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Contemporary Research Topics

learning & teaching 13:

November 2024

https://doi.org/10.34074/scop.4013

Published by Otago Polytechnic Press.

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Scope: Contemporary Research Topics** (**Learning and Teaching**)* is peer-reviewed and published annually by ***Scope: Contemporary Research Topics, Otago Polytechnic Press.

The series *Scope (Learning and Teaching)* is concerned with views, critical debate and reflections on learning and teaching theory and practice. It seeks to address current topical matters in the field of tertiary education. Its focus is on building a sense of community amongst researchers from an array of New Zealand institutions with the goal of linking with a wider international community.

EBSCO Database: *Scope: Contemporary Research Topics (Learning and Teaching)* is catalogued on the EBSCO Database in recognition of academic quality and alignment with international peer review processes.

An online version of the journal is available free at https://thescopes.org/journal/
ISSN (for hardcopy version): 1179-951X;
ISSN (for online version): 1179-9528.

learning & teaching 13:

November 2024

Copy Editing: Ingrid Sage

Design & Typesetting: Suzanne Thornton

Printing: Uniprint

Cover Credit: Emma Allen

Series Editor: Associate Professor Martin Benedict Andrew

Editorial Team: Trish Chaplin-Cheyne (Editor), and Megan Kitching (Editorial Assistant)

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https://doi.org/10.34074/scop.4013019

CHALLENGE AND INSPIRE

Trish Chaplin-Cheyne

Nau mai, haere mai and welcome to this thirteenth issue of *Scope: Contemporary Research Topics (Learning and Teaching)*. We had a strong response to our call for papers this year. The sixteen contributions to this issue come from tertiary education institutions around the motu and also from industry and organisations in the disability support and education space. The issue's open theme invited authors to address the opportunities, challenges, concepts and critical thinking that inform contemporary learning and teaching practice in higher education within New Zealand.

In 2022, *Scope (Learning and Teaching)* featured a special section on Neurodiversity and Neurodivergence. Following the success of this initiative and the Neuroabilities Symposium held at Otago Polytechnic in 2023, this issue again highlights recent research on neurodivergence in learning and teaching. The number and range of contributions in this area reflect a growing hub of research and align with our goal of building community amongst researchers from an array of New Zealand institutions and a wider international community.

Improving student outcomes

We open this issue with two contributions reflecting on bicultural learning and teaching. First, John Mumford reflects on how the Māori welcome at the start of the academic year left an indelible impression on his teaching. His contribution describes how elements inspired by pōwhiri enriched the teaching of computer connection concepts to ākonga. In their co-authored contribution, David Woodward and colleagues consider how Māori pedagogy might inform their teaching practice. The authors, five of whom identify as Pākehā and one as Māori, set out to investigate what informs their perspectives of Māori in Aotearoa New Zealand. They propose that tertiary education, while still expressing Pākehā cultural dominance in curricula, is moving to a more culturally inclusive approach in which whanaungatanga/connections with family and community are considered fundamental. Through sharing their own experiences, the authors seek to better understand Māori pedagogy and how Pākehā facilitators can better support Māori learners.

Staying with the focus on ākonga, Willfred Greyling addresses the topical issue of literacy. Despite recent claims that literacy skills are declining among young people in New Zealand, Greyling shows that Waikato Trades Academy learners' reading competence, measured by the Literacy and Numeracy for Adult Assessment Tool (LNAAT), has remained stable for the past seven years. Targeted learners continue to make statistically significant progress in reading and literacy, and Greyling offers recommendations for how to ensure such positive results continue.

Next, Marianne Cherrington, Tavish Sehgal and Margo Ballesta explore using project-based learning along with reflective practice to inspire new student cohorts at Otago Polytechnic Auckland International Campus to become sustainable practitioners. They report on how their project-based learning exercise aimed to reimagine sustainable practice for the next generation of OPAIC graduates in the context of the businesses and communities they serve. Project management skills also form an essential component of Information Technology at the Southern Institute of Technology. Working with IT learners on a staircasing pathway to degree courses,

John Mumford uses a case study of one lesson to reflect on how learners pass from grasping basic concepts to making connections between project management and their own lives and contexts.

Learning design

In "VARK is a Four-Letter Word," Amy Benians and Terri Brian urge educators to be cautious before adopting notions of learning styles. The VARK (Visual, Auditory, Reader/Writer, and Kinesthetic) model and similar frameworks, they argue, are not supported by neuroscience and, if conflated with learning ability, may disempower learners by encouraging a fixed self-assessment of their preferences and abilities. Benians and Brian outline a series of more multimodal approaches kaiako can adopt, including positive ways to encourage ākonga to recognise their learning strategies.

When given the opportunity to redevelop a nursing sociology paper, Josie Crawley and Amy Simons turned to narrative pedagogy as a way of expanding and transforming students' frames of reference and cultural awareness. Their contribution to this issue explains this approach, and describes the strategies and specific exercises the authors used to explore and deconstruct diverse stories with their students. Through narratives, reflective writing and conversations, the authors show how nursing students engaged in the process and became reflective practitioners who approach diversity with respectful curiosity.

To conclude the first part of this issue, Chloe McMenamin and Kristie Cameron from Unitec investigate how students in veterinary and animal science are using digital tools, from ChatGPT to Zoom. Their study encourages educators to be aware of their students' needs, including the needs of neurodivergent ākonga, and to use a considered range of digital tools using a multimodal design. A guided approach by the educator, they argue, should ensure that learning directives are effective, safe and achievable without digital barriers for people suited to working with animals.

NEURODIVERSITY AND NEURODIVERGENCE

The special section opens with a survey of current understanding of neurodivergence among staff in tertiary education. As neurodivergent educators, Stella Lange and Rachel van Gorp wanted to find out how colleagues across their institution understood, recognised and responded to neurodiversity in their students. The results of their interviews with kaimahi are reported in this issue. They reveal that, while many educators have some knowledge of neurodiversity and adapt their teaching to accommodate individual ākonga needs, others lack a contemporary or informed understanding of neurodivergence. They conclude that work remains to be done to ensure best outcomes for kanorau ā-roro (neurodivergent) ākonga.

Rachel Byars in her contribution then reflects on her own efforts to better understand and acknowledge neurodivergence and neurodiversity. As an experienced educator seeking to learn from others in the neurodivergent space, Byars describes how she moved from learning the terminology and exploring the research on neurodivergent ākonga to taking active steps towards adapting her teaching, guided by colleagues and mentors in a team approach to professional development. Rebecca Gilbertson and Tania Allan Ross also recognise the need to further educate kaiako to support neurodivergent learners. Their article, "Executive Functioning: What it Is and Why it Matters," outlines the cognitive skills comprised under the heading of executive functioning, and how difficulties with these skills can impact learners. The authors then share the results and strategies gleaned from a workshop discussion on the same topic, drawing on the wealth of personal and professional experiences of practitioners.

Victoria Beckwith explores the Kato Toolkit's "10 Habits for Phenomenal Educators for Pacific Learners" through a neurodivergent lens. The 10 Habits' descriptions encourage reflexivity and reflection, which could

challenge and inspire educators who are supporting and teaching neurodivergent learners. Beckwith proposes that relationality, belonging, story-telling, kindness, clarity, trust, and creativity encourage positive engagement for both Pacific and neurodivergent learners and educators. Knowing ourselves and our learners, this article proposes, supports diversity in our organisations and provides inspiration for our communities. Marianne Cherrington's contribution to this section also considers organisational diversity and neurodivergence, especially in tertiary vocational education. Reflections are given from the author's experience in the electrical training industry, and focus on a six-month period culminating in cyclone Gabrielle and two major flood events which created enormous challenges to overcome for learning and teaching. In this context, Cherrington's article suggests ways to enhance the learning, resilience and wellbeing of neurodiverse students.

The next article explores the authors' combined experiences teaching neurodivergent learners in healthcare assistant programmes at one institute of technology in New Zealand. Elizabeth Youard, Lizzy Guest, Carolyn Wilson and Mary Cooper share insights gained from experience on how kaiako can best support the individual needs of neurodivergent learners. They discuss their collective learnings in the context of neurodivergence in vocational education and propose future research opportunities based on our experiences.

We conclude this section with two contributions focusing on autistic ākonga, an underserved area of research in Aotearoa New Zealand. First, Nicolina Newcome presents the experiences of five autistic people in tertiary education. As a counterbalance to published research around autistic students, this piece considers how the tertiary education environment can be a positive space for autistic ākonga. Newcome and her research participants echo other contributors to this issue in calling for educators to see neurodivergent tertiary students not necessarily in terms of challenges and needs, but also in terms of strengths and motivations. To close the issue, we hear from a team of authors from Altogether Autism, a free, national advisory service. In their article, Rachael Wiltshire, Joanne Lawless, Rebekah Corlett, Timothy Folkema and Luella Wheeler describe the development and dissemination of guides for tertiary educators on Autistic learners' needs in Aotearoa New Zealand. Going beyond the provision of advice, the authors consider barriers to support and challenges around engaging staff to use resources once developed. On a positive note, they conclude that many autistic learners' needs can be met with relatively small changes in teaching practice.

As with many of the contributions to *Scope (Learning and Teaching) 13*, the articles in the Neurodiversity and Neurodivergence section offer practical recommendations for kaiako alongside reflections on teaching theory. We hope you enjoy this issue.

Trish Chaplin-Cheyne is the Director of Te Ama Ako | Learning and Teaching Development (LTD), where she is responsible for developing and implementing the learning and teaching strategic direction and workplan to implement the goals and objectives of Otago Polytechnic's strategic plan. Te Ama Ako (LTD) are tasked with ensuring that Otago Polytechnic programmes and courses are designed to best practice standards, that our academic staff have the full range of knowledge and skills needed to facilitate learner success, and that learners enjoy an outstanding experience with Otago Polytechnic. She is the editor for *Scope: Contemporary Research Topics (Learning and Teaching)* and a member of various polytechnic-wide committees, task groups and panels. Trish joined Otago Polytechnic in 2015, as a Learning Facilitator involved in the Designing for Learner Success initiative. Her areas of particular interest are curriculum and assessment design.
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https://doi.org/10.34074/scop.4013001

MAKING CONNECTIONS: REFLECTIONS ON TEACHING THE BASIC PRINCIPLES OF COMPUTER NETWORKING WITH A RENEWED APPRECIATION OF PŌWHIRI

John Mumford

INTRODUCTION

Every academic year at the Southern Institute of Technology (SIT) starts with a pōwhiri to welcome all kaimahi (staff), ākonga (students) and manuhiri (visitors) back on campus with dignity, passion and resolve for the coming year. Relationships and connections (whanaungatanga) are crucial to Māori, unifying people, honouring commitments to each other and fostering a sense of belonging (Houkura / Independent Māori Statutory Board, 2023). Pōwhiri left an indelible impression on me about the significance and the endurance of such connections, and how they can help us through the challenges that each academic year brings. For the purposes of this reflective piece, "a Pōwhiri is a formal Māori welcoming ceremony carried out by tangata whenua (local people or hosts) to welcome manuhiri (visitors) into a space" (Napan et al., 2022, p. 66). Thus, the students, the staff and all visitors are welcomed into the campus space.

Several months later, while writing a lesson plan to help a culturally diverse group of commerce students understand how computers connect with each other, my impression of the pōwhiri came to mind. I could see the similarities between the pōwhiri and its protocols for the interactions, and the way that computers interact with each other. This seemed to be a much more natural way of understanding a somewhat abstract process that operates invisibly to a computer user yet is crucial to the digital communication age. Thus, in the spirit of whanaungatanga, my intention was to welcome the ākonga into the learning space. My goal was to "provide a wide range of teaching strategies that ensure a sense of belonging for Māori students and all students using Māori concepts and pedagogy" (McRae & Averill, 2019, p. 168).

The Internet is founded on underlying software protocols which manage the communications between devices in a structured manner. Thus, with renewed appreciation for the significance of pōwhiri, I set about planning and delivering a lesson about computer communication motivated with a fresh sense of purpose and deeper awareness of human connections, and the power of collaboration. Fostering connections and collaboration is at the heart of current reforms in tertiary education providers as members of Te Pūkenga.

CONTEXT AND CONTENT

In the context of IT education at tertiary level, computational thinking includes several facets that can be linked to computer networking, and collaboration in a wider sense. Doleck et al. (2017, p. 4) identify five computational thinking competencies: algorithmic thinking, cooperativity, creativity, critical thinking and problem solving. Teaching computer communication and cooperativity may occur in isolation from the more holistic and naturally grounded perspective that pōwhiri provide. Presenting the technical explanation of computer communications from a purely Pākehā perspective would tend to be the default approach. Why not explore the technical content

using a fresh viewpoint and support both present and future benefits for our students? Students who experience teaching and learning contexts from Pākehā and Māori perspectives are likely to gain deeper appreciation of what each culture can contribute to their studies. Hargreaves (2022) emphasises the principles of culturally responsive teaching. In addition, it is acknowledged that "culturally responsive pedagogy is an educational approach that recognizes the diverse backgrounds and experiences of learners and seeks to create inclusive and engaging learning environments" (Caingcoy, 2023, p. 3204). This piece outlines the teaching strategies forming the basis for a lesson on computer communication, students' responses, teacher reflections and ways of connecting and critiquing the incorporation of pōwhiri elements within the context of a business computing course.

COMPUTER NETWORKING CONCEPTS AND SKILLS IN THE CLASSROOM

The session occurred on a weekday afternoon in the classroom with 15 Diploma in Commerce (Level 5) students. The class comprised mature students and some younger students with varying prior knowledge of computing and use of information technology (IT) in business contexts. As part of SIT organisational policy's regular observation of culturally responsive teaching, this was an opportunity to draw on work and life experiences, especially pōwhiri, as we navigated our way through the course. This informed my teaching with a fresh approach to teaching computer networking within the context of information systems studies. Some students would be revisiting semi-familiar material and others would be returning to education after some years in the workforce and perhaps had never dealt with these topics in an academic setting. This seemed to be an ideal opportunity to present the material with a questioning approach at the outset, to enhance student engagement and make theory and practice more connected. It was also a situation to foreground pōwhiri experiences as a vital part of the learning process in the classroom. Those more familiar with computing would have to revisit what assumptions we start with and why, rather than just how computer communication works; those returning to study, having had real world experience of computer communication and collaboration, would bring with them a questioning approach based on life experience (Why do I need to learn this? What for? What does pōwhiri have to do with computing?).

The kanohi ki te kanohi (face to face) lesson commenced with a greeting: Tēnā koutou, tēnā koutou, tēnā koutou, katoa (Welcome everybody). The learning goals and structure for the session were laid out on the whiteboard, the tutor ticking off each stage of this schedule as they were completed. The main parts of this lesson were arranged into three sections.

The first section involved asking the class: what are protocols? In addition, the students were requested to give an example of a protocol from an everyday situation. The students' verbal responses were shared, and this prepared the class for building on prior knowledge and making connections between technology and cultural customs. The examples shared were drawn from their experiences of introducing themselves to others, respectful listening and attention to a person speaking, and asking questions in a session at an appropriate time.

The second section involved the core learning activity for this lesson: a very simple and short sequence of events in the form of a role-play. Three uniquely coloured cards were introduced to the class. Each card represented one stage of the computer connection process. Each card face had a short English phrase on one side complemented by a Māori translation of the same phrase on the other side. Two students were invited to participate in the learning activity, with one student acting as the initiating computer, and the other as the receiving computer. The tutor then guided the role-playing pair through the short process drawing on experiential learning theory (Kolb & Kolb, 2017). The student read aloud each phrase, in English and in Māori, as it progressed. The role play sequence then played out.

The role play sequence

Each student in the pair activity chooses whether to act as a sending computer, to initiate the interaction, or act as the receiving computer, waiting for the sender to start the process.

Step 1: The sender then reads aloud from one side of the card, "I would like to converse with you," then turns the card over and reads aloud in Māori, "E hiahia ana ahau ki te kōrero ki a koe."

Step 2: The receiver then replies to the sender by reading aloud, "Received. I would like to converse with you," then turns the card over and reads aloud in Māori, "Kua riro mai. E hiahia ana ahau ki te kōrero ki a koe."

Step 3: The sender then replies to the receiver by reading aloud, "Received. Good, let's talk," then turns the card over and reads aloud in Māori, "Kua riro mai. Kia pai tā tatou kōrero."

The third section involved a guided reflection by the tutor on the learning activity. The key aspects modelled in the simple activity could be likened to two parties engaging in customary communication, being ready to interact to achieve a common goal through collaboration. The back-and-forth nature of the process resonated with the students' examples of protocols. The tutor then drew some comparisons with pōwhiri, which reminded the students of that first key event of every academic year, and of the possible connections with the technical world of computer communications.

First, the students are involved in the teaching activity through practical participation. Second, they have an opportunity to reflect on this experience. Third, they are supported to think about the abstract concept of computer networking protocols. Fourth, the students can experiment further, to see what happens when this technical communication process fails in some way. Thus, the students are guided to navigate Kolb's cycle of learning (Morris, 2020, p. 3).

SIMILARITIES AND DIFFERENCES BETWEEN PŌWHIRI ELEMENTS AND COMPUTER COMMUNICATION

Pākehā and Māori perspectives of the world are rooted in very different cultural histories. Consequently, looking for similarities between a Western technological viewpoint and Māori knowledge systems, concepts, and values (such as kaitiakitanga) will naturally reveal significant differences in perspectives. A listing and brief description of the key elements of pōwhiri (Massey University, 2023) highlights the similarities and differences between pōwhiri and the computer connection concept.

