. Ākonga will then be assisted to match their competencies to industry and community needs.
- *My teacher, my way/Ko tōku kaiako, ko tōku huarahi* – Delivers flexible access to personalised learning environments (PLEs) based on ākonga's learning preferences. Ākonga will be provided with choices on how they learn and are assessed, and have access to a nation-wide network of kaiako (teachers/mentors) and peers. Both digital and non-digital technologies are proposed as a means for personalised learning to be accessed and engaged with.

The above proposed operational model and service concepts were derived from a series of surveys, focus groups, and consultations with ITO and ITP staff and students/ākonga. These studies (named Te Rito) provide insights into learners and the people working for Te Pūkenga. Three reports were presented across the third quarter of 2021 (Te Pūkenga, 2021b). The first, provided insights into Māori learners,

the second into Pacific learners, and the third focused on 'disabled' learners. From these, learner and staff personas were developed (Te Pūkenga, 2021a). All of these have informed the drafting of the operating model and 'service concepts' presented above.

Many specific aspects of these concepts are ambitious and will be challenging to implement, especially those requiring involvement of elements outside of Te Pūkenga's direct remit or action entailing engagement with and by others. The precepts of operationalising these service concepts will also necessitate significant internal change, introduced at a time when Te Pūkenga is also dealing with practical challenges, such as integrating different ICT and student management systems from the merged organisations. However, the principles driving Te Pūkenga's strategies and objectives reflect many of the common international trends and recurring recommendations for good practice in the provision of VET. For example, the European Centre for the Development of Vocational Training (CEDEFOP, 2020) recommendations that ensure VET retains its relevance and can meet challenges going into this decade.

Hence, the 'service concepts' and accompanying operating model are laudable – at least in principle. They propose learner agency over what, how and when they learn. We can visualise the 'service concepts' as definitions and precepts for enacting teaching and learning experienced by learners. Therefore, the 'enacted curriculum' with its promise of impacting on learners' 'experienced curriculum', has been the focus of the 'service concepts'. Billett (2011) defines curriculum as consisting of three nested forms. There is the overarching intended curriculum which sets the expectations of learning through qualification outcomes. In Aotearoa NZ, qualification outcomes are described in the form of graduate profiles and educational and occupational pathways (Chan, 2016). Qualifications (intended curriculum) are then interpreted and actioned by teachers/trainers in the form of pedagogical approaches, creating the enacted curriculum. This consists of the ways in which learning is structured or designed to enable learners to attain qualification outcomes. How learners then engage and interact with the enacted curriculum is termed the experienced curriculum. Service concepts match well, the intentions for operationalising the enacted curriculum, as they provide details on how learners/ākonga will interact with and be empowered to maximise their engagement and achievements through VET.

The 'learner-driven' curriculum will require empathetic and clear support mechanisms. As in the pre-RoVE environment, work will need to be undertaken with the New Zealand Qualifications Authority (NZQA) to ensure alignment between Te Pūkenga's proposals to meet its charter goals, and the structure and systems for the awarding qualifications. However, the new major players created through RoVE add another layer of complexity: - The WDCs will have stronger power in standards setting and direct influence over programme development and funding, RSLGs offer regional representation on VET requirements – which may conflict with that set out by WDCs – and CoVEs have a broad mandate to support excellence in sector training and education. Furthermore, the creation of Te Taumata Aronui (TEC, n.d.-d), the group set up to ensure RoVE reflects the government's commitment to a

Māori-Crown partnership, means that for essentially the first time there exists an official body with a role in ensuring all tertiary education in Aotearoa NZ can equitably support success for Māori. The work of these actors will ideally be complementary and collaborative, supporting the provision of high-quality VET opportunities to all New Zealanders. However, there also exists the possibility of their differing mandates, priorities, and constituencies leading to conflict and confusion. Therefore, there is a clear need to ensure the various intended curriculum 'stakeholders' (NZQA, WDCs, RSLGs, CoVEs etc.) understand how their strategic direction will impinge on both the enacted and experienced curriculum. Additionally, the operationalisation of service concepts through the functional elements of its operational model will be Te Pūkenga's challenge given the need to consolidate, merge and extend the current programmes already provisioned through ITOs and ITPs.