Key Element	Description	Similarities	Differences
Karanga	A greeting call or incantation.	Sender request to make connection with receiver using agreed language.	Sung by a person drawing on their breath, intellect, and emotions. Intention for enduring relationships.
Whaikōrero	Formal speeches.	Back-and-forth exchange of data in standard format. Internet locations established.	Form of language, breath, intellect, and emotions. Intention for enduring relationships. Connections with ancestors and whakapapa.
Waiata	A song performed at the end of the whaikōrero to support what has been said.	Signals are used to guarantee safe data delivery and remove the connection once there is no more data to share.	Sung by a person or group drawing on their breath, intellect, and emotions. Intention for enduring relationships. Reinforcement of message.
Hongi and harirū	Shake hands and press noses.	Graceful connection release sequence, where both parties have closed their side (or abrupt, where connection is closed quickly).	Close personal space and breath of life shared.
Kai	Sharing food, which lifts the tāpu (sacredness) of the pōwhiri.	Users at each end of the connection experience some change in their information.	All computer communication is viewed as data with no innate ethical sense of what is or is not sacred.

Figure 1. Key pōwhiri elements with descriptions followed by similarities and differences between each element and computer communication.

CONCLUDING THOUGHTS

Our journey started with the pōwhiri at SIT and its lasting impression on me and my teaching practice. This experience raised my awareness of the potential similarities and differences between pōwhiri and computer connection concepts, which form the underlying basis for foundational software processes of the Internet. The lesson planning which resulted from my subsequent reflections led to the navigation of a teaching sequence on basic computer connection principles with a class of commerce students. The lesson had very positive feedback from the students. The group of commerce students appreciated the effort that I had put into making an abstract concept more understandable through a simple role-play exercise which embedded te reo Māori into its planning. The Māori teacher who observed the lesson provided very heartfelt feedback on the suitability of the lesson plan, although no consultation with mana whenua was sought. The similarities between pōwhiri and the lesson topic could be viewed as somewhat naïve. Linking pōwhiri to Western technology may detract from the sacredness of Māori customs. Shedlock and Hudson's research on Māori concept modelling of IT artefacts associates the meaning of pōwhiri with the night, darkness or relating to departed spirits. They also include the idea of binding together in their review of literature (Shedlock & Hudson, 2022, p. S26). More profound aspects of pōwhiri include recognition of the mana of the participants, the weaving together of different peoples and acknowledgment of those who have passed (Smith, 2016). Thus, the clear distinction between a sacred process that welcomes people into a collaborative space, and computer software protocols as artificial objects, must be maintained, honoured, but not appropriated.

My learning journey with pōwhiri has only just begun. The themes of connection, collaboration, and shared goals can inspire us to develop our bicultural pedagogy as we navigate our way through education reforms aspiring to reflect the values of Te Pūkenga.

John Mumford is an IT Teacher at the Southern Institute of Technology, whose research interests include Teaching Innovation, Mathematics Education, Adult Literacy and Numeracy and Postgraduate Education. John has a Master of Adult Literacy and Numeracy and is dedicated to empowering learners to develop their critical thinking skills and dispositions.

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https://doi.org/10.34074/scop.4013014

PĀKEHĀ FACILITATORS EXPLORE JOURNEYS INTO MĀORI PEDAGOGICAL APPROACHES IN TEACHING PRACTICE

David Woodward, Alexa Forbes, Shannon Booth, Elise Allen, Clare Morton and Mawera Karetai

Figure 1. Koru by Solomon Drader.

INTRODUCTION

A group of tertiary educators, all of whom have completed the Graduate Diploma in Tertiary Education (Level 7) (GDTE), collaborated in a Community of Practice (CoP), to consider how Māori pedagogy might inform their teaching practice at Otago Polytechnic. Five identified as Pākehā, tangata tiriti, and one as Māori, tangata whenua. As a starting point, we set out to investigate what informs our perspectives of Māori in Aotearoa New Zealand. We needed to consider our individual whakapapa and our understanding of te ao Māori ahead of looking at what informs our facilitation of Māori learners.

Methodology

We sought guidance from the Otago Polytechnic Kaitohutohu office and explained that our journey of autoethnographic (Maréchal, 2010) reflection on teaching practice would be guided by our tangata whenua representative, Mawera Karetai. We adopted a social constructivist (Palincsar, 1998) approach to the research by employing a CoP (Wenger, 1998), characterised by mutual engagement, joint enterprise and shared repertoire. We employed this social constructivist approach to mine information from the participants, also the authors of this article, five Otago Polytechnic lecturers and one University of Otago lecturer. The research group met online regularly to explore the research questions. The irony of using a Western approach to reflect on our approach to Māori pedagogy was not lost on the group. We accepted this might be a long journey that should begin with reflection on our individual experiences of te ao Māori and the whakapapa of where we are now.

Findings

1. What informs your perspective of Māori in Aotearoa New Zealand?

Alexa's parents emigrated to New Zealand (separately, before she was born) and settled in the Waikato town Te Awamutu.

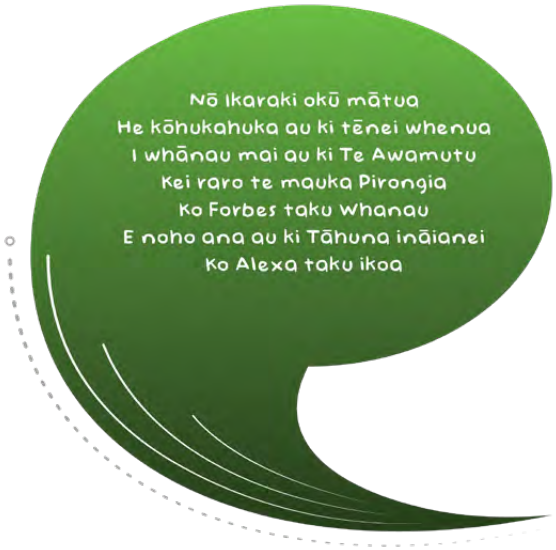

Figure 2. Alexa's pepeha by Solomon Drader.

I acknowledge the protection and the authority of the Māori Queen and the iwi of the place I was born and raised, many of whom are descended from the Tainui Waka. I live in Tāhuna Queenstown, and acknowledge Kāi Tahu, the iwi authority of this area.

Growing up in the Waikato, there were tangata Māori at school, in my street, and at my dad's doctors' surgery. Early on, I noticed the fun: music, singing, and games. I loved hanging out at their houses, but they did not often come to mine. I did not question or think about this but it has informed my current perspective and my ever-increasing respect for te ao Māori. This background motivated my pursuing studies in te reo and te ao Māori. I can kōrero some but understand more than I speak. I am fascinated by the formal language and the basis of the kupu whakarite (metaphorical language) and its connection with nature. I recognise the educational playing field is not level. I recognise Māori can be marginalised through systemic and casual racism. I want to tautoko (support) and help.

I grew up with Māori friends, although would not have termed it that way. However, during my early adult years (age 20–50), many of those friendships fell away. When Te Wānanga o Aotearoa started offering free reo courses, I was an early adopter. I loved reconnecting with te ao Māori, including waiata and kōrero rōpū (discussion groups) and to again enjoy the weaving together of bicultural lives. I noticed differences and difficulties around trust, a largely unacknowledged history, and the differences in our worlds. I also interact now on a political level as an Otago Regional Councillor and member of the Mana-to-Mana committee.

Like Alexa, Shannon was born and raised in Te Awamutu, the first town south of Hamilton in the heart of the Waikato district.

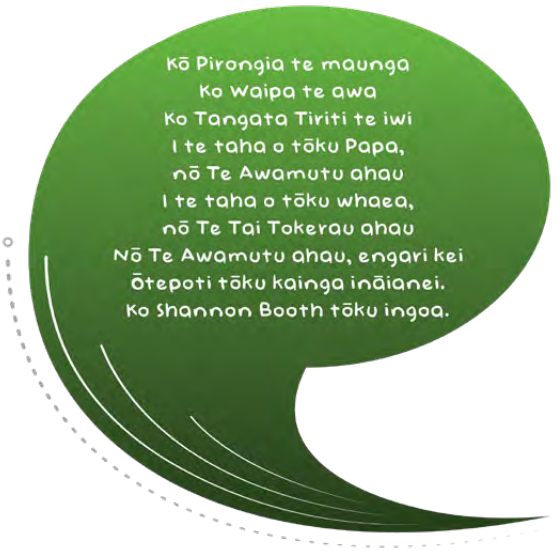

Figure 3. Shannon's pepeha by Solomon Drader.

Growing up in Te Awamutu in the 1980s and 1990s, I only saw two cultures – Māori and Pākehā. Back then, I did not even know what the term "multicultural" meant, let alone that there was even a need for the term's existence. There were no other visible cultures, no other accents, no other languages, just English or Māori, or in many cases, both blended together. Both cultures were represented in the education we received, and in our daily lives – so much so that in my world, it did not even necessitate being labelled bicultural – it just 'was.'

I grew up in a largely 'lower socio-economic' area of town, where many of my closest friends were Māori. I remember feeling accepted into their whānau as one of their own, and still am today. In some of these households, te reo Māori was the main language spoken at home, so I had the opportunity to pick up some of the basics of the language by, at times, being totally immersed in it. My daily conversations with friends would resemble a mixture of the two languages together: "Oi! Stop being a tutu!" "Kei te pai e hoa, he's just feeling hōhā." And regarding tikanga Māori, that too was just a part of everyday life. If new visitors of significance came to our school, we *all* went to the pōwhiri at our school marae to welcome them; if someone's family member died, we *all* got on the bus to travel to their marae for the tangi and show our respects and support to the whānau – "we" as in brown, white, black, yellow, purple … *all* of us. It was just the way it was. It need not be questioned. As a child, I never saw the 'us' and 'them.' Just 'we.' Looking back now, I wonder if that is the way it actually was, or was it my childhood naivety about the divisions?

David identifies as a Pākehā, tangata tiriti.

Figure 4. David's pepeha by Solomon Drader.

My ancestors were English. I was born and grew up in Christchurch which, unlike Dunedin with its Scottish heritage, boasts a more English heritage with a high proportion of Europeans (75 percent), a low proportion of Māori (10 percent), and more recently an increase in the Asian (15 percent) population. Apart from learning about Māoritanga at primary school (such as using poi and singing "Pōkarekare Ana"), at age 14 I played soccer for the Technical football club and two of my teammates were Māori. They were both top athletes, Canterbury representatives, had a good sense of humour and were mostly polite and well behaved. A few years later a Māori guy in his 40s joined our local table tennis club and became good friends with our whānau. He would regularly call round to our place with his guitar and sing songs that we all knew, and he had a great sense of humour. At 26, I moved to Palmerston North, then Adelaide, before returning to Balclutha and finally arrived in Dunedin (Mosgiel) in 2011. I do not recall any further contact with Māori, perhaps until I returned to New Zealand and entered the tertiary education sector.

Clare was born in Levin and lived there until she was eight years old. From there, she moved around New Zealand with her family.

Figure 5. Clare's pepeha by Solomon Drader.

We always had a connection with the Ohau river as it was a special place my grandmother (my Oma) always took us to swim in the summer. My father's family live in the United Kingdom; my father migrated here as part of the 10-pound pom scheme after the war and never left. My mother's father's family were English settlers who arrived in New Zealand in the early 1900s and marriages were always within those settlers' families. My grandmother was Dutch and arrived here after the war when she had the choice of either Australia or New Zealand to live. I have no Māori connections on either family side, or it was never part of our family history. Both sides of my family are firmly seated in European ancestry, one side dating back to the King of Scotland James IV. So, this is very new learning for me. It has been a journey of understanding about the Treaty of Waitangi and what this means to the people of New Zealand. I still feel like an outsider with my European history but as I learn about the principles and the culture, I am beginning to see how important this is to all of us who live here in Aotearoa. This learning has only happened since I have been at Otago Polytechnic and have embarked on my GDTE and MPP (Master of Professional Practice) journeys.

Elise's ancestors are immigrants from the United Kingdom and Europe.

Figure 6. Elise's pepeha by Solomon Drader.

Three of my grandparents were born overseas. I identify as takata bola, a descendant of boat people, and more broadly as tangata tiriti. I grew up in Dunedin and went to a small primary school in the West Harbour area, in the lee of Kāpukataumāhaka. We had te reo lessons as a whole school once or twice a week, which I wish I had continued. In terms of formative cultural education, we had more access to learning about Samoan culture than te ao Māori, through happenstance rather than planning. I picked up a bit more knowledge when working at Otago Museum and the Dunedin libraries, but it was not until working at Otago Polytechnic that most of my knowledge of te ao Māori was formalised.

In summary, the North Islanders of our group had far greater contact with Māori people in their formative years which informed their later understanding of difference and the need for further understanding and knowledge. Our South Islanders came to this awareness later in life. All gained further understanding of te Tiriti, te ao Māori and te reo Māori through working at Otago Polytechnic. Some had undertaken further study from other institutions.

2. *As a tertiary educator, what informs your perspective of Māori pedagogy in an Aotearoa New Zealand context?*

I (Alexa) look for guidance around tools that are safe for Pākehā use. I am familiar with models such as Te Whare Tapa Whā (Durie, 1998 and illustrated in Woodward et al., 2020) and Te Wheke (Pere & Nicholson, 1997) and I apply these. I also look to Māori underpinning concepts, kawa and tikanga to frame my thinking. I understand concepts of decolonisation as outlined in the foundational work of Linda Tuhiwai Smith, *Decolonizing Methodologies* (Smith, 1999). My concerns centre on the continued cultural dominance of Pākehā in curricula, and on my responsibilities under te Tiriti. Otago Polytechnic seems open to questioning and changing the tools offered. For example, the Bachelor of Applied Management (Capable NZ, n.d.) now requires reflection on te Tiriti. Māori kaupapa offerings are emerging. But these are still limited and need to more fully support Māori

learners within their cultural kaupapa. Māori may feel excluded by being asked to complete tasks in the way they are currently outlined but work is being done to make change.

It was not until I (Shannon) left Te Awamutu to attend university that I was encouraged to analyse "how one integrates the principles of the Treaty of Waitangi into their professional practice" and to consider the pedagogy that would inform teaching practice. However, back in the late 90s, any course content that focused on Māori language, practices, and/or education came across to me as almost 'token.' The content felt like an add-on, an afterthought, or just box ticking.

Moving towards the role of educator myself, I wanted my students to know I was genuine in my support of Māori and did not want my efforts to be seen as 'token,' so I enrolled in a Graduate Diploma in Māori Studies to further my knowledge and understanding. I do not feel there is one 'Māori pedagogy' to follow, but there are principles that can guide us. To me, Māori pedagogy looks like taking the time to build relationships, getting to know my students on a personal level, ensuring that I pronounce their name correctly, taking an interest in their lives, ensuring they know I care, sharing my knowledge openly and vulnerably, embracing the concept of ako – a teaching and learning relationship where both the student and the educator learn from each other – and encouraging and welcoming whānau participation. The educational journey need not be an individual one, but a shared one of collective support and understanding. As the African proverb says, "It takes a village to raise a child."

The realisation that informs my perspective struck me (Elise) suddenly at a conference workshop about bicultural educational practices. We were told a story about a tangata whenua man who met with a programme leader about starting a tertiary education programme. When he got to the meeting, there was no greeting, no proper introductions, just straight down to business. He knew straight away that he did not belong in that programme. I realised that before anything culturally specific or language-based comes into consideration, there are two incompatible world views at play here: the human-focussed world view and the business-focussed world view. My instinctive approach to pedagogy, backed up by theories such as social constructivism (Palincsar, 1998) and experiential learning (Kolb, 2015) and even by Ken Robinson (2016), is fundamentally human-focussed. I realised that by emphasising collective achievement over individual achievement, process focus over goal focus, learning things over winning marks, and learning holistically and in context over siloed subjects, my courses would be more culturally inclusive, in general, and a better learning environment for Māori learners specifically. This is just the beginning of the journey.

David's understanding is that teaching Māori ākonga is based on the collective philosophy principle of kaupapa Māori, a set of values, principles and plans for Māori education that includes use of te reo Māori (Māori language) and tikanga (Māori customs and protocols) and is informed by mātauranga Māori (Māori knowledge or indigenous wisdom) (Pihama et al., 2004). Teaching is informed by te Tiriti o Waitangi and the importance of tino rangatiratanga, the self-determination principle (Smith, 1997). Such a learner-centred pedagogy provides autonomy for learners and could be likened to Maslow's (1943) hierarchy of needs and the concept of self-actualisation.

Ako is the culturally preferred pedagogy, where, in the Māori world view, teaching and learning are one and the same, a sharing of knowledge. Māori pedagogy is underpinned by the cultural aspirations principle of taonga tuku iho or the Tiriti principles of partnership, participation and protection. Māori teaching acknowledges the socio-economic mediation principle of kia piki ake i ngā raruraru o te kāinga that, despite any socio-economic disadvantages or difficulties that Māori may be experiencing, kaupapa Māori practices and values aim to ensure that a collective responsibility involving the whole community will come to the aid of akōnga. Finally, Māori learning is based on the extended family structure principle of the whānau and whanaungatanga: forming relationships and connections between whānau and communities (Bishop et al., 2007; Makareti, 1986; Pihama, 2001; Pihama et al., 2004; Te Rangi Hiroa, 1949/1987).

Kaupapa Māori pedagogy uses a humanist (Maslow, 1943) approach. Makareti (1986) describes how children were taught all aspects of life through living and sleeping with their parents, grandparents, and granduncles. From their whānau they would learn of folk-lore, traditions, and legends, from stories, games, waiata (song), whakapapa (genealogical connections), and karakia (incantation and prayer). They would also learn of their relationship to the land, sea, rivers, mountains, forests, birds and all aspects of nature. Nepe (1991) argues that tīpuna whaea/tīpuna mātua–mokopuna (grandparents–grandchildren) were the most "intimately bonded" and fundamental of these relationships. Through a caring and nurturing relationship between the child and the grandparent, learning and teaching transpired.

For our veterinary nursing learners, we (Clare and colleagues) are trying to adapt a vocation that is based on a Eurocentric veterinary education model into a te ao Māori teaching and learning style. Both the educators and stakeholders struggle with this, as although the concept of a Māori pedagogy can be taught (by us as educators), we are trying to translate a profession which is essentially colonialism-based into a different way of learning for us all. For me (Clare) as an online educator, this has been a difficult barrier to overcome as it is hard to engage with learners and to build whanaungatanga (relationships and connections between individuals) through online learning. We try to build a whānau-type relationship within our online 'classroom' by having set weekly meetings, social chat groups and face-to-face block courses three times a year. It is a slow start to an industry that is reluctant to change.

3. What does the future of education founded in te ao Māori look like in Aotearoa New Zealand?

Te ao Māori emphasises the importance of relationships between nature and people. It is a holistic worldview that focuses on interconnections and is grounded in tikanga (customary values and lore) and mātauranga (knowledge).

Alexa sees the future as relational and culturally interwoven. There is much work for Pākehā to do to get over notions of equality in a colonised, one-sided educational culture. As Pākehā, my job is to open the way for and remove barriers to Māori learning through relationships with Māori learners and colleagues. Once noticed, barriers are seen in every aspect of our society but getting the noticing happening for everyone is a challenge. Every task in every course must be examined from a kaupapa Māori perspective to ensure that tools and readings include a te ao Māori approach. While I am seeing more people opening to kaupapa Māori, our tools, aids and course materials do not necessarily match. We can start by committing ourselves to follow pōwhiri protocol, karakia to settle the mauri, and whakawhanaukataka to make sure everyone in the room knows who else is there and how they connect.

Shannon grew up in an environment where she saw te ao Māori and te ao Pākehā (from her childhood perspective) seamlessly intertwined. She is aware that not all New Zealanders experience such harmony. She is also aware of the intergenerational race-based beliefs some carry, and believes that only knowledge and understanding of the past will help those people move forward from these adverse viewpoints.

As a Pākehā educator, who so genuinely wants to do the right thing by her Māori students, Shannon says, "I need to know what I can and cannot do, what I can and cannot say, and to be educated enough to feel comfortable and competent to deliver in an area that is not my first language or culture."

Elise believes the future of education in an aspirational sense, founded in te ao Māori, would require an enormous cultural shift away from neo-liberalist ideals: no more percentage marks or grade point averages, no more narrow, individual-subject classes, no more 'bums on seats' models or EPIs (educational performance indicators). Real, genuine learning is a reciprocal process that is very difficult to quantify, is holistic and practical, and cannot be 'delivered' by one individual to hundreds of learners by seating them in rows and requiring silent note taking from minute one to minute 55. In this ideal world, apprenticeships are commonplace, children learn

by immersion and storytelling instead of by rote, and assessments are performance-focussed rather than output-focussed (or memory-driven). None of these practices are easy, cheap or particularly measurable in terms of return on investment, and an approach like this may not be particularly competitive on the global stage, nor logistically easy to achieve, but it is where we should go.

David suggests, using Otago Polytechnic as an example of a tertiary provider, that the smaller classroom sizes and learner-centred pedagogy provide a supportive, inclusive learning environment. Together with Te Punaka Ōwheo (the Māori Centre), these strategies can assist Māori learners and create a te ao Māori learning environment. At Capable NZ, one-on-one mentoring is the norm and can assist a kaupapa Māori pedagogy. Otago Polytechnic teachers need to embrace tikanga and encourage use of te reo. Studying the Certificate in Bicultural Competency is a good start; however, full immersion in te reo and mātauranga Māori would be ideal.

As educators, Clare believes we need to be supporting more Māori ākonga into vocations that they would not necessarily be encouraged into, such as the veterinary industry. All our ākonga should be supported in all aspects of their learning, but as educators she believes, we should also be doing all we can to ensure that their cultural needs are being recognised and adapting our teaching styles and classrooms for this. This means that we ourselves also need to learn cultural diversity and be prepared to challenge the way our industry learns. At the School of Animal Health, Clare and colleagues are slowly doing this by introducing Māori veterinary words rather than the English versions, and engaging in cultural and sustainability learnings and embedding these practices into our new programmes.

DISCUSSION

Kaupapa Māori educational philosophy is derived from an ancient history of tikanga, embraces te reo and is informed by mātauranga Māori. Māori pedagogy is a holistic approach that affirms a Māori world view and validates Māori people, language, culture and aspirations – by Māori for Māori (Pihama et al., 2004).

Education in tradition-based Māori society was inclusive, co-operative, reciprocal and obligatory (Metge, 1986). Knowledge was transmitted through the process of ako, meaning to both teach and learn, through the sharing of knowledge. Lifelong learning was discussed by Pere (1994): "Traditional Māori learning rested on the principle that every person is a learner from the time they are born to the time they die."

Aotearoa New Zealand has made considerable progress since the 1847 Education Ordinance, where Governor Grey wanted to remove Māori children from "the demoralising influences of Māori villages," to hasten their assimilation to "the habits of the European" (Barrington, 1970) and promote 'assimilation.' Decolonisation and emancipation have enabled the establishment of Te Kōhanga Reo (Māori early childhood immersion centres) and Kura Kaupapa Māori (Māori immersion language schools) under the Education Act, to challenge mainstream views and have provided a 'for Māori by Māori' alternative for educating Māori children.

At the tertiary level, wānanga, polytechnics and universities, while still expressing Pākehā cultural dominance in curricula, are moving to a more holistic, humanistic, culturally inclusive, wrap-around approach to Māori pedagogy where whānau and whanaungatanga – connections with family and community – are considered fundamental. As Evans et al. (2023) noted, in the case of Māori considering engineering as a career, connection to their whānau and associated support networks is a crucial factor in the decision-making process. The desire to maintain this connection and remain close to their hau kāinga (home) may take priority over travel for tertiary study.

Importantly, as discussed by Bishop et al. (2003), Māori learners, parents and their principals (along with some of their teachers) felt that the most fundamental influence on Māori learners' educational achievement was the quality of in-class, face-to-face interactions between kaiako (teachers) and ākonga (learners). The tuakana–teina

(older-younger sibling/teacher-student) relationship is like Carl Rodgers' (1969) humanistic, learner-centred approach, and the analogy of building a bridge between the teacher and the learner. Sometimes the learner crosses the bridge unaided to engage in learning, at other times the teacher and learner meet halfway, and occasionally the teacher must cross the bridge and take the learner by the hand for learning to begin.

One aspect that may encourage Māori learners at Otago Polytechnic is the hands-on approach of experiential learning or learning by doing and reflection. Woodward et al. (2020), concluded that constructivism provides the vehicle for learner empowerment and was the most widely used evidence-based pedagogical framework employed by educators for Otago Polytechnic learners. Constructivism includes the use of experiential learning and reflection (Knowles et al., 1998; Kolb, 2015). Scaffolding (Bruner, 1966) using progressive learning, as discussed by White (1995) for Te Kōhanga Reo (Māori early childhood immersion centres), is another form of constructivism. Social constructivism (Vygotsky, 1978), using group learning by doing and reflection, may also be a valuable pedagogy for Māori learners.

CONCLUSION

We have used Western research concepts to explore our thinking around Māori pedagogy. What has been revealed by this exploration is that more needs to be done. The group is committed to further understand and apply Māori pedagogy and understand how Pākehā educators can better support Māori learners.

Figure 7. Mawera's pepeha by Solomon Drader.

Ko koe ki tēnā, ko ahau ki tēnei kīwai o te kete. When I (Mawera) think of the future of education in Aotearoa it is not one group or another that holds the responsibility for creating fair, just, and future-focused learning environments. The responsibility lies with all of us, working together, to understand and address the challenges in achieving this learner-centred environment. Holding the kete (basket), walking together, shaping the future. Ka rawe ngā mahi, e hoa mā.

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Article https://doi.org/10.34074/scop.4013011

INVESTIGATING THE IMPACT OF PATHWAYS AWARUA ON WAIKATO TRADES ACADEMY LEARNERS' READING COMPETENCE

Willfred Greyling

INTRODUCTION

Given recent claims that literacy skills are declining among 15-year-olds in New Zealand (May & Madina, 2023; MoE, 2023), this article shows that at-risk Waikato Trades Academy (WTA) learners' reading competence, measured by the Literacy and Numeracy for Adult Assessment Tool (LNAAT), has plateaued, with entry-level and exit-level reading scores remaining stable for the past seven years (2017–2023). Consistently, regardless of the literacy and numeracy (LN)-embedding strategy, reading progress for the targeted WTA learners has been statistically significant, with large effect sizes recorded for pre-COVID-19, COVID-19 and post-COVID-19 cohorts.

Once individualised LNAAT reading protocols are available, vocational educators and learning advisors are required to select relevant interventions that address learner needs at their level of competence. As an intervention, Pathways Awarua is the resource of choice because its modules are aligned with the LNAAT and the learning progressions (TEC, 2008a, b). This requires that educators and learning advisors have relevant expertise in assisting learners to make this choice of intervention. It should be noted too that, although Pathways Awarua modules were designed for self-directed learning (as occurred in this study), several case studies found that learners benefited from educator mediation in these online sessions, especially where the educator offered immediate performance-enhancing feedback to boost learner engagement (Alkema et al., 2014).

An important aspect to consider here is the level of mediation: are educators and support staff equipped to mediate the interactive online engagement of learners enrolled on Pathways Awarua? Managing cohorts of learners to access these interactive online modules is not enough. Educator and support staff training on how to use prompts, ask questions, give clues, and use extended sequences of interaction is key. For example, the use of implicit, explicit and fading graduated prompts seems indicated in lifting LN outcomes for learners (Fang et al., 2016; Navarro & Mourgues-Codern, 2018) above current levels of performance for the targeted cohort of WTA learners. A significant positive for the sector is the reading support and training available from Ako Aotearoa (Pathways Awarua, n.d.). This gives guidance on how to use learners' LNAAT results in identifying the starting point for reading development in Pathways Awarua and accomplish learning as an interactive event.

The main aim of this article is to report on the impact of Pathways Awarua on the reading performance of Step-1 and Step-2 WTA learners for three periods. Period 1 covered 2017 to 2019 (pre-COVID-19) (P1); Period 2, 2020 and 2021 (hybrid COVID-19 online support and out-of-lockdown support for the period); and Period 3, 2022 and 2023 (post-COVID-19 Pathways Awarua support).

The literature study refers in brief to the main findings and recommendations of the Ministry of Education's (2023) annual report, the value of computer-adaptive assessment tools such as the LNAAT to arrive at individualised

descriptions of learners' current reading needs, and the dynamic assessment interface between the LNAAT and Pathways Awarua modules where both have been aligned with the reading progressions (TEC, 2008a, b).

Our research questions relate to the reading performance calculated for the three levels of the Group variable (P1, P2 and P3) as well as two ethnicities (Priority [Māori and Pasifika] and Pākehā learners). Our research methods were quantitative, including descriptive statistics (means and standard deviations), analysis of variance for initial and progress scores, as well as repeated measures analysis to compare initial (Time-1) and progress (Time-2) scores. We used standard hypothesis testing to compare means for the levels of the two independent variables, *Group* and *Ethnicities*. Our findings, discussion, as well as conclusions and recommendations follow. At this juncture, it is noted too that this study received ethics approval from the Wintec Human Ethics Research Group on 10 April 2024 against reference number WTLR07090424.

LITERATURE STUDY

Outline

The findings and recommendations of the Ministry of Education's annual report for 2023 (MoE, 2023) provide the context for this study and serve as backdrop for a comparison of the reading performance of Step-1 and Step-2 learners for three periods: pre-COVID-19 (2017 to 2019) (P1), COVID-19 (2020 and 2021) (P2), and post-COVID-19 (P3). The 2020 and 2021 (P2) cohorts were exposed to online support during the lockdowns, as well as regular LN-embedding practices by tutors and tailored support from learning advisors outside the lockdowns, while the 2022 and 2023 (P3) cohorts were subject to LN-embedding practices by tutors and the systematic introduction of Pathways Awarua modules by WTA advisors as an intervention. A brief account is given of the LNAAT as a computer-adaptive reading assessment tool which yields protocols describing individual learner needs at their current level of competence.

The last topic highlights the dynamic interface between identifying individual reading needs and then selecting modules from Pathways Awarua that target those needs. The LNAAT and Pathways Awarua are aligned with the reading progressions (TEC, 2008a, b). This ensures a dynamic assessment framework integrating initial diagnostic assessments of learner needs, modules directed at these needs, and progress assessments.

The state of literacy and numeracy development in New Zealand

The New Zealand Ministry of Education's annual report (2023) cites the internationally acclaimed PISA (Programme for International Student Assessment) (2018) results (among other sources) which indicate declines in the reading performance of 15-year-old learners in the country. Later in the year, May and Medina (2023) reported similar results from PISA 2022. Notably, the Ministry of Education 2023 annual report refers to the "scarring" effects of the COVID-19 lockdowns on learning, citing all-time low pupil attendance, barriers to school attendance, staff shortages, and low availability of relief staff as some of the negative factors during and immediately after the lengthy COVID-19 lockdowns. The report also refers to "several decades of stagnation in literacy and numeracy, as measured domestically" (MoE, 2023, p. 6).

The Ministry of Education's summary of the PISA 2022 results (May & Medina, 2023) published in December 2023, after the Ministry's annual report, highlights a 28-point (or 2.8 percent) decline in reading performance from 2000 to 2022. This decline was not deemed statistically significant. The report did note that the proportion of 15-year-olds below the baseline of reading proficiency increased by seven percent from 2000 to 21 percent in 2022. Also, 79 percent of the NZ group remained above these levels, which was five percent above the OECD performance.

These findings suggested that WTA learners in the at-risk category (Step 1 and Step 2 on the reading progressions), who were already targeted in LN-embedded and learner support strategies at the institute, could and should be tracked to note any adverse COVID-19 impacts on reading skills.

To argue the case, pre-COVID-19 reading data were included in the data base. Paired samples of learners' reading scores obtained within each of the three periods were collated in a data set. Other ethnicities were not that well represented and were omitted. Likewise, Pasifika learners' numbers were low which meant that their data were collated with those of Māori learners under *Priority learners.* This meant that the independent variable, *Ethnicities,* had two levels (*Priority* and *Pākehā learners*). The second independent variable was *Group* with three levels (pre-COVID-19, P1; COVID-19, P2; and post-COVID-19, P3). The dependent variables were *Time-1 scores (Initial assessments)* and *Time-2 scores (Progress assessments).*

The Ministry of Education's 2023 annual report places front of mind not only the so-called stagnation in LN levels, but also the expressed teacher need for professional development, curriculum refresh actions, and closer engagement with educators. Feedback from WTA learning advisors articulated the same need: how were they to mediate the learning process as it unfolded in an interactive online environment such as Pathways Awarua?

The findings reported in this article remain positive: consistently, for the three years prior to the COVID-19 lockdowns (P1), the COVID-19 period (P2), and the post-COVID-19 period (P3), we found remarkably similar baseline values on initial and progress assessment scores for these learners. For the seven years under review, comparisons of within-subjects means yielded statistically significant differences, with a large effect size (partial eta squared value) for the group (N=304). For similar comparisons of reading performance at the institute (partial eta squared values >0.14), see the most recent institutional report (Greyling et al., 2024).

Instead of arguing for "stagnation" and "decline," a case is made for "plateauing" in reading performance. The present is a key moment in "breaking through resistance levels" based on pre-COVID-19, COVID-19 and post-COVID-19 reading performance. Arguably, the current LN approach at the institute may have passed the COVID-19 stress test (Dohaney et al., 2020), countering significant declines in reading performance for the target population of at-risk students.

The Literacy and Numeracy for Adults Assessment Tool (LNAAT) as a computer-adaptive tool

The LNAAT, aligned in its design with the reading and numeracy progressions (TEC, 2008a, b, c), is an interactive online tool with functionality consistent with the principles of computer-adaptive assessment (Van der Linden & Glas, 2000; Veldkamp & Sluijter, 2019; Veldkamp & Verschoor, 2019). This means that a learner's current response, either correct or incorrect, will prompt the next-item-selection algorithm randomly to pick an item based on that response. If the response is correct, the next-item-selection algorithm will pick a more difficult item; if incorrect, a less difficult item. This continues until the upper boundary of learner performance can be determined, at which point the termination algorithm will be activated, and a result generated.

It is important to note that the Tertiary Education Commission (TEC) appointed the New Zealand Centre for Educational Research (NZCER) as custodian of the LNAAT. Psychometricians and analysts at NZCER regularly calibrate the items in the item bank, tracking and advising TEC on item performance. These tool-integrity checks include aspects typically associated with Item Response Theory (IRT) such as parameter estimates for items in the item bank (Baker & Kim, 2004), item analyses following the RASCH model, differential item functioning, and construct validity (Baker & Kim, 2004; B. Gardiner, E. Lawes, & J. Mazengarb, personal communication, May 5, 2022; Jalali, 2009; Kamata & Vaughn, 2004; Martinková et al., 2017).

Alignment between the LNAAT and Pathways Awarua

Pathways Awarua, under the custodianship of Ako Aotearoa, offers reading development modules which, like the LNAAT, are aligned with the Steps in the reading progressions (TEC, 2008a, b). Individual learners or their tutors may access the resource and tailor the choice of module to the diagnostic information in individual LNAAT protocols. Once learners have worked through the so-selected modules and have attended their programme, they sit the LNAAT progress assessment (TEC, 2023).

An example of such a dynamic assessment framework is reported in Navarro and Mourgues-Codern (2018) who conducted a study aimed at enhancing Spanish-speaking elementary students' learning. Employing computer-adaptive testing as a diagnostic to identify an individualised starting point for each learner, they applied a scaffolding approach derived from graduated prompts to progress learner competence beyond current knowledge and skill. This approach, consistent with Vygotskyan theory, emphasises the critical role of teacher intervention in facilitating student learning beyond their current skill levels (Derry, 2013; Tudge, 1990; Verschoor & Straetmans, 2000; Vygotsky, 1978).