Given the above summary of Te Pūkenga aspirations and intentions, the next section discusses how the present contributions may inform Te Pūkenga's future operations.

Discussion – Aspiring Towards the Te Pūkenga Charter

In this section, we seek to connect the requirements in Te Pūkenga's charter, the indicative operational approaches set out in the consultation for its operating model, and the 'service concepts', with the various 'innovations' presented and discussed across the volume. As prefaced in the above sections, the service concepts reveal Te Pūkenga's aspirations, and align well to concepts of 'enacted curriculum'. The perspectives, frameworks and processes presented through the various chapters in this book are also indicative of the enacted curriculum, as perceived by ITO and ITP practitioners, leaders (see Chaps. 2 and 3 in Part I), and researchers. Hence, some analysis of what is currently established and what is proposed for Te Pūkenga's direction is undertaken in this section. To achieve this, the service concepts are separated into two sections. One including the service concepts primarily informing how Te Pūkenga interrelates with external stakeholders (i.e. employers, community groups, iwi etc.); and the other the service concepts focused on learner support.

Service Concepts for Interrelationships with External Stakeholders

The Te Pūkenga service concepts discussed here are:- A good place to work/he wāhi mahi pai; match and mentor/rōpu mahitahi; Te Pūkenga community facilitators/ngā ringa toro a Te Pūkenga; and mātauranga innovation hubs/ngā pū mātauranga auaha. These service concepts relate to how Te Pūkenga collaborates and co-creates with

employers, iwi, industries, communities etc. to provide learning opportunities and support for learners. Several chapters in this volume provide present approaches to these service concepts. Notable chapters are briefly summarised below:

– Many ITO initiatives across their existence have impacted on learner outcomes (see Chap. 2 with Williams presenting the ITO history and role; Chap. 7 on ITOs support for Pacific workplace learners; Chap. 8 on ITO initiatives to address the shortage of women employed across the traditional trades occupations; and Chap. 9 on supporting workplace-based foundation learners).
– ITP disciplinary specific approaches (see Chap. 11 for school and ITP sector collaboration to provision better transition between school and work; Chap. 12 for industry collaboration to provide authentic project-based learning opportunities for ICT students; Chap. 14 for the development of the BEngTech; and Chap. 15 for the development of degree apprenticeship) represent ways disciplinary or industry sectors may work towards the provision of learning to enable ākonga to meet their goals.

Service Concepts for Supporting Learners

Included in this section are the service concepts to: Match and mentor/rōpu mahitahi; every step of the way/te hikoi tahi; pathway planning and the lifelong learner record/pūkete ākonga; adaptive skills framework/anga pūkenga urutau; and my teacher, my way/ko tōku kaiako, ko tōku huarahi. All these service concepts reflect the vision of placing the learner/ākonga at the centre of their learning. To meet this goal, learner-directed learning is undertaken by the provision of adaptive skills frameworks supported by lifelong records of learning, ‘career counselling’, and flexibility in the provision of how, when, who, and where learning is engaged with. These precepts indicate the need to ensure personal learning environments (PLEs) with elements of adaptive learning are integrated through programmes of study. Te Pūkenga will also need to ensure the structure and ways learning may be engaged with, reflects learner needs.

Currently there is information available to learners on how to select what to learn. These are available through various sources including Careers New Zealand, school-based career advisors etc. Vocational pathways (see NZ Careers, n.d.) provide groupings of occupational pathways with common skill foundations. Careers NZ provides a website which provides information on various occupations including job profiles, ratings of potential job opportunities (i.e. poor, average, good), information on training opportunities, and alignment of the job to the vocational pathways. Currently, what the system lacks is adaptability to the needs of learners. Singapore’s Skills Future framework provides a good example of what may be possible. The Singapore skills framework provides sector information, career pathways, occupation/job roles description, skill description, and training programmes. The framework also enables workers and employers to better visualise, understand

and utilise, the vertical and horizontal relationships between various industries and their occupations (See Skills Future Singapore, n.d.).

Additionally, as exampled in Chap. 6 whereby Māori candidates were supported to have their expertise accredited. The role of recognition of current competency (RCC) and assessment/recognition of prior learning (A/RPL) are crucial to ensuring on-going mobility and increased/enhanced capability for all workers. One aspect supporting the deployment of RCC/RPL processes is that Aotearoa NZ qualifications registered on the NZ Qualifications Framework (NZQF) require learners to meet graduate profile outcomes (Chan, 2016). A holistic approach is possible as RCC/RPL candidates provide evidence of how they meet the graduate profile outcomes which describe skills, knowledge, and attributes relevant to occupational requirements.

Recommendations

This final section recommends some important processes required to ensure smoother transition of ITOS and ITPs as they merge into Te Pūkenga.

Common Understanding on the Philosophies Underpinning Teaching/Learning Required

As with the chapters on workplace learning (see Alkema's Chap. 9) and Mitchell and Woodhouse's development of the BCA in Chap. 17 describing the various pedagogical approaches from ITPs, perspectives on teaching and learning are dependent on the context in which teaching and learning is enacted.

As the aspirations defined in the 'service concepts' detail the 'enacted curriculum', the entire VET sector, Te Pūkenga and the WDCs, RSLGs, CoVEs, employers and industry organisations, other training providers etc., will need to work collaboratively to align their strategies and direction as these impinge on the 'intended curriculum'. All must work contiguously to ensure the learner journey is not overcomplicated and there is clear direction for outcomes which are connected to occupational and skills needs.

This could be particularly challenging for Te Pūkenga given its chartered goal of creating greater integration between workplace-led and provider-led learning. The pre-reform VET system created hard barriers between these two approaches; workplace learning was the preserve of ITOs, while classroom teaching was confined to providers (ITPs, PTEs, and wānanga). This allowed for the development of distinct pedagogical approaches each designed to reflect those contexts. Simply allowing space for both these forms to flourish within the Institute will be challenging enough, let alone improving interaction and engagement between the two. Developing a

common approach will require 'technical' discussions of pedagogy, and engaging with issues of culture, identity, and organisational power.

Upskilling Across the Sector

Moving forward, the challenges ahead are considerable. The operationalisation of Te Pūkenga's proposed 'service concepts' require shifts in the mindset of all working in the current ITOs and ITPs. From interim analysis of the suggested 'ways of doing' and frameworks gathered through the data availed through Te Pūkenga's consultation process, a key contributor to Te Pūkenga's ability to 'have the learner at the heart' is the change management process. The provision of professional development to all Te Pūkenga colleagues will be required to help everyone understand their role and to contribute meaningfully to the larger entity.

As argued in Maurice-Takerei and Anderson's chapter (Chap. 19) on the provision of professional development for the Aotearoa NZ VET workforce, a crucial element for quality learning is the upskilling of teachers and all support staff. As presented in the above sections, individualised approaches for innovation and pedagogical excellence are already standard throughout the ITOs and ITPs. With larger learner cohorts possible, Te Pūkenga will be able to achieve economies of scale to shift programmes from traditional structures of campus-based face-to-face and full-time study, to approaches which offer greater learner flexibility for access with regards to time and place. All these endeavours are founded on the imagination, capabilities, and enterprise of the Te Pūkenga workforce. Indications from the functional element of Te Pūkenga's operational model indicate capability development to be a 'single hub', bringing a consolidated approach towards the professional development of its workforce'. This has the advantage of providing sound direction for the entire institution but may also have challenges given the range and scope of provision (workplace, institution-based), modes of delivery (f2f /online/blended/distance), diversity of learners and levels of learning (foundation to post-graduate), and pedagogical approaches.