Broadly speaking, literacy and numeracy practices at the institute have followed a dynamic assessment framework for more than a decade (TEC, 2009). A similar pattern was identified for the three targeted groups: at Time 1 (initial assessment), the LNAAT results yielded individualised diagnostic information to plan interventions; for the pre-COVID-19 (P1) and the COVID-19 group (P2), LN-embedding practices and tailored, incidental LN support from WTA learning advisors were on offer, either in person or online; for the intervention group (P3), Pathways Awarua was introduced alongside LN-embedding practices; and at Time 2 (Progress assessments), the LNAAT was used to track reading gains at the end of each period.

RESEARCH QUESTIONS AND QUANTITATIVE METHODS

The following research questions were posed:

- Would LNAAT reading scores differ significantly for the pre-COVID-19, COVID-19 and post-COVID-19 groups?
- How would the performance of two ethnicities (Priority [Māori and Pasifika] and Pākehā) compare within and between groups?

The following hypotheses were tested:

For between-group comparisons:

- *Hypothesis 1*: The differences in scale score means for the independent variables (Group and Ethnicities) at Time 1 were not statistically significant.
- *Hypothesis 2*: The differences in scale score means for the independent variables (Group and Ethnicities) at Time 2 were not statistically significant.

For within-group comparisons:

- *Hypothesis 3:* The differences in scale score means between Time 1 and Time 2 were not statistically significant.
- *Hypothesis 4:* There was no interaction effect between Time and the two independent variables (Group and Ethnicities).

Hypothesis 1 was included to establish whether significant group and ethnicity-specific differences in reading performance existed at Time 1 (Initial Assessment)—a comparison of Time-1 and Time-2 means for groups at different baselines would pose a validity challenge. Put differently, we could only proceed with the comparison if the Time-1 means for the independent variables (Groups and Ethnicities) were at the same baseline values.

Hypothesis 2 was intended to identify whether statistically significant group and ethnicity-specific differences obtained between the levels of the two independent variables, Group and Ethnicities, at Time 2 (Progress Assessment). If they started from the same baseline (hypothesis 1), we could then determine whether statistically significant between-group differences obtained at this point.

Hypothesis 3 was aimed at a repeated measures analysis for the full cohort to see whether the full cohort had achieved statistically significant gain in a within-subject comparison of means.

Hypothesis 4 was intended to identify any interaction effects between the Time-1 and Time-2 comparisons and the levels of the independent variables, Group and Ethnicities. Descriptive statistics (means and standard deviations), analysis of variance (ANOVA) and repeated measures ANOVA were applied to address the four hypotheses.

As stated earlier, paired samples of reading scores for each of the three periods were collated for two independent variables: Ethnicities (Priority and Pākehā learners) and Group (P1, P2 and P3). Reading scale scores at Time 1 and Time 2 were the dependent variables and allowed for repeated measures analysis.

The institute has consistently pursued one hundred percent learner participation rates in LNAAT for all years. The data selection was not random, but included all reading scores for learners whose scores could be paired within each of the three periods. Sample sizes are cited in Figure 1.

FINDINGS

This section deals with descriptive statistics for the two independent variables, as well as ANOVA results for between-subject and within-subject comparisons. Figure 1 shows the means and standard deviations for the Pre-COVID-19 (P1), the COVID-19 (P2) (2020 and 2021) and the Post-COVID-19 groups (P3) (2022 and 2023):

Repeated	Group/Period	Learners	Mean /1000	Std. Deviation	N
Time-1 reading scores	P1	Priority	477.9	44.3	73
		Pākehā	469.5	48.0	46
		Total	474.6	45.7	119
	P2	Priority	477.7	39.8	54
		Pākehā	486.1	38.0	30
		Total	480.7	39.2	84
	P3	Priority	481.9	36.4	45
		Pākehā	483.2	45.0	56
		Total	482.6	41.2	101
	Total (Time 1)	Priority	478.9	40.7	172
		Pākehā	479.1	44.9	132
		Total	479.0	42.5	304
Time-2 reading scores	P1	Priority	543.0	70.2	73
		Pākehā	563.6	60.8	46
		Total	551.0	67.2	119
	P2	Priority	530.0	57.5	54
		Pākehā	538.3	68.4	30
		Total	533.0	61.4	84
	P2	Priority	544.9	53.1	45
		Pākehā	546.1	76.9	56
		Total	545.6	67.0	101
	Total (Time 2)	Priority	539.4	62.2	172
		Pākehā	550.4	69.9	132
		Total	544.2	65.8	304

Abbreviations:

P1 = Pre-COVID-19 Tailored Support & LN-embedding practices;
P2 = COVID-19 lockdowns (online support) & post-lockdown face-to-face support; as well as
P3 = Post-COVID-19 Pathways Awarua & LN-embedding practices.

Figure 1: Means and standard deviations by Group and Ethnicity for Time-1 and Time-2 reading performance.

The similarity in reading performance at Time 1 and Time 2 is clear from a visual scan of Figure 2 below. The Time-1 and Time-2 means varied by a small margin. An eyeball-scan shows that these differences within the three groups of Priority learners were at 1 percent at Time 1 and 1.5 percent at Time 2. For the three groups of Pākehā learners, these differences were at 1.5 percent at Time 1 and 2.5 percent at Time 2 for the three periods.

A between-group comparative scan of Priority and Pākehā learners' scores revealed a difference of less than 1 percent at Time 1 and 3.4 percent at Time 2. These differences are clear from Figure 2 and can be cross validated against the data in Figure 1.

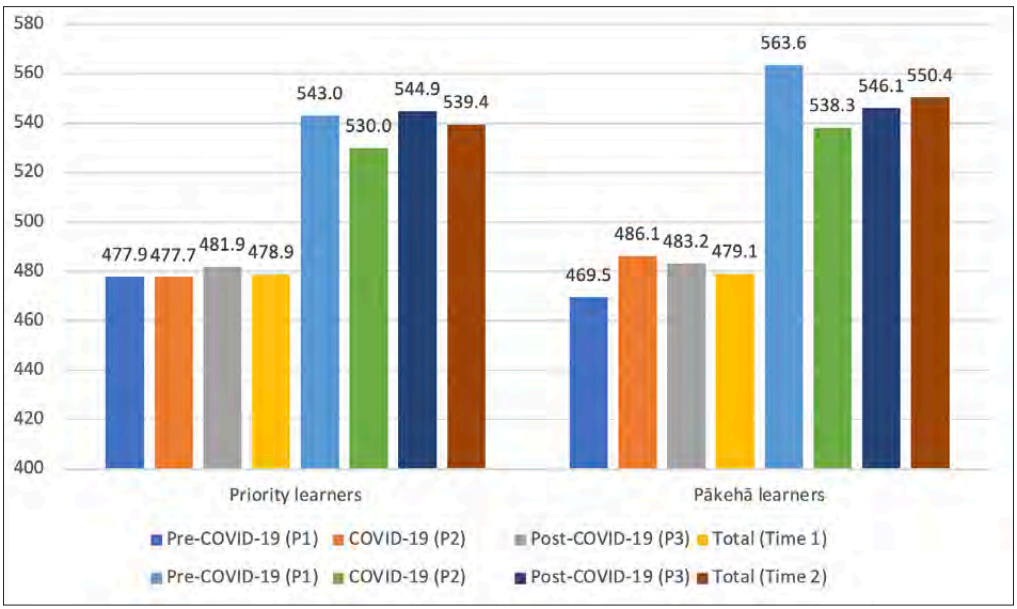

Figure 2: Means by Group and Ethnicity for Time-1 and Time-2 reading performance.

It would seem from these results that the COVID-19 lockdowns may not have had a significantly negative effect on reading scores. To explore this tentative conclusion, one-way between-subject ANOVAs were computed for the levels of Group and Ethnicities.

Between-subject comparisons for the levels of Group and Ethnicities

Neither hypothesis 1 nor hypothesis 2 could be rejected: No statistically significant differences were found for either Group or Ethnicities when Time-1 and Time-2 scores were analysed separately. At Time 1 the subjects in the three levels of group started from a similar baseline. These appear in the blocked text below:

Hypothesis 1	The differences in scale score means for the independent variables (Group and Ethnicities) at Time 1 were not statistically significant.
Statistical analysis	One-way ANOVA analyses of Time-1 means.
Findings	For Group comparison (3 levels): $F[2/301]=1.065$, $p<0.346$ For Ethnicity comparison (2 levels): $F[1/302]= 0.002$, $p<0.966$
Conclusion	No statistically significant differences in means at Time 1 were found for the two levels of each independent variable. For both independent variables, the subjects started from a similar baseline performance which enhanced the validity of the comparison.

Figure 1 and Figure 2 confirm remarkably similar starting points for the levels of the two independent variables: Group (P1, P2 and P3); and Ethnicities (Priority [Māori and Pasifika]; and Pākehā learners). Likewise, the ANOVA results for Time 2 did not yield any statistically significant differences and are cited in the blocked text below:

Hypothesis 2	The differences in scale score means for the independent variables (Group and Ethnicities) at Time 2 were not statistically significant.
Statistical analysis	One-way ANOVA analyses of Time 2 means.
Findings	For Group comparison (3 levels): $F[2/301]=1.892$, $p<0.152$ For Ethnicity comparison (2 levels): $F[1/302]=2.103$, $p<0.148$
Conclusion	No statistically significant differences in means at Time 2 were found for the two levels of each independent variable. For both independent variables, the subjects recorded progress scores that were at similar levels which meant that if they improved, differences in Time-2 means were negligibly small.

Within-group comparisons for variables Group and Ethnicities

Hypotheses 3 and 4 were investigated and the following results recorded: Hypothesis 3 could be rejected because a statistically significant difference was found when Time 1 (Initial Scale Score means) and Time 2 (Progress Scale Score means) were compared. This was clear from the repeated measures ANOVA results for within-subjects comparisons—the Wilks' Lambda value in the multivariate tests output yielded the following result: $F(1, 298)=322.312$, $p<0.000$, $\eta^2=0.52$. This statistically significant result also has practical significance, given that the η^2 (partial eta squared value) of 0.52 is far above the 0.14 cut-off value for a large statistical effect.

We rejected the null hypothesis that there was not a statistically significant difference in the within-subjects means comparison of Time-1 and Time-2 comparison computed for all learners (N=304). The results for hypothesis 3 are captured below:

Hypothesis 3	The differences in scale score means between Time 1 and Time 2 were not statistically significant.
Statistical analysis	Repeated measures ANOVA analysis of within-subjects comparison for the collective of subjects.
Findings	Time 1 vs Time 2 comparison: $F[1/298]=322.212$, $p,0.000^{*}$, $\eta_p=0.52$
Conclusion	We rejected the null hypothesis. The probability value of less than 0.1 percent and the partial eta squared value (η_p) showed that the magnitude of the difference in scores was practically significant given the value of 0.52 (which was significantly above the threshold of 0.14).

Hypothesis 4 focused on interactions: For the interaction effects, we found none for Time and Ethnicity; however, a small effect was noted for Time and Group. The magnitude of this difference was a partial eta squared value of 0.032 which is deemed small (Field, 2017). This meant that neither Group nor Ethnicities impacted on the variance in the magnitude of the difference between Time-1 and Time-2 scores. This is consistent with the earlier finding that no significant differences were present in between-subject and between-group comparisons (hypothesis 2). For consistency, these results are cited below:

Hypothesis 4	There was no interaction effect between Time and the two independent variables (Group and Ethnicities).
Statistical analysis	Interaction effects in the repeated measures ANOVA analyses.
Findings	For Time*Ethnicity effect: $F[1/302]=1.763$, $p<0.185$ For Time*Group effect: $F[2/301]=4.934$, $p<0.008^{*}$, $\eta_p=0.032$
Conclusion	No interaction effect was found in the repeated measures ANOVA between Time and the Ethnicity variable; however, a statistically significant effect was recorded for Time and Group—the partial eta value of 0.032 indicated a small effect with no practical significance (Field, 2017). The magnitude of these differences was negligible as no statistically significant differences in the follow-up pairwise comparison of the three groups' progress were found.

DISCUSSION

These results indicate that no significant between-group differences obtained when either the Group or Ethnicities variables were compared. The results for the first independent variable, Group, indicate that no differences in performance were found at either Time 1 (Initial Assessment) or Time 2 (Progress Assessment). The implication is that the three cohorts (P1, P2 and P3) started from the same baseline which means that they were relatively similar in terms of their initial reading skills. In addition, the implication is that the literacy support offered by the WTA advisors to the pre-COVID-19 (2017–2019, P1), the COVID-19 (2020 and 2021, P2) and the post-COVID-19 groups (2022 and 2023, P3) yielded similar results.

As an intervention, the effect of Pathways Awarua was not significantly different compared to the tailored, incidental support of the preceding five years (2017–2021). How learners were supported might have had an inhibiting effect: it was noted that the advisors supervised learner access to Pathways Awarua but did not systematically mediate learning on this interactive online resource. Mediation and instructional support, it was argued, could assist targeted learners to break through the "resistance level" noted earlier.

The repeated measures analysis showed that statistically significant gains had been achieved by the three groups. The significant effect size when means were compared for the full group indicates that educator and advisor LN support on offer to learners on the programme has been successful irrespective of mode of support. An effect size of 0.52 is large and significantly above the value of 0.14 mentioned in the literature for large effects (Field, 2017). No practically significant interaction effects were found for Ethnicity or Group.

Post-COVID-19 performance should be viewed in the light of the statistically significant gains achieved. This not only applies to the Group variable (P1, P2 and P3), but also to the two ethnicities in question. From an equity point of view, no statistically significant differences were found for the interaction between the reading measures (Time) and the Ethnicity variable. Figure 1 and Figure 2 show how remarkably close the means were for the two ethnicities we investigated in the separate between-groups Time-1 and Time-2 comparisons.

Our contention is that Pathways Awarua should remain the LN-development resource of choice. To break through the resistance levels we have found, educators need to be trained in systematically using appropriate interactional strategies and graduated prompts to lift learner engagement when they work on Pathways Awarua modules.

CONCLUSION AND RECOMMENDATIONS

The following conclusions were arrived at:

- For the three groups of learners (Pre-COVID-19, COVID-19 and Post-COVID-19) statistically significant gains were recorded. The high partial eta squared value of 0.52, alongside the significant probability value ($p<0.000$), meant that practically significant progress had been achieved.
- The modes of delivery associated with each group (or period) yielded similar results. At worst, one may argue that the similar means at Time 2 for the seven-year period indicate a plateauing in performance which represents a resistance level to be breached rather than stagnation.
- It is argued that this resistance level can be breached if educators and advisors are trained to mediate learners' online learning experience of Pathways Awarua modules. Mediated learning would include using prompts, asking questions, giving clues and engaging in extended sequences of interaction, as well as activating implicit, explicit and fading prompts.
- The LN-embedding practices of trained vocational educators were a constant across the seven-year period and these positive effects should be neither underestimated nor neglected.

We recommend that:

- the WTA support team and vocational educators be trained in instructional strategies to align the choice of Pathways Awarua modules and the individualised needs of learners; as well as to develop and implement appropriate instructional mediation strategies to support targeted learners.
- appropriately trained vocational educators be taken through a renew and refresh project to be reminded of LN-embedding processes and how the LNAAT and Pathways Awarua can be optimally integrated into a dynamic assessment framework.
- educators and advisors alike be strongly encouraged to participate in Ako Aotearoa training on the use of LNAAT and Pathways Awarua.
- this study be replicated once the recommendations above have been implemented.

ACKNOWLEDGEMENTS

I would like to thank Shelley Wilson, Executive: Teaching and Learning at Wintec, for her support. I am also grateful to Cheryl Belcher and her Waikato Trades Academy Team for their contribution to the project. A big thank you too to the two reviewers whose comments were on point, prompting much-needed reflection on the argument. The final version remains my responsibility.

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Article https://doi.org/10.34074/scop.4013006

STUDENT IDEATION: A PROCESS FOR CONTEXTUALISING SUSTAINABLE PRACTICE

Marianne Cherrington, Tavish Sehgal and Margo Ballesta

INTRODUCTION

The Otago Polytechnic (OP) Sustainable Practice Strategic Framework (SPSF) conveys a simple pledge to "do the right thing" (Mann & Elwood, 2009) via Strategic Objectives for Sustainable Practice (SOSP) (Otago Polytechnic, 2014). Progressing a commitment toward sustainability, the SOSP are:

- to develop sustainable practitioners (articulated for each OP field of study) (Ker, 2017).
- to model evidence-based sustainable practice in our operations.
- to encourage communities and businesses to embed sustainable practice.
- to ensure our actions benefit our communities.

Sustainable practitioners are "able to apply frameworks of sustainable practice (ecological, social, political and economic) to the context of their industry or field of study, in order to challenge existing practices and develop more sustainable ways of operating" (Ker, 2017, p. 112).

It became apparent that although the Framework specified what the objectives meant for Otago Polytechnic last decade, for Otago Polytechnic Auckland International Campus (OPAIC), it was time to re-examine what the SOSP meant from our customer perspectives, and contextually for our international campus. After two years of COVID-19 flux and rounds of online teaching, a lot had changed. What did the SOSP mean now, in terms of climate change, 'post-COVID' (Cherrington et al., 2022a)? What had changed and how?

If developing sustainable practitioners was valuable and a point of difference in the marketplace, then discovering its value-add from our students' perspective would be well worth exploring, to make learning and teaching engaging within a qualification and more meaningful as a point of difference as well as a bridge towards employment. Indeed, the SPSF is superseded by the OP Sustainability Plan 2020–2022 with the intention of *Making Sustainable Practice and Development Core Business at Otago Polytechnic.*

A project-based learning (PBL) process was used, with reflection, reflexive practice, and observations (Cherrington, 2020). The goal was to stimulate a culture of ideation and innovation via individual and group work, to create a 'product' to be used and built upon by subsequent students in any field of study. Feedback from the PBL process built continual improvement (ethics approval AIC85). The intention was a PBL product that would create continuity and tools to guide and inspire new student cohorts to become sustainable practitioners.

A PBL format was used to allow an organic development of a tool or product for sustainable practice that was made by and for learners and fledgling sustainable practitioners. The context was the environment on campus, in an organisation growing commitment to making sustainable practice and development core business (Cherrington, 2019).

PROJECTS VERSUS PROJECT-BASED LEARNING

A project can be a common yet superb way of scaffolding learning and building capabilities; projects are quite different than project-based learning approaches (Bredenkamp et al., 2022). At OPAIC, we are more accustomed to projects than PBL and creation of a project from that learning approach. We used Figure 1 to summarise the key differences between projects and PBL (Maros et al., 2021).

Project approaches	**A project-based learning approach**
-are outcome focused	-is focused on the process
-are teacher-directed	-is student-directed
-can be completed autonomously	-needs collaboration and teacher facilitation
-often lack real-world context	-is founded on real-world experiences and issues
-occur after the teaching and learning	-produces real learning throughout the project
-have projects that lead to the same goal	-creates a student-choice pathway to outcomes

Figure 1. Project versus project-based learning approaches.

Project-based learning is an active, student-centred method of instruction that emphasises students' autonomy, constructive investigations, goal setting, cooperation, communication, and reflection in the context of real-world activities (Cherrington et al., 2021a). It has been studied in a variety of settings and at various levels of education, from primary to higher education (Kokotsaki et al., 2016).

Project-based learning is a new way of learning that utilises a variety of skills essential for success in a contemporary workplace (Bell, 2010). It is meaningful when two conditions are fulfilled. Firstly, learners must see the undertaking as *personally significant*, with tasks that are important to them, so they are motivated to complete the PBL successfully to meet instructional aims. The second condition for meaningful work is e*ssential purpose*; this is met by exposure to authentic learning experiences. In a project-based learning environment, a teacher explicitly teaches and assesses these skills, and students are given numerous opportunities to practise and assess themselves (Larmer & Mergendoller, 2010).

A PBL approach allows students to build capabilities such as cooperation, communication, critical thinking, and technology use, all of which will benefit them in the workplace and in life. These are the specific capabilities that our industry partners are seeking of our graduates. Project-based learning that is well-designed and implemented should build multiple capabilities as the conditions are met (Larmer & Mergendoller, 2010).

Project-based learning is often regarded as a viable and superior alternative to traditional teacher-led instruction. It has a strong positive influence on students' academic achievement when compared to traditional schooling (Chen & Yang, 2019). It is not that project-based learning will totally replace traditional schooling; rather, PBL is valuable in the dynamic environment in which workplaces exist.

When students work together to solve and analyse a problem (Tsybulsky & Muchnik-Rozanov, 2019), then present their findings to an audience (in class, in research forums, or in conferences), it allows them to retain the information and gain the skills they will need in the future (Chen & Yang, 2019).

Project-based learning problem-solving processes support critical thinking, cooperation, issue resolution, interpersonal communication, information and media literacy, and leadership (Chu et al., 2017). The process is creative, flexible, and original (Duchovicova et al., 2019). It also aids in the development of students' abilities,

skills, attitudes, and values, allowing them to comprehend global difficulties in a rapidly changing global economy (Zat'ková & Poláček, 2015). Self-education is a component of project-based learning, which encourages students to take ownership of all parts of their work (Klopfenstein, 2003).

Project-based learning also allows for a deepening and expansion of comprehension, the integration of learning into a full system of knowledge, and the realisation of knowledge's meaning and purpose. Students learn to work independently and collaboratively, creatively planning and completing their work, because the students direct the process. Students take greater responsibility for their work, and overcome obstacles to work with information, present their own work, and correctly express themselves.

It is not that PBL is a quick and easy exercise. However, within a PBL process, students typically justify their choices and will develop a deeper understanding and profound acceptance of other opinions and perspectives as they evaluate their own and others' work (Klopfenstein, 2003). Project-based learning can be a valuable instrument for engaging in the interpretation of educational content and acquiring new knowledge, as well as the development of personal characteristics necessary for collaborating with others and resolving problems (Chmelárová & Pasiar, 2017). It can lead to student mobilisation.

EMBEDDING SUSTAINABILITY

Otago Polytechnic has sustainability embedded in its papers or as indicative content. At OPAIC, the United Nations Sustainable Development Goals, also known as Global Goals (United Nations, 2021), form our framework for sustainable development; they are commonly used in organisations worldwide. OPAIC took a broad definition of sustainability, from creating campus projects to reduce our emissions, to researching and publishing topics about sustainability, to creating Green Office Toitū, which progressed student-based organisational actions that were aimed at mitigating climate change (Bredenkamp et al., 2022).

For applied management students studying Contemporary Issues in Organisations, PBL was used as a tool to explore and re-contextualise Strategic Objectives for Sustainable Practice at OPAIC, in much the same way that most organisations are exploring the practice of sustainability in their workplaces and operations. As a COVID-survival mode gives way to growth strategies, sustainable practice, embedded in all that we do, will further evolve how we do things. There can be no excuse for burning the planet. Emissions continue to rise; the planet is still heating. As avid practitioners of sustainable development, we must decarbonise the economy, urgently (Masson-Delmotte et al., 2021).

From an economic perspective, organisations must always consider the allocation of scarce resources. As our planet becomes more stressed and depleted, resources become constrained; organisations and the people they serve will suffer (Manate & Cherrington, 2021). This is why many organisations begin their sustainability journey by reducing waste in any form. Even simple policies can mitigate impacts and vulnerabilities to climate change, to support adaptation needed for our planet (Pörtner et al., 2022).

By re-examining SOSP for activation at OPAIC, the information and knowledge gained via project-based learning supports the development of sustainable practitioners. The PBL product developed can be activated, then enhanced by new student cohorts, who re-imagine and evolve sustainable practice in any field of specialisation, through the strategic objectives for sustainable practices.

CREATING WORTHWHILE PROJECT-BASED LEARNING

Project-based learning can be built into curricula, or integrated into learning environments in a variety of ways. Teachers must change their roles from directors to facilitators of learning and build their own PBL approaches, which tolerate ambiguity and 'noisy' activity in the classroom (Condliffe et al., 2017). New classroom management skills will be needed to effectively support student learning and the prudent use of technology (Pace et al., 2020). Teachers must trust and believe that their students are capable of learning effectively using this method.

Five components should be activated for successful PBL learning (Larmer & Mergendoller, 2010):

1. **Create a legitimate question** using clear, compelling language to provide students with a sense of purpose and challenge. It should be provocative, open-ended and linked to the essence of what you want pupils to understand; there should be sufficient complexity to create debate without the extremes of disharmony or apathy (Krsmanovic, 2021).
2. **Student choice and participation** develops student ownership over a project; the more voice and choice they have, the better. Devising projects that allow students to choose options appropriate for their style of learning should reflect key cultural and contextual considerations. Learners can choose what topic to study within a general driving question or how to design, create, and present products. To avoid ambiguity or a sense of being overwhelmed, limited-choice tactics can be set, such as presenting a limited menu of innovative product options to guide and focus activities (Owston, 2018).
3. **Innovation and genuine inquiry** can be activated in PBL environments where students follow a path that begins with their own questions, leading to a search for resources and the discovery of answers. This journey frequently ends with the generation of new questions, the testing of ideas, and the drawing of students' own conclusions. True inquiry leads to innovation via a fresh answer to a burning topic, a new product, or a problem-solving solution created by an individual. Students gain fresh insights, encouraged by techniques of questioning, hypothesising, and receptivity to new ideas and viewpoints. These mind-sets are valuable in the classroom and in the workplace (Albrahim, 2020).
4. **Revision and feedback** should be formalised procedurally. This can be done by bringing the class back together on topic. Support and specific feedback stress the value of producing high-quality products and performance. Students must understand that first attempts often lack quality; editing is part of the process, and an inevitable part of real-world employment. As PBL will connect to learning outcomes, students should be educated on how to analyse each other's work using rubrics or other sets of criteria. Adult mentorship can also be used to provide input and perspective, which is extremely relevant to pupils (Lee & Galindo, 2021).
5. **A product displayed in public** becomes more meaningful. When students show their work to a live audience, they are more concerned with the quality of their work. This approach creates legitimacy and develops authenticity. Students not only build capability and replicate professional duties, they can build real-world products that are used by people inside or outside of school (Cherrington et al., 2021b).

THE STRATEGIC OBJECTIVES FOR SUSTAINABLE PRACTICE PROJECT-BASED LEARNING PROJECT

At OPAIC, a Contemporary Issues in Organisations class used a series of in-class experiential exercises to explore the SOSP and what they meant to our campus (Chawla & Cherrington, 2020; Ganeshan et al., 2021). As the 2022 academic year began, the exercises began solely online due to the COVID-19 campus closure. Group exercises explored all four SOSP sequentially in online class-based chats. To focus the learning, each group chose one of the SOSP to collate and explore in depth. This was supported by a project-based learning process, which ran as a continual thread throughout the term. Project-based learning was used to add value to the student learning.

The extensive student discussions, reflection and examination of assumptions using reflexivity were also supported by a senior project student who collated key insights. The PBL process led to ideation and a simple product in the form of an SOSP bullet-point process diagram that could be used and developed further by subsequent student cohorts in any field of study. Note that:

- students at first struggled with the difference between projects and project-based learning.
- students enjoyed the experiential nature of PBL, with their suggestions in the process.
- students needed help to create the product 'forgetting' the tangible output required!

The product was utilised and further refined at as series of campus-wide workshops at OPAIC during Campus Sustainability Week in term 2, 2022. The PBL product became more detailed in four session topics:

1. Greenwashing versus Green-blushing, as corporate communication.
2. Sustainability for Employability, as a transition from OPAIC to the 'real world.'
3. Innovating for Impact, as projects that could begin in students' sphere of influence.
4. Climate Change Action, as defined by the students.

AN INNOVATIVE, PROJECT-BASED LEARNING APPROACH TO IDEATION

Ideation requires some imagination, but it must be structured to draw out the required learning objectives. For PBL, we used back-casting as a tool of innovation to activate and ideate towards sustainable development and actionable recommendations (Delaney, 2015). Back-casting is also a common and efficacious future-thinking applied management tool, used to illuminate "global vision" perspectives for tailored strategic solutions (Kumar, 2012).

By first envisioning a scenario or reality worthy of achieving, a baseline analysis can be created for possible solutions that can be prioritised for action (Kumar, 2009), as in Figure 2. The Sustainable Development Goals (United Nations, 2021) were used as our framework for sustainable development and, in this case, also as a visionary blueprint to guide PBL. We realised that brainstorming alongside a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis (as a snapshot in time) could shift mind-sets for new modes of sustainable practice in light of climate change, by viewing threats as opportunities (Zhukov & Cherrington, 2020) and by transforming weakness to strengths in our conversational environment (Zaffron & Logan, 2011). The SWOT analysis became part of a structured approach to drive an innovative PBL approach that generated discussion and built buy-in (Kumar, 2012).

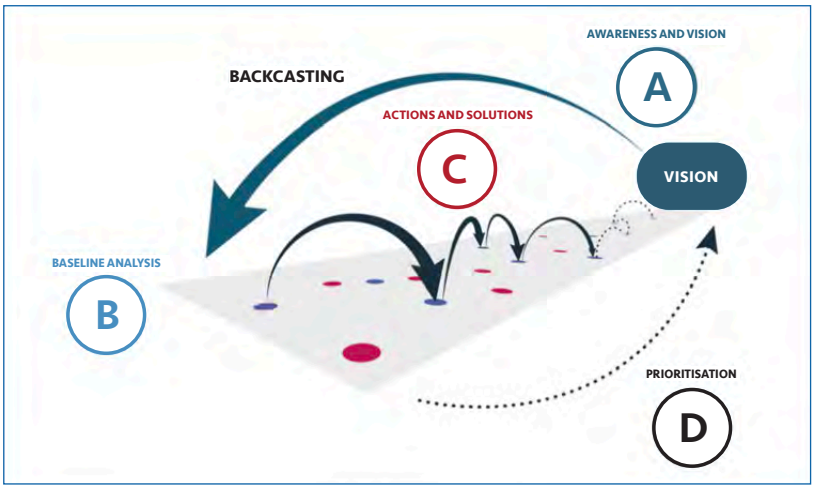

Figure 2. Back-casting from a vision of the UN SDG framework.

An interesting student insight is that, with SWOT analysis and back-casting, sole-proprietorships or small SMEs can produce tailored approaches to act on climate change and emissions reduction for more sustainable operations, even for very specific project-based work (Naviza et al., 2021). Open PBL discussion closed knowledge gaps that can sometimes stymie action.

Innovation can recalibrate risk and accelerate strategy. A seven-step innovation process (Figure 3) can begin with brainstorming or any step in an iterative loop (Kumar, 2012) to realise a PBL product.

Sense Intent	Know Content	Know People	Frame Insights	Explore Concepts	Frame Solutions	Realise Offerings
• Foundation • trends • vision	• Research • tangible • understand	• Research • testing • understand	• Analysis • abstract • observation	• Synthesis • abstract • principles	• Synthesis • abstract • make/create	• Realisation • viable plans • communicate

Figure 3. An iterative process for innovation (Kumar, 2012).

TECHNOLOGY, CREATIVITY AND A PROJECT-BASED LEARNING PRODUCT

Students can experiment with multiple technologies within the project-based learning process by using technology as a means rather than an end. As technology taps into student familiarity with computers, real usage of technology can build engagement. New technology plays a vital role in the learning and teaching milieu as hybrid teaching methods have shown (Nancy et al., 2020). Students can utilise a variety of technologies to display their understanding during the presenting and communication phases.

Not all technology need be computer-based or disruptive. Technological improvement can be realised via process innovation, creating new opportunities from the cheap/fast/good trade-off (Mehl & Fose, 2016) using existing technologies alongside mentorship. Traditional quality processes are based on reducing waste and continual improvement through "Plan > Do > Check > Act" cycles (Deming, 2018). Embedding sustainable practice can transform using continual improvement SOSP processes for OPAIC, as a form of continual communication in

and between terms of student cohorts (Figure 4). Furthermore, SOSP processes can be tested and refined through scholarly peer-reviewed submissions and conference presentations within topic specialisations (Ministry of Education, 2022).

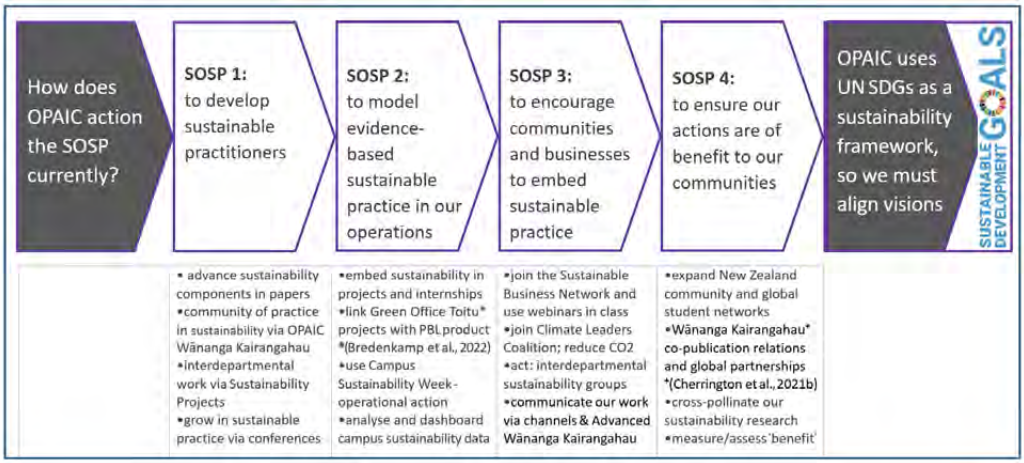

Figure 4. PBL Product: SOSP contextualised as a back-casted, bullet-point process (Version 2).

To have the potential to meet all four SOSP, OPAIC actions must begin with creating sustainable practitioners, who can support sustainable operations within a campus. To that end, the embedding of SOSP in every course within an OP qualification was a thoughtful, mandated process, but it cannot stop there. The true test of our actions will be to extend SOSP 1 and 2 beyond our campus.

Activating SOSP 3 and 4 would benefit businesses and communities, especially after pandemic challenges; climate action could gain momentum with sustainability frameworks (Salahi & Smith, 2021). Our practice of collecting, analysing and responding to feedback from staff and graduates can expand throughout our international networks. Yet, already, our SOSP process product has evolved and progressed mind-sets and potentialities for SOSP activation (Cherrington et al., 2022b). The product works as a means of activating and updating SOSP on campus.

CONCLUSIONS AND FUTURE WORK

Project-based learning is an important method for developing independent thinkers and learners. It is a natural method, where problems evolve through self-enquiry, learning progression and research. The use of a variety of learning tools to solve real-world challenges helps to motivate novel, innovative and creative approaches to learning, while obtaining vital skills needed for succeed in our global economy (Rieckmann, 2018).

In the future, we will not only be judged by future generations on our results, but on equitable sustainable development. This will require the ability to think critically and to collaborate, negotiate, and plan with leadership. By using PBL, we may better equip our students to confront the challenges of the twenty-first century with confidence and a repertoire of abilities they can employ effectively. Project-based learning projects can be a simple, evolving process (Figure 4) but can also frequently create stunning, enormous enterprises designed and presented with the utmost pride and attention.

The PBL exercise reimagined what sustainable practice could mean for our next generation of OPAIC sustainable practitioners, especially in the context of this new dynamic era. Future work will involve integrating our PBL product in interdepartmental learning and campus sustainability initiatives from term to term to create updated versions that scaffold a new appreciation of what the development of sustainable practitioners can mean in the context of the businesses and communities we serve. The answers will unfold between the blurred lines of work and teaching and learning.

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THE POWER OF REFLECTION IN IT PROJECT MANAGEMENT: REFLECTIONS ON BRIDGING THE THEORY-PRACTICE GAP FOR PRE-DEGREE STUDENTS

John Mumford

INTRODUCTION

Pre-degree Information Technology (IT) students take a core course in Project Management as part of the New Zealand Certificate in IT Essentials, a staircasing pathway to degree studies at the Southern Institute of Technology (SIT) | Te Pūkenga. Project management skills form an essential component of the professional development of IT undergraduates, especially as they relate to compulsory, management-related papers in the Bachelor of Information Technology. This paper on project management essentials helps students navigate the basics of project management as it relates to IT projects by completing theoretical and practical assessments. The outcomes for this paper include the application of project management tools and methodologies, applying professional and ethical principles to comply with IT-related law, and developing communication skills.

Over the years, a significant body of knowledge has been developed and widely accepted as the Project Management Body of Knowledge (PMBOK) (Amaro & Domingues, 2022, p. 1878). It is common for topic material to be based on business contexts, with a natural focus on economics. In more recent years, with the establishment of IT across almost all sectors of modern life, the need for commercial software system projects to be prudently managed has become very important. Another leading methodology based on process management, particularly for IT projects, PRINCE2 (Project in Controlled Environments), is also a vital foundation for teaching IT project management. PRINCE2, like PMBOK, utilises time, quality and cost constraints (Pawar & Mahajan, 2017, p. 190). Software project management skills are useful in any area of IT and especially with the use of Agile methodologies, such as Scrum and Kanban (Kremer-Herman, 2022, p. 49). Scrum involves sprint review meetings where "the customer or stakeholder verifies the work and declares and distinguishes the completed and incomplete work or work that needs to be improved" (Bhattarai et al., 2020, p. 4). PRINCE2 also has a process which has some similarities to Scrum. "Manage Stage Boundaries is another process where board of the project makes review of all the work in various stages. In this process the stages are evaluated and recommendations are given either to go ahead or not" (Bhattarai et al., 2020, p. 3).

This reflective piece outlines the teaching of a lesson on IT project management, students' responses to the teaching session, teacher reflections on the constructivist approach, and the incorporation of the students' reflective elements within the context of a New Zealand Certificate in IT Essentials Project Management paper.

CONTEXT AND CONTENT

In the context of IT education at tertiary level, computational thinking includes several aspects that can be linked to project management. Doleck et al. (2017, p. 359) identify five computational thinking competencies: algorithmic thinking, cooperativity, creativity, critical thinking, and problem solving. Teaching IT project management with

an emphasis on generating IT solutions as an application of problem solving, the project management essentials course aims to make recognised project management content as relatable as possible, given the sometimes large-scale application examples used to illustrate it. The gap between project management content and the real aims and aspirations of IT students can make the subject seem relatively dry and irrelevant. Students who experience teaching and learning contexts from personal perspectives are likely to gain deeper appreciation of the interconnectedness between project management theory, according to PMBOK and PRINCE2, and their lives.

IT PROJECT MANAGEMENT LESSON

The session occurred on a weekday morning in the classroom with three students. The class comprised a small group of adults with varying prior knowledge of computing and use of information technology in business contexts. This was an opportunity to draw on the students' previous work and life experiences as we navigated our way through the course. For example, a student who had recent work experience in IT helpdesk support would have familiarity with the timeframes for helpdesk job resolutions, the time and financial constraints, the allocation of resources, and actions to be taken to meet stakeholders' expectations. In this way a prior understanding of the need for IT project management has already been developed. Mature learners would be returning to education after some years in the workforce and perhaps had never dealt with this topic in a tertiary academic context. The material was presented with a questioning approach from the beginning, to enhance student engagement and make theory and practice more logically and personally connected. Students more familiar with IT and building software solutions, often as part of computer gaming interests, would be acquainted with the set of tasks and processes needed to achieve their goals, within certain time and money constraints. These students might also have to revisit why one would need to know about IT project management. It is not uncommon for IT students to assume that they will mainly be computer programming, with perhaps a relatively small amount of time required for other subjects. Ivory et al. (2024) found that "broadly speaking, students are seen to hold misconceptions about soft skills, and typically prefer to prioritise technical knowledge acquisition over soft skill development, which is particularly evident for students with technical career aspirations" (p. 4). Agile methodologies such as Scrum involve Sprint Review and Sprint Retrospective, which can offer substantial reflective opportunities for the software development teams (Schwaber & Sutherland, 2020, pp. 9–10).

The kanohi-ki-te-kanohi (face-to-face) lesson commenced with a greeting: Tēnā koutou, tēnā koutou, tēnā koutou katoa (Welcome everybody). The learning goals and structure for the session were laid out on the whiteboard, the tutor ticking off each stage of this schedule as they were completed. The main parts of this lesson were arranged into four sections.

The first section involved asking the class: what is a project? In addition, the students were requested to spend a few minutes writing down some brief notes about an example of a personal 'project' from their everyday situations. After an appropriate timeframe for reflection, the students' verbal responses were shared, and this prepared the class for building on prior knowledge and making connections between the course theory and real life. The resulting perceptions, defined in their own terms, related well to an official definition of a project. The Project Management Institute (PMI) defines a project as "a temporary endeavor undertaken to create a unique products, services, or result" (2024, para. 1). The key phases of project management typically include initiating, planning, execution, monitoring and controlling, and closing (Roseke, 2017). These phases were then presented, and class discussion developed. Questions were raised about the need to distinguish between the various project management phases, which naturally led into the second part of the teaching session.

The second section involved the core learning activity for this lesson, which involved a mapping of the key project management phases to the student's personal project example. As discussion ensued, broad agreement was reached between the formal project management content and everyday life. Since the students' project

examples were drawn from their home and work lives, separating each part of the project management phases from each other proved challenging. Some students observed that the phases in small projects almost seemed to merge into each other, since their activity had been mentally pre-planned, and implementing this informal notion of a plan was all that mattered. Upon deeper and more deliberate reflection, the separation between the project management phases became more evident to the students, which was signalled as a relevant and very worthwhile activity. For certain individuals, this retrospective process produced those "aha" moments of clarity, thus reducing the perceptual distance between the course theory and their everyday lives. Valuing and drawing on students' existing knowledge, experience, and identity is a key principle in effective teaching (Ministry of Education, 2018). In addition, constructivist learning theory is based on the premise of building knowledge through joining new knowledge with what students already know (Bada & Olusegan, 2015, p. 66).

The third section of the lesson involved asking the students to take this initial reflective activity a step further, by starting to draw on the content and activities in the other papers of the course. This was a way of broadening their perceptions of projects and project management. One of the papers, Developing Computer Applications, focused on a software development life cycle and programming tasks. The second paper focused on Information Technology and Systems Essentials. This paper dealt with systems analysis, database and hardware skills. The session involved the tutor asking questions about what topics students were studying in their other IT essentials courses, and how these might relate to the key phases of project management. This initially proved somewhat challenging to the students. As they were provided with ample one-on-one time with the tutor, the connections between their life experiences, project management, and other topics started to develop. Working alongside each student evoked some very thoughtful reflections and responses, reducing the stress of trying to find or construct an example project to complete the class activity. In addition, this enhanced the student's appreciation of the qualification's unity, despite the range of topics taught by different tutors.

The fourth section focused on reviewing and summarising the key points of the lesson. This involved the tutor reviewing the main concepts and project management terminology presented. The students were invited to share their perspectives on how meaningful the session was, which aspects of the session were easier than they had expected, and which parts were more challenging than they had initially thought. Some final class discussion ensued with a recognition of the benefits of reflection in relation to IT project management skills instruction. Finally, as the lesson concluded, the students acknowledged the benefits of reflecting on the reflective process necessary for effective teaching sessions. Absalom and De Saint Léger (2011) identify the benefits of multi-level reflection in enhancing student engagement.

CONCLUSION

Institutes of technology focus on vocational education and training. IT courses and qualifications aim to develop technical and interpersonal skills for further study or employment. The facilitation of deep reflection in teaching and learning at SIT encourages students to challenge themselves and their often-hidden assumptions about the relevance and value of the topics they study, the concepts that are needed for a strong grasp of IT principles, and the dispositions that accompany them. This piece has outlined a constructivist teaching and learning approach with personal reflection foregrounded, and made reflections on various perspectives about the connections between project management and everyday life. The students gained added value of developed reflective skills to take with them on their academic or employment journeys. All of the small group of students graduated. Informal feedback from other tutors who teach the higher levels of IT project management within the Bachelor of IT can confirm that the students who took the project management essentials paper adapted more quickly to the more advanced papers than their peers who had direct admission into the degree. This course prepared its students for project management courses in undergraduate studies. Thus, the students could build on these foundations when navigating Agile methodologies and more advanced project management content. The students used the power of personal reflection on their work and life experiences to make meaningful connections between everyday projects and their IT project management course.

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VARK IS A FOUR-LETTER WORD: ABANDONING UNIMODAL APPROACHES IN FAVOUR OF MULTIMODALITY WHEN DESIGNING FOR LEARNING

Amy Benians and Terri Brian

Enduringly popular, learning styles frameworks that categorise learners according to their preferences for particular modalities lack scientific and pedagogical grounding. Although it appeared that Tracey Tokuhama-Espinosa's 2018 book, *Neuromyths: Debunking False Ideas About The Brain* signalled the end of learning styles as educational models, experienced educators still seek to apply them, both as learning design frameworks and to describe learning preferences amongst their diverse learner cohorts. This often results in the attempt to provide unimodal instruction based on perceived learner preferences or to differentiate learning material by providing it in multiple formats (auditory contents for auditory learners, visual materials for visual learners, and so on). In this article, we will argue that learning styles frameworks (specifically, the VARK model) have been misappropriated from their original intention and that such unimodal approaches are generally ineffective, often promoting harmful teaching practices and limiting learners. Numerous reviews have examined learning styles and have found a lack of evidence to support their continued use in education (for example, see Coffield et al., 2004 for a systematic review). This article rejects learning styles as educational and learning design models in favour of more contemporary, evidence-based, multimodal approaches such as dual coding, multimedia learning theory, and Universal Design for Learning (UDL).

FROM NEUROSCIENCE TO NEUROMYTH

Historically, there has been widespread interest in the application of neuroscientific research findings to educational practice. The field of neuroscience is complex, however, and the accurate transfer of research findings to an educational context is often difficult. This has enabled many misconceptions to occur (Ansari et al., 2011). In 2002, the Organisation for Economic Co-operation and Development (OECD) raised concerns with regards to these misconceptions and the resulting proliferation of so-called "neuromythologies" (OECD, 2002, p. 43). The influence of these myths in education is seen to be problematic because it wastes resources which could be better spent on the development of evidence-based practices (Pasquinelli, 2012; Sylvan & Christodoulou, 2010). As an example, learning styles theory promises improved academic performance based on the identification of individual modality preferences for informational processing. This promise is not supported by evidence, and contrasts with current understandings of the neuroscience of learning. Research shows, however, that despite a lack of evidence, belief in the learning styles neuromyth remains high globally amongst educators of all levels (Newton & Salvi, 2020). The perspective of modality-specific learning styles, as with other learning-style taxonomies, is in principle a 'type' theory; that is, learners must be classified according to their learning preferences, and this information is then inappropriately used for making instructional decisions (Aslaksen et al., 2020).

A BRIEF HISTORY OF LEARNING STYLES

The evolution of learning styles as a type theory can be traced from the post-war period when psychologists such as Kurt Lewin and colleagues conceptualised 'styles of thinking.' In so doing, they attempted to categorise the human population into groups with distinct cognitive styles that predicted certain personality traits. By the 1960s, educational psychologists had started using these cognitive styles to predict individual learning abilities. More recently, the widespread application of personality assessments such as the Myers–Briggs test has promoted the development of type-based learning-style assessments (Lake et al., 2019). Over time, two general categories of theoretical models of learning styles have emerged: those based on learners' sensory modality preferences, such as VAKT (Visual, Auditory, Kinesthetic, and Tactile) (Dunn & Dunn, 1989) and VARK (Visual, Auditory, Reader/Writer, and Kinesthetic) (Fleming & Mills, 1992); and those based on cognitive preferences for processing new information, for example Kolb's (2014) Learning Style Inventory. The sensory modality learning style inventories dominate in the current educational landscape, and we will therefore focus the following critique on the VARK model.

THE VARK MODEL

Developed by Lincoln University academics Neil Fleming and Colleen Mills, VARK was initially intended as a metacognitive tool and as a "catalyst for reflection" for use by both learners and teachers (Fleming & Mills, 1992, p. 137). The 16-item questionnaire attempts to assist learners to identify their sensory modality preferences and, in turn, to encourage openness to adopting other learning strategies. According to the VARK website, the results of the questionnaire are intended to "indicate a 'rule of thumb' and should not be rigidly applied. The questionnaire is not intended to 'box' [learners] into a mindset that [they] have been 'diagnosed'. Rather, it is designed to initiate discussion about, and reflection upon, [their] learning style – metacognition" (VARK Learn, n.d.). Advocates suggest that when used in this "metacognitive fashion" (Fleming & Mills, 1992), VARK can encourage self-reflection, and form the basis for developmental conversations. Fleming and Mills (1992) comment that "students find [VARK] provides a framework that is consistent with their rational, intuitive notions about how they address information in learning situations. They therefore have no difficulty accepting the notion that adjustments ... in accordance with their modality preferences ... could benefit their learning effectiveness" (p. 145). This suggests that learners can use knowledge of their sensory modality preferences to enhance learning effectiveness, adapt their learning strategies, and focus on strengthening areas of perceived weakness (Felder, 2020; Syofyan & Siwi, 2018).

Learning styles proponents have advocated that, if applied as frameworks for learning design, they can be used to plan and deliver instruction to match learner preferences (Felder, 2020; Kolb & Kolb, 2018), and to focus teaching on strengthening the modalities in which learners are weaker (Fleming & Mills, 1992; Syofyan & Siwi, 2018). Zhou (2011), for example, suggests that deliberate mismatching of learning styles and teaching methods should help learners "learn in new ways and to bring into play ways of thinking and aspects of the self not previously developed" (p. 76). Also worth noting here is Fleming and Mills' (1992) acknowledgement that it is "simply not realistic to expect teachers to provide programmes that accommodate the learning style diversity present in their classes" (p. 138).

WHAT IS THE PROBLEM WITH VARK?

The idea that learning can be improved if learners are classified and taught according to their preferred VARK learning style is based on over-simplistic neuroscience research findings, namely that visual, auditory, and kinesthetic information is processed in different parts of the brain. These separate networks, however, are highly interconnected, and there is profound cross-modal activation and transfer of information between sensory modalities (Calvert et al., 2000; Murray & Shams, 2023). It is incorrect, therefore, to assume that only one

sensory modality is involved with information processing (Aslaksen et al., 2020). The suggestion that learning and teaching methods should be adjusted to match a learner's preferred sensory modality arose largely from Dunn and Dunn's (1989, 1992) idea that learning preferences are biologically determined and fixed, limiting the ability of learners to adjust to other modalities. Dunn and Dunn argue that, for this reason, the style of instruction should be matched to the learner's preferred modality and predict that, if learning is designed in this way, it will be beneficial to learning. The notion of matching instruction to the learner's preferred sensory modality is described by Pashler and colleagues (2008) as the "*meshing hypothesis*." On initial inspection, modality-specific instruction *appears* to be supported by a multitude of small studies that have amassed a body of evidence. However, few of these studies have applied an appropriate research design, and there is no supporting evidence for the meshing hypothesis (Cuevas, 2015; Kavale & Forness, 1987; Pashler et al., 2008). Subsequent more carefully-designed studies have also not produced supporting evidence in support of learning styles and, instead, suggest taking an entirely opposite multimodal approach (Aslaksen and Lorås, 2018; Cuevas & Dawson, 2018; Newton & Salvi, 2020; Rohrer & Pashler, 2012). However, an educator who may see learning styles as "a good thing" will find an abundance of educational articles favourably reporting the use of learning styles. Newton (2015) concluded that if an educator were to seek out articles that reinforce their existing beliefs, without a critical review of the literature, this confirmation bias would perpetuate both their beliefs and the use of learning styles in education, despite a lack of evidence for any improvements in learning.

Are VARK learning styles actually harmful to learning? These learning preferences are often conflated with learning ability, yet merely provide an oversimplistic means of categorisation. By labelling a student using some observable features, a number of other features are often incorrectly inferred (Willingham et al., 2015). Scott (2010) argues that educators who label and define learners with a fixed learning style may engage in harmful stereotyping behaviours that can perpetuate cultural differences and inequities. Equally, a learner may use them to blame external and uncontrollable elements for their lack of success: "I'll never do well in this subject"; "It's the teaching style or delivery method"; "I can't change my style" (Willlingham et al., 2015). Tokuhama-Espinosa (2018) also argues that learning styles can have a negative impact if a learner adopts a fixed idea about their learning style. For example, the 'visual learner' may avoid or disengage with music, podcasts, or webinars, while the 'auditory learner' may avoid information presented graphically. Similarly, learners may also develop a false sense of confidence in their ability to master subjects which they perceive to match their preferred learning style (Khan et al., 2018). Interestingly, a study by Breckler et al. (2009) found that, after completing the VARK questionnaire, only 15 percent of respondents were able to accurately predict their preferred modality. This suggests that how a learner thinks they learn best does not typically match with how their VARK results predict they should learn. Contrary to the metacognitive hypothesis, these perceptions are all "detrimental to motivating learners to feel empowered in taking control of their own learning" (Yan & Fralick, 2022, p. 63).

MULTIMODAL ALTERNATIVES TO VARK

Although learners may naturally prefer one modality over another, it seems there is currently no reliable evidence to support the use of VARK as a tool to improve educational outcomes. Rather, a pedagogical shift towards integrating multimodal learning experiences is more likely to support and enhance learning (Khan et al., 2018). Multimodality reflects the many ways in which we process information, communicate, and express ourselves, and is a powerful means to customise learning. It requires learners to engage with new information in a sense-making process, creating deeper learning opportunities (Bezemer & Kress, 2016), and extends the available options so that learning can be constructed via one modality, while also interweaving the use of others (Nouri, 2019; Phuong et al., 2017; Sankey et al., 2010).

According to Clark and Mayer (2023), in simple, laboratory-based contexts, presenting information in more than one modality results in a strong positive learning effect through better encoding and retrieval of memory. Similar benefits are also seen to occur in "naturalistic contexts" such as learning people's names, where faces and

written names tags provide visual support for auditory stimuli (Murray & Shams, 2023). As supporting evidence, Calvert and colleagues (2000) have shown the existence of "cross-modal" integration areas in the brain that receive information from both auditory and visual processing systems. Not only do these areas light up in brain scans when auditory and visual information are concurrently delivered, they compare, contrast, and check for congruency of auditory and visual stimuli. Aslaksen et al. (2020) reason that from this integration, transfer, and exchange of information between sensory modalities, the brain emerges as a highly plastic, interconnected, and dynamic network during learning. It follows that it is therefore incorrect to rely on only one sensory modality for learning. In a study by Sankey et al. (2010), learners reported favourably on the inclusion of multimodal learning elements, perceiving that these assisted with comprehension and retention of content, and indicating that learning materials were more engaging and easier to use. Although the study was unable to prove a positive learning effect as a direct result of the inclusion of multimodal representations, Sankey et al. (2010) conclude that careful consideration should be given to their incorporation as a means of improving learner engagement, progression, and retention. Given the evidence, the increased opportunity for communication in multiple modes, and the contemporary educational landscape, a strong case appears to exist for designing and delivering multimodal, rather than unimodal, learning experiences (Bezemer & Kress, 2016; Bouchey et al., 2021).

DUAL CODING AND THE COGNITIVE THEORY OF MULTIMEDIA LEARNING

Dual coding theory is a theory of cognition suggesting that the brain processes information along verbal and non-verbal channels. It predicts that better learning will occur if visual information is overlaid with auditory information, and that working memory capacity will be increased when information is received through both the eyes and the ears. This is because it is processed separately by visual and auditory processing centres, each of which is presumed to have a separate working memory compartment (Hodes, 1998; Paivio, 1990). Cuevas and Dawson (2018), whose research found no support for a unimodal approach to instruction, present evidence instead for dual coding as an instructional tool. Participants in their study were verbally presented with the same 20 statements and instructed to remember these by either creating a corresponding mental image, or by focusing on the sounds of the words. It was found that better learning occurred for those learners able to combine both visual and auditory information. Cuevas and Dawson (2018) reason that this provides strong evidence for dual coding theory as an instructional approach. A study by Constantinidou and Baker (2002) also found that presenting visual images with an accompanying verbal list helped all learners with recall, regardless of their preferred modality. They claim this is an example of the "picture superiority effect," and that it is therefore better not to rely on learning through unimodal auditory presentations such as lectures and discussions.

Mayer and Moreno's (1998) Cognitive Theory of Multimedia Learning (CTML) is an extension of dual coding theory. It is based on three assumptions about how information is processed in the brain: the dual-channel assumption, the limited-capacity assumption, and the active-processing assumption. The dual-channel assumption, as dictated by dual coding theory, suggests that visual and auditory information are processed via separate channels. The visual-pictorial channel processes images seen through the eyes, and the auditory-verbal channel processes spoken words. The limited-capacity assumption suggests that there is a limit to the amount of information that can be processed at any one time and the active-processing assumption suggests that learning takes place via active cognitive processes whereby information is identified, selected, organised, and integrated with prior knowledge. In short, the cognitive theory of multimedia learning assumes that the human mind is a dual-channel, limited-capacity, active-processing system, and that learning is more effective when experienced via multimedia messages (Mayer & Moreno, 2010). Criticisms of dual coding and CTML as multimodal approaches include their failure to consider that cognition can be affected by elements other than words and images. Astleitner and Wiesner (2004) point out that CTML does not consider motivational elements in relation to the amount of information that can be processed. Despite these shortcomings, there does appear to be validity in the suggestion that presenting information in multiple modalities helps learners process and integrate information more effectively (Clark & Mayer, 2023). It should be noted, however, that research in more

complex, realistic, educational environments is needed to establish the positive effect of multimodal learning approaches on learner achievement. This is particularly necessary in the context of higher education, and in the application and use of technology to promote and support multimodal instruction (Bouchey et al., 2021).

UNIVERSAL DESIGN FOR LEARNING

Bouchey et al. (2021) point to growing research interest in the use of technology as a powerful means to customise the learning experience. This extends to the ways in which technology supports multimodal representation via the principles of Universal Design for Learning (UDL). UDL is based on the premise that all learners have varied abilities, experiences, and preferences, and that these are dynamic depending on the context and an individual's stage of development (Meyer et al., 2014). Rather than matching instruction and learning environments to individual learner preferences, UDL aims to meet the needs of all learners without the need for extensive accommodations and modifications (Nelson, 2013). Its principles espouse a more flexible approach to the design of learning experiences, driven pragmatically by the nature of the content. The UDL framework is presented through three guidelines: Representation (the what of learning), Action and Expression (the how of learning), and Engagement (the why of learning). It suggests that learning experiences should be designed and delivered in multiple modalities; that flexibility be provided in the ways in which learners express themselves, and that learning should be based on learners' interests, values, and learning pathways (CAST, 2018). There is a tendency in formal education to present information unimodally via language and, specifically, printed text. This can represent a persistent barrier for some learners. The Representation guideline suggests that learning becomes more difficult when information is presented in formats that require extra effort or assistance. Research suggests that to reduce these barriers, it should instead be represented via a variety of modalities (Bodemer et al., 2005). The Action and Expression guideline also recommends that alternative modalities are provided to allow learners to express their knowledge, ideas, and understanding of concepts (CAST, 2018). UDL therefore provides a promising and well-intentioned learning approach to multimodal learning design. Boysen (2021), however, cautions that strong claims made for UDL warrant critical analysis, particularly where UDL exhibits similar features to learning styles with a lack of empirical research and overreliance on simplified neuroscience. Further research is required into the application of UDL as a multimodal learning design framework to establish a positive learning effect.

THE END … ?

VARK and the concept of learning styles frameworks can be viewed with a critical eye and considered to be 'of their time.' For the reasons presented above, if an educator chooses to use a learning styles framework such as VARK in their practice, it should not form the basis for the design and delivery of learning experiences. Furthermore, if we allow learning styles to remain in our institutions as a way of encouraging self-reflection and the acquisition of metacognitive skills, we need to validate them for that purpose. Concerns need to be addressed around learners and educators adopting fixed ideas about their learning preferences and conflating this with their ability to succeed. Importantly, we need to move beyond the neuromyth of learning styles toward multimodal approaches informed by evidence, and applied according to the content we are teaching and the context within which we are teaching it.

Our recommendations for adopting a multimodal approach to learning design and delivery are:

1. Follow the content and consider the context. It is important that all content is taught in its ideal modality and in one that is fit for purpose. For example, a mathematical model needs to be visualised; the stress on a syllable or the rhythm of a form of poetry needs to be heard, and the pressure required to shape a piece of pottery or to administer an intravenous injection needs to be felt.
2. Move between different modalities to keep your learners engaged.

3. Use multimodal approaches such as dual coding, multimedia learning and UDL, to deepen learning and support understanding of new knowledge.
4. If encouraging students to recognise their learning preferences and broaden their learning strategies, combine this with an introduction to metacognitive strategies supported by an appropriate framework.
5. Instead of differentiating content and delivery according to learning styles, explore diversity through the design of learning activities and assessments based on a learner's interests, prior knowledge, and cultural preferences.

We now have a broader, deeper understanding of how learning occurs through multiple modalities and senses. Educational practice should allow for flexibility and adopt a strengths-based approach to minimising barriers and designing learning for all learners. Replacing our use of the term "learning styles" with "modalities" in our common learning and teaching lexicon, and planning instruction that recognises the dynamic nature of learner diversity, helps us move from a fixed mindset to one that helps learners recognise their own strengths and challenges, and supports their growth and development.

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Article https://doi.org/10.34074/scop.4013017

TEACHING STRATEGIES THAT CELEBRATE NARRATIVE PEDAGOGY

Josie Crawley and Amy Simons

INTRODUCTION

When given the opportunity to redevelop a nursing sociology paper, the authors looked for a pedagogy that had the potential to transform first year students' awareness of both their own thinking and beliefs and expand openness to explore alternate realities. Transformative learning is a process of effecting change within an individual's frame of reference – the way in which an individual interprets the world based on their experiences (Grocott, 2022). Narrative pedagogy is briefly explained and applied within this context as a transformative pedagogy. This article describes multiple strategies the authors have employed while infusing a course with opportunities for students to develop their understanding of themselves and others, becoming reflective practitioners who approach diversity with respectful curiosity.

BACKGROUND

Effective teaching and learning involves flexibly matching pedagogy to students' learning needs, desired learning outcomes and context. Nursing education aims to prepare students to be able to practise sustainably as registered nurses, now and into the future. Within the profession of nursing in Aotearoa New Zealand, understanding the diverse experiences and backgrounds of clients and whānau is a key part of providing culturally safe care, in the context of rapidly evolving health care systems. Cultural safety, as defined by the Nursing Council of New Zealand, is determined by the client and requires the nurse to reflect on their own cultural background and the impact it may have on the care of clients (Nursing Council of New Zealand, 2011). As educators, our choice of pedagogy when teaching will influence if students are reflectively self-aware, able to think through multiple perspectives, improve clinical encounters and are open or closed to new possibilities. As we (the authors) wished our nursing students to experience transformative learning, we designed a full first-year course (15 credits) around a narrative pedagogy frame.

WHAT IS NARRATIVE PEDAGOGY?

Telling stories to teach has been practised since humans could draw pictures and communicate; learning through narratives and reflective exercises can be a powerful teaching tool. Academic discussion of narrative pedagogy in nurse education evolved from hermeneutic analysis of nurse teaching and learning as a collaborative communal experience (Diekelmann, 1995; Diekelmann & Diekelmann, 2009). Narrative pedagogy has been embraced by nurse education around the world for nearly 25 years (Ironside, 2015), as an addition to other pedagogies.

Enacting narrative pedagogy, phenomenology is valued. Multiple stories are sourced and told, sometimes by lecturers, other times led by students. Students and teachers focus on conversations as they collectively explore learning experiences and the co-created experience is interpreted (collaboratively by teachers and learners) with

'inherited' perspectives challenged (Ironside, 2015). Processes involve students', clients' and teachers' responses, experiences and stories being intentionally de-constructed, reflected upon, and explored for meanings. Deconstruction includes exploring the context, alternate interpretations and elements such as temporality within narratives. This sets the scene for transformative learning and awareness of multiple perspectives, with multiple potential story sources to stimulate learning (Crawley et al., 2012).

Learning situations are designed to provide multiple viewpoints highlighting current understandings and assumptions as open and able to be challenged. Ironside (2015) provides a bibliography of studies where narrative pedagogy resulted in nursing students who were curious asking questions and becoming open to alternate perspectives. She emphasises the importance of nurse educators enabling narrative pedagogy to create spaces for thinking, exploring perceptions and deconstructing assumptions as open and problematic (Ironside, 2015). For teachers who are new to narrative pedagogy processes, we recommend the internationally successful guide to reflective storytelling in tertiary settings by Janice McDrury and Maxine Alterio (2002).

Nurse researchers have reported the positive effects of individual narrative exercises, but we could find few who reported on full immersion in theory courses where the key pedagogy was narrative. Davidson (2004) reports that after experiencing a course infused with storytelling, health students felt learning was personalised, participatory, and promoted a safe, trusting environment. Storytelling strategies in nurse education valuing student, clinician and teachers' lived experiences are recommended by Koening and Zorn (2002) to support diverse students including those having academic difficulties, cultural minorities, mature students and those living with physical or psychological impairment. Narratives in their multiple forms (memoirs, digital stories, interviews, poems, art, or documentaries) can provide an alternate lens. Spanish nurse educators used a critical thinking tool which required students to choose "a literary note" in addition to research and media – students evaluated the narrative note as the most powerful dimension of the exercise, reinforcing the observation of problems and their social impact (Urcola-Pardo et al., 2018).

FRAMING A THEORY COURSE WITH NARRATIVE PEDAGOGY

The Bachelor of Nursing Year 1 Population Health course aims to explore holistic nursing practice in diverse contexts and the historical and societal factors that shape society. In the first year of a three-year nursing degree, students have little (if any) clinical experience and limited life experience to hang this learning off. To meet this course aim, we felt that students needed to start with their own experiences to identify personal bias. This is necessary for the development of empathy and the bridging of self to the varied experiences of others. We aimed to develop a course that encouraged students to seek multiple perspectives, and to build their creative reflection abilities. The course is framed around narrative pedagogy because of its potential for transformative learning, to explore perceptions and deconstruct assumptions.

Reflective space was purposefully built into each lesson plan and multiple stories prioritised and integrated to illustrate key content, from multiple perspectives, including panels of invited health consumers. The course takes a broad look at the health of diverse populations in Aotearoa New Zealand through examining the many historical, social and cultural causes of inequitable health outcomes.

NARRATIVE PEDAGOGICAL ACTIVITIES AND PROCESSES

Presenting a diversity of stories was integral to the teaching process with learners being offered opportunities to explore experiences of others through their own words and images. When using client narrative, a minimum of three stories with their individual perspectives was offered or suggested within activity questions. This helped deconstruct assumptions as you have very different experiences within the 'same' group; for example, refugees, rural students, or Pasifika families.

Opportunities for personal reflection, deconstruction of stories and discussions about possible meanings, and how they might relate to nursing practice, were built into each lesson plan. Narrative resources such as artwork, spoken stories, game playing, exploring digital worlds and health data were paired with strategies to reflect using creative writing. Learners reflected on their personal responses and were given space to share their insights, build their own characters and stories through activities and follow their personal curiosity in engaging with the realities presented. We have included a selection of the activities below, divided into those explored in a tutorial group (about 33 students) or in the lecture setting (about 140 students).

Exercises within the tutorial group

1. **Online exploration of Dollar Street – viewing images of global families from diverse economic and cultural backgrounds** (Gapminder, n.d.). Students used an online resource called Dollar Street which is a catalogue of photos and videos of families from around the world. In small groups, students chose a country to explore and made a virtual visit to the homes of three families from differing socioeconomic backgrounds. They could meet the family and explore the various rooms in the homes and see day-to-day objects like toothbrushes, toys, kitchen utensils and toilets. They were asked to reflect on what they were seeing and make connections to the determinants of health.
2. **Listening to refugee stories and exploring how they may differ from media representation.** Students were asked to find visual media representations of refugees and describe what they found as the common narrative. They then watched a video of people who identified as former refugees now living in Aotearoa New Zealand. The video provided perspectives on the differing experiences and perspectives on mental health issues for former refugees (TVNZ, 2024).
3. **Choosing and discussing an excerpt from a disability narrative that resonated with the learner**. Students walk around a range of 10 illustrated excerpts, reading them all before choosing where to stop. Discussions can blow open assumptions about disability and culturally safe care.
4. **Pen-to-paper, four-minute student reflective response to image of nurse with hand on arm of gentleman in dressing gown, using frame for mobility**. For the first two minutes the prompt is a nurse thinking ("I wonder …"). For the second two minutes, the prompt is the person using the walker thinking ("I would …"). We discuss different perspectives as the group brings them up, linking and expanding these into nursing practice stories: how do you notice cues and adapt practice to clients' needs? We also relate the discussion to key disability terms and concepts.
5. **Sustainable goals: students self-select global health topics**. They explore their choice, referring to the World Health Organisation website, relate their chosen topic to sustainable goals and potential nursing actions, then watch the short video *Leave No One Behind* (The Global Goals, 2016).
6. **Student pen-to-paper response with three one-minute prompts: I saw; I feel; I think**. They do not have to share the full content, but sharing key words, feelings and metaphors is encouraged in group discussion afterwards.
7. **Reading stories of nurses contributing to meeting the United Nations' Sustainable Development Goals (SDGs)**. Using the International Council of Nurses' (2017) resource, *Nurses' Role in Achieving the Sustainable Development Goals,* groups of students explore stories from around the world to learn how nurses are involved in meeting the SDGs.
8. **Board game to explore the determinants of health.** In tutorials, students play the Canadian board game, *The Last Straw!* (Reed & Rossiter, 2007). Students create a player profile which includes gender, ethnicity and socioeconomic status and then proceed to move through infancy to older age. As players progress through the game, they encounter life challenges such as bullying in school, unexpected illnesses, lack of health resources as well as positive experiences such as adequate prenatal care and community support. Players gain and lose 'vitality chips' along the way. A final debrief explores the experience of advantage and disadvantage and the influencing factors.

9. **Explore the effects of colonisation on Indigenous health (outside of the New Zealand context)**. Students worked in small groups to watch videos and explore resources about Indigenous people in Australia, Canada and Uganda. Students were asked to identify the similarities and differences and listen to how individuals in the videos described themselves and their communities. Students reported back on the key experiences and histories that were described and what health issues were identified, and made connections to the experience of Māori. The tutorial concluded with a short video called *Reclaiming Our Spirits* (UBCNursing Vancouver, 2017) which documents an evidence-based programme in Canada that includes nurses and Indigenous elders in supporting Indigenous women who have experienced violence.

Exercises in the lecture theatre with large groups

1. **Identifying students' own health beliefs and where they come from**. This exercise is done in the lecture theatre and involves every student identifying a simile for good health, a metaphor for poor health and a family saying regarding health, then collating them together. A portion are anonymously shared, showing enormous variety and multiple perspectives within a relatively homogenous group of first-year nursing students.
2. **Exploring socio-economic and genetic determinants of health through the lecturer sharing their own family story with photos**. This provides alternate views of overcrowding and family shape. It promotes collegiality and shows students that it is safe to share their own reality.
3. **Rural nursing stories illustrating lived experiences of rural populations, with story excerpts and locals' photographs throughout the lecture**. The lecture is framed within the Sociological Imagination Framework, a theory taught and required to be applied by students in an assessment. Students are encouraged to ask questions regarding the model as well as content and sharing stories. At end of the lecture, the model headings initials are put up, and students brainstorm an acrostic poem with factors for each.
4. **Health consumers from diverse cultural backgrounds were invited to share their experiences of receiving health care**. They highlighted how they defined cultural safety and identified when they received culturally safe care and what this looked like for them.

HOW DO STUDENTS FIND BEING ENGAGED WITH THESE EXERCISES?

The narrative pedagogical approach engages students in the learning process, reflecting and critiquing as part of the classroom exercises. This ranged from verbal feedback during exercises and unsolicited student follow-up discussions while several exercises employ multiple anonymous sticky notes within their design. Students expressed appreciation when exercises provided choice and flexibility, which allowed students to follow their curiosity. Students particularly engaged with real-life stories and narrative including the lecturers' use of their personal and nursing experiences. Students became more aware of multiple perspectives and appreciated the importance of listening and identifying strengths in individuals and populations, without judgement. Classroom materials collected suggested students' personal learning with specific exercises included uncovering and exploring bias, openness to diverse human experience, cultivating curiosity about diversity and a deeper understanding of the factors that shape society.

We noticed students usually participated actively in the small group setting, that body language was engaged, laughter common and depth of thinking, integrating ideas and questions were noted when small groups fed back to the larger group.

CONCLUSION

In redesigning the course, narrative pedagogy allowed space for learners to cultivate self-awareness of personal biases and their cultural lens and to develop a curiosity about others that fostered openness and respect for diverse experiences. Stories paired with creative and reflective writing/talking exercises were key teaching methods. Students engaged with the process, particularly real-life narratives in multiple formats, and shared anecdotes suggesting changing perspectives, increased understanding of themselves and the importance of basing practice in listening and working with the client's reality. This suggests that the authors' embedding of narrative pedagogy throughout the course not only helped achieve the aims of the course, but it also provided a foundation for developing empathic, self-reflective, and culturally safe student nurses.

Josie Crawley (Associate Professor at Otago Polytechnic School of Nursing, Te Pūkenga) has won national awards for her tertiary teaching and Editors' choice for her reflective writing. Her research platform explores narrative inquiry, phenomenological experience, narratives for education, reflection, and compassionate care. She has published in a variety of academic journals, and her poetry has been included in a collection of poems by Aotearoa New Zealand Nurses, and health and nursing journals.

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Article https://doi.org/10.34074/scop.4013018

THE USE OF DIGITAL TOOLS FOR LEARNING BY NEUROTYPICAL AND NEURODIVERSE ANIMAL SCIENCE STUDENTS

Chloe McMenamin and Kristie E. Cameron

INTRODUCTION

Digital educational tools can have a positive impact on learning practices (Casey et al., 2015; Icard, 2014; Parwata & Sudiatmika, 2020) and can increase student agency in content, pace and level of engagement (Karich et al., 2014). The use of digital tools for managing personal life is ubiquitous, resulting in educators using digital platforms for teaching and to engage with students who have high levels of competency in navigating the digital space. Therefore, educators of the next generation of students in veterinary and animal science need to harness this proficiency for effective teaching and learning. This small study sought to determine which digital tools were used by animal science students and identify if there are tools that could be provided to assist students of varying abilities in their learning.

Within veterinary nursing education, how digital tools are being used for learning varies, although their use is becoming more widespread (Gledhill et al., 2017). Over one thousand students reported using their smartphones most often, and digital tools for communication and media, such as YouTube videos, to assist in their learning (Gledhill et al., 2017). However, YouTube videos can be inaccurate, thus students at Unitec are directed to online resources such as @Dove.org (atDove, n.d.) and an internally monitored communication system called Slack, Veterinary webinars, and to follow the pages of reputable relevant agencies such as the RNZSPCA, prompting the use of technology for learning. Engagement with learning is increased using gamification; animal science students reported enjoyment using Kahoot! for formative assessment, although there was no indication that it improved test scores (Cameron & Bizo, 2019).

The global pandemic saw compulsory reliance on digital tools for learning, instead of being in the classroom. Studies of tertiary students across the globe (for example, Aristovnik et al., 2020) and those of single universities (Mishra et al., 2020) or communities (Agarwal & Kaushik, 2020) report that students were generally satisfied with the 'new normal' using real-time video conferencing, such as ZOOM, to engage with lectures, and also using asynchronous methods such as written content, recorded lectures and communication via platforms such as Moodle. However, since the pandemic there has been a decline in student engagement and attendance across many tertiary educational providers (Wester et al., 2021), therefore, competence in using digital tools for learning remains an important remnant of the pandemic. This is evident in the use of platforms, for example educators directing students to content on Facebook and Twitter (Kimmons et al., 2021; Mei et al., 2019) but relies on the student's engagement to aid the learning process (Fossland et al., 2015).

Digital tool use in education can improve learning experiences for students who are neurodiverse (Horlin et al., 2023; Skelling, 2020). The widespread use of digital media, such as TikTok and Instagram, where anyone can connect and distribute information has increased awareness, acceptance and normalisation of neurodiversity

(Russell et al., 2022). For example; Aragon-Guevara et al. (2023) reported that of 133 videos with the hashtag #Autism, 27 percent were accurate, however, they were viewed 198.7 million times, and 'liked' by 25.2 million people. Anecdotally, enrollment at Unitec has increased since 2021 with 60 percent of students who registered for disability services listing 'neurodiversity' as a category for help; this increased to 71 percent in 2022 and 74 percent in 2023. Further, the use of note takers in class has decreased considerably (about 90 percent) with the use of note-taking software and the use of recorded lectures (D. Cavell, personal communication).

This study aimed to identify digital tools that could be provided to assist neurotypical and neurodivergent students by measuring which digital tools students use in their personal life and in their study. This goal was to assist educators in their utilisation of tools to enhance the learning experience for both neurotypical and neurodivergent students in the animal sciences field.

METHOD

Participants

Sixty-nine students enrolled in a variety of animal science courses at Unitec Institute of Technology, New Zealand, in Semesters 1 and 2 of 2023, participated in this study. Each belonged to one of five cohorts: Level 5 Bachelor of Applied Science (BASCI); Level 5 New Zealand Certificate in Animal Technology (NZCAT; first year); Level 6 BASCI, Level 6 Diploma in Veterinary Nursing (DVN, second year); and Level 7 Bachelor's in Veterinary Nursing (BVN; third year). The research was approved by the Unitec Human Ethics Committee Protocol 2018-1016.

Measures

Participants were asked to complete a 13-question multiple-choice questionnaire survey. They were asked to state their educational cohort and age, and to select whether they considered they might have or had a diagnosis of neurodivergence. There was no definition provided to ensure students did not feel excluded in completing the survey. The remaining questions required respondents to select tools they used in their personal life and in their studies. The list of tools was compiled by the authors and a member of the Learning and Achievement team (Figure 1). There was an opportunity for students to state tools they used but were not listed, detail tools that they did not use and why, and if there were tools that they would like to use for their learning in the future.

Digital Tool	Developer	Description
Chat bot GPT	OpenAI, Microsoft Corporation	Artificial Intelligence that provides text via prompts
CollaNote	Zauberberg Lab Limited Company	Notetaking App to PDF
Echo360	Echo360 Ltd	Lecture capture system
Excel	Microsoft Corporation	Spreadsheet editor: part of the Microsoft Office 365 suite
Facebook	Meta Platforms, Inc.	Social media and networking
Facebook messenger	Meta Platforms, Inc.	Communication chat service
Google docs	Google	Online multi-editor word processor
Google sheets	Google	Online multi-editor spreadsheet editor
Grammarly	Grammarly, Inc.	Cloud-based spelling and grammar reviewer
Instagram	Meta Platforms, Inc.	Social media for sharing content
Instagram messenger	Meta Platforms, Inc.	Communication chat service
Kahoot!	Kahoot AS	Online game-based learning platform
Keynote	Apple Inc.	Information presentation software for Mac
Mac 'Word'	Microsoft Corporation	Word processor; part of the Microsoft 365 Office suite
Moodle	Martin Dougiamas	Open-source learns management system
Outlook	Microsoft Corporation	Email exchange server software; part of the Microsoft 365 Office suite
Padlet	Padlet.com	Cloud-based collaborative web platform
Powerpoint	Microsoft Corporation	Information presentation software; part of the Microsoft 365 Office suite
Signal	Signal Messenger LLC	Communication chat service
Slack	Salesforce Inc.	Communication platform
Snapchat	Snap, Inc.	Multimedia instant messaging service
Socrative	Socrative.com	Online quiz platform
WhatsApp	Meta Platforms, Inc.	Communication chat service
Wikipedia	Larry Sanger and Jimmy Wales	Open-source content website
Word	Microsoft Corporation	Word processor; part of the Microsoft 365 suite
Youtube	Google	Online video sharing and social media platform
ZOOM	ZOOM.us	Online video communication platform

Figure 1. The digital tools mentioned in the survey and in this article. The developer and a brief description are included.

Procedure

The survey was conducted at the beginning of a teaching period and required approximately 10 minutes to complete. A PowerPoint slide provided details of the purpose of the survey and how to answer the questions. Participation in the study was voluntary which was indicated on the slide. If participants wished to not participate in the study, they were informed to fold their survey and pass it to the end of the row where it would be collected with the completed surveys.

Data analysis

Due to the small sample size, all responses for analysis were used (even if incomplete), and the number of responses for each question is provided in the text. Further, more than half of the students provided more than one answer to Question 6 so this data was not analysed. The survey data was compiled in Microsoft Excel® and descriptive statistics were conducted. For most questions, multiple answers were allowed therefore the percentages tabulated and graphed used the number of respondents within each category of neurodiversity as the denominator. Bar graphs were used to indicate the percentage of respondents within each neurodivergent category and the total number of respondents. To identify differences between the proportions of the different variables z-scores were calculated for variables that were dissimilar in the graphs to describe the relationship to the mean for that comparison of the groups of students; for example, if a comparison is significant it means that respondents used a particular digital tool significantly differently to the average of a comparison group. A basic theme analysis was conducted on the qualitative data.

Results

Demographics

Of the respondents, 53.7 percent (15/68) were enrolled in the first-year veterinary nursing course, 22.4 percent (15/68) enrolled in the Bachelor of Veterinary Nursing and 23.9 percent (16/68) enrolled in the Bachelor of Applied Science (Figure 2). Of these students over half (35/69, 55.6%) were in currently in a Level 5 course, 41.3 percent (26/69) in a Level 6 course and two students in a Level 7 course. Over half were between 18 and 23 years old (42/68, 61.7%). Most respondents reported to be of New Zealand or Pākehā ethnicity (27/64, 42.2%), or 'other' (30/64, 47.0%), with 10.9 percent being Māori students (7/64).

Nearly 20 percent of respondents (13/68, 19.1%) reported to be neurodivergent with 30.9 percent (21/68) reporting to be maybe neurodivergent. The Level 6 cohort consisted of the most neurodivergent students (7/13, 58.9%) with more Level 5 students self-reporting as maybe neurodivergent (12/21, 57.1%) and neurotypical students (19/34, 55.9%) than other levels.

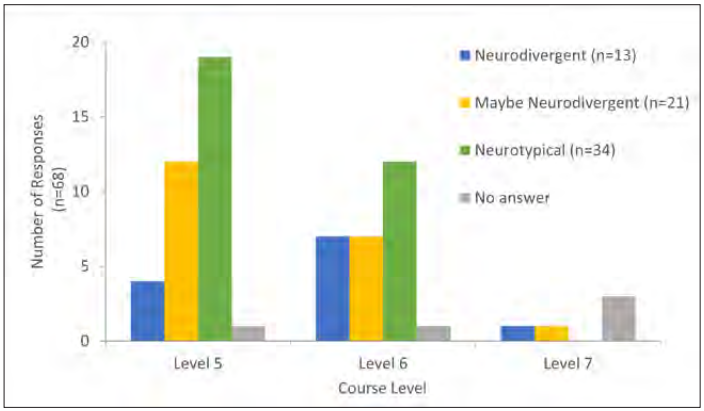

Figure 2. Distribution total responses of self-reported neurodiversity (n=63) across Level 5, 6 and 7.

Most students (40/68, 58.8%) used pen and paper to take notes in class and 36.8 percent (25/69) typed into a blank document ($z = 2.64$, $p = .0083$; Figure 3). Neurodivergent and maybe neurodivergent students reported using 'other' technology more than neurotypical students ($z = 2.31$, $p = < .05$. These included using notetaking apps such as OneNote or CollaNote and transferring written notes to digital after class.

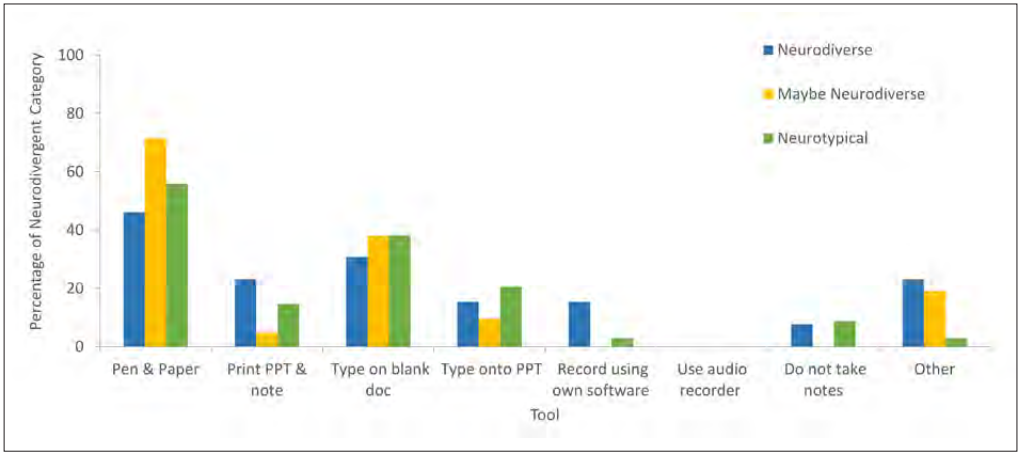

Figure 3. Percentage of respondents in each Neurodivergent category using different tools in class.

Smartphones were used by nearly all students in their personal life (56/69, 81.2%), but not for studying (21/69, 30.4%, $z = 3.14$, $p = .003$; Figure 4). Similar percentages of respondents used their iPad/tablet every day (11/69, 15.9%) and for study (10/69, 14.5%), and their own laptop everyday (48/69, 69.6%) and for study (53/69, 76.8%). More neurodivergent and maybe neurodivergent students used a desktop computer for everyday use (9/34; 26.5%, $z = 3.62$, $p < .05$) and for study (11/34; 32.3%, $z = 4.61$, $p < .05$) than neurotypical students for everyday use (6/34, 17.6%) and study (5/34, 14.7%).

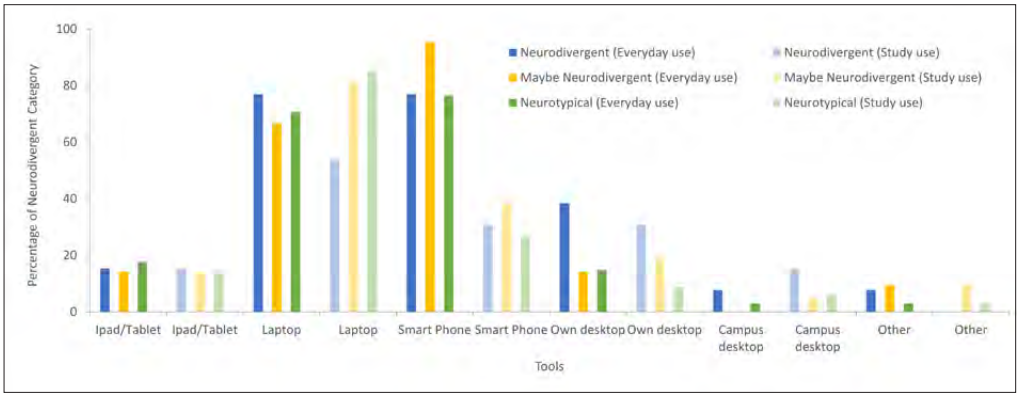

Figure 4. Percentage of respondents in each Neurodivergent category for everyday and study use of hardware.

Communication tools including Gmail (11/13, 84.6%, $z = 2.42$, $p < .05$), phone texting (10/13, 76.9%, $z = 3.57$, $p < .05$), Instagram messenger (6/13, 46.2%, $z = 2.21$, $p < .05$) and Instagram (6/13, 46.2%, $z = 2.79$, $p < .05$) were used by neurodivergent students for more everyday than for study (Figure 5). Maybe neurodivergent (between 10–15 out of 21) and neurotypical students (between 16–25/34) used WhatsApp, phone texting, Instagram ($z = 4.45$, $z < .05$), and Instagram messenger, Facebook, and Facebook messenger more every day by maybe neurodivergent (between 2–6/21) and neurotypical (between 4–7/34) than for study (all ps $< .05$). In comparison, tools such as Office 365 were used more frequently by those maybe neurodivergent (1/21, 3.2%) and neurotypical students (10/34, 29.4%) for study than every day ($z = -3.16$, $p < .05$) and neurotypical students (12/34, 38.2%) used Slack, an app monitored by the institution ($z = -2.63$, $p < .05$) in their study whereas neurodivergent students (3/13, 23.1%) did not.

Further, there were more neurotypical students using WhatsApp (16/34, 47.0%, $z = -2.00$, $p < .05$) and Facebook (18/34, 52.9%, $z = -2.34$, $p < .05$) every day than neurodivergent students using WhatsApp (2/13, 13.4%) and Facebook (9/13, 69.2%). Whereas more combined neurodivergent and maybe neurodivergent students used Facebook (4/34, 11.8%, $z = 2.06$, $p < .05$) in their study compared to neurotypical students (0/34); with neurotypical students preferring to use Outlook (13/34, 38.2% $z = -2.00$, $p < .05$) to communicate