Managed Change

As discussed above, change in how learning and teaching is envisaged will require careful and planned development. The organisational management literature encourages the deployment of planned approaches to achieve effective change (Kotter & Schlesinger, 2008). However, educational change is complex (Lemke & Sabelli, 2008) and belief systems within education are perceived to be grounded in the personal experiences of educators and, difficult to shift (Kane et al., 2002). Hence, the educational values and beliefs of teaching colleagues will strongly influence their responses to change. The importance of learning towards encouraging and

supporting change through professional development (Tyler et al., 2014) for all Te Pūkenga colleagues cannot be under-estimated. Innovating for change does not occur without reason or intention and is evidenced through everyday practice (Gherardi, 2012). Of note is the need to understand how change impacts on an individual's identity of who and what they are and what they find important (Giejsel & Meijers, 2005). Hence, it is essential the rationale for Te Pūkenga's co-ordination and management of the operational model with its functional and service concepts are well understood by all internal and external parties. The provision of exemplars and examples, some of which are in this volume, may assist the process of change, as these provide activities individuals are able to empathise and connect with (Giejsel & Meijers, 2005).

The diversity of the disciplines, industries, and communities Te Pūkenga is accountable to means there will be multiple approaches to how the proposed operational model and its accompanying functional and 'service concepts' are understood and operationalised. Te Pūkenga's challenge is to provide flexibility but also robust quality systems to assure it meets the needs of its large and varied portfolio. With diversity comes greater complexity, and the likely need for greater resourcing for support systems.

Moving Forward

Unsurprisingly, studies of VET reform reveal the process to be complex (Caves et al., 2021), Huntington's two chapters on RoVE implications (see Chaps. 4 and 5) propose similar challenges for Aotearoa NZ. As summarised by Caves et al. (2021) studies on VET systems have usually been conducted on what constitutes 'good' VET but there are few on how to implement the indicators of effective VET. Through a literature review on VET reform implementation, Caves et al. (2021) identified the determinants of the efficacy of VET reform. These include how strategic objectives match the context of reform; align to the expectations and needs of 'clients' (including industries, communities, trade unions etc.); the likelihood of diverse needs being met by the sector; and commitment of government, industry, and the VET system to the reform. Context determinants include the fit between reform objectives and the socio-economic-political frameworks the reform is to be operationalised into; a strong economy; and educational quality. Te Pūkenga is perhaps well placed with regards to these context determinants. A focus on learners and their needs, along with alignment to industry/occupational/future of work requirements may be extrapolated from Te Pūkenga's consultative documents thus far. Capacity determinants (as discussed in the above sections) include the need to upskill all VET system colleagues, have clear leadership, ground decisions on robust evidence-based research, and the need to instigate clear change management strategies. However, due to many contextual country variables presented, centralisation or decentralisation of VET systems or provisions has inconclusive research as to its efficacy (Caves et al., 2021). Hence, it is important to track how a large organisation, moves on from

merger into development of new ways to operate, and then into implementation. Through doing, challenges arising are identified; solutions shared, and organisational cohesion achieved.

Conclusion

In this chapter, themes collated through the discussions, frameworks and models presented in the preceding chapters are analysed to establish alignment to the charter and operational 'service concepts' of Te Pūkenga and the wider Aotearoa NZ VET system. In doing, the volume's editors propose some recommendations going forward as Te Pūkenga and the strategic components of the Aotearoa VET system (i.e., the WDCs, RSLGs and CoVEs) settle into their roles and responsibilities. It is important all components of the sector align to support provision to VET learners as Aotearoa NZ manages the challenges posed by widespread global issues exampled by post-pandemic economic/social/political consequences, and the uncertainties driven by the conditions impacting on work and workplaces of the future. To do so, will harness and maximise the once in a generation opportunity presented by RoVE, to co-create a world-class, bi-cultural, responsive, accessible, integrated, and high-quality VET system for all New Zealanders.

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Te Reo Māori Glossary

In recent decades the Māori language – Te Reo Māori or Te Reo – has experienced a notable revitalisation. Te Reo has been formally recognised as an official language since 1987, and Te Taura Whiri I Te Reo Māori (the Māori Language Commission) promotes its use by Māori and non-Māori alike. Te Reo terms, phrases, and names are now common in official terminology and increasingly used in the daily life of all people in Aoteaora New Zealand.

In this glossary we list the meaning of some common Te Reo terms relevant to the contents of this book, for readers who are unfamiliar with them. Some of these terms may have multiple meanings, or involve nuances beyond what we can offer here. For further definitions and terms not in this list, we recommend consulting *Te Aka*, the online Māori dictionary, at www.maoridictionary.co.nz.

Ako	The learning and teaching relationship; this term embodies a sense of reciprocity and partnership between teacher and student.
Ākonga; Tauira	Learners, students, and apprentices. *Tauira* has connotations of more mature learners, and is more commonly used in tertiary education settings than *ākonga*.
Aotearoa	The indigenous Te Reo name for New Zealand, often joined as Aotearoa New Zealand.
Hapū	Regional and local Sub-groups within *iwi*.
Hui	Meeting or gathering.
Iwi	Often translated as 'tribe', the largest collective societal grouping of Māori, linked by *whakapapa*. Many Māori can *whakapapa* to multiple *iwi*. In modern times *iwi* are significant organisations that operate social services and commercial businesses, as well as having local, regional, and national governance roles and influence.
Kaiako	Teacher or instructor.

S. Chan, N. Huntington (eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand*, Professional and Practice-based Learning 34,
https://doi.org/10.1007/978-3-031-12168-5

Kaihautū	Leader. Traditionally, one who sets the speed and rhythm in a waka (canoe).
Kaitautoko	An advocate or supporter.
Kaumātua	A person who has significant *mana* and is a respected authority, especially on matters to do with *Te Ao Māori*.
Kaupapa	Custom, practices, and philosophy; the way things are done and considered.
Kāwanatanga	Governorship or sovereignty (depending on translation). One of the three articles of *Te Tiriti*.
Korero	Conversation and dialogue.
Kura; Wharekura	Schools that teach through Māori-language immersion. *Wharekura* refers specifically to secondary schools.
Mahi	Work and effort.
Mana	Respect, prestige, and status.
Marae	A shared complex of communal buildings and spaces, most with specific cultural or ceremonial purposes, affiliated with an *iwi* or *hapū*.
Mātauranga Māori	Knowledge and understanding founded in *Te Ao Māori*. *Mātauranga* as a standalone term refers more broadly to knowledge in general.
Mokopuna	Grand-child and includes grand-nephews/nieces.
Ōritetanga	Equity or equitable treatment. One of the three articles of *Te Tiriti*.
Pākehā	New Zealanders of European descent.
Rangatahi	Younger people (*Tamariki* refers specifically to children).
Rūnanga	A governance body such as a council or board.
Tamariki	Children
Tangata whenua	Literally, people of this land. At a national level this refers to all Māori, while at a regional level it may be used specifically to refer to local *iwi* and *hapū*. *Mana whenua* refers to the inherent rights that *tangata whenua* possess by virtue of their historical connection to the land.
Taonga	A treasure, something to be prized.
Te Ao Māori	The world as experienced and conceptualised by Māori.
Te Ika-a-Maui	The most common and officially used Te Reo name for the North Island of Aotearoa New Zealand.
Te Tiriti o Waitangi	The Te Reo version of The Treaty of Waitangi. Important differences between the English and Te Reo texts mean that *Te Tiriti* and The Treaty are often treated as two separate documents, with the Te Reo version having precedence.
Te Waipounamu	The most common and officially used Te Reo name for the South Island of Aotearoa New Zealand.
Tikanga	The protocol and procedures appropriate for a particular context.

Tino Rangatiratanga	Self-determination. One of the three articles of *Te Tiriti*.
Tuakana-teina	Literally refers to a relationship being older and younger people, such as siblings. Often used to refer to a mentoring and guidance relationship between an expert (tuakana) and someone with less experience (teina).
Wahine	Woman; the plural form is *wāhine*.
Wānanga	A learning environment. This also refers to a specific class of tertiary education organisations founded in *Te Ao* and *mātauranga Māori*, and is used by some non-Māori education organisations (such as universities) in Te Reo translations of their name,
Whakapapa	Genealogy and familial connection.
Whānau	Family. As well as people bound by kinship, this term can include or be used metaphorically to refer to unrelated people with strong bonds.
Whanaungatanga	Relationships and shared connections between people. The process of developing these connections is *whakawhanaungatanga*.

The editors would like to thank Peter Jackson (Te Atiawa, Taranaki) for reviewing this glossary. Any errors are ours alone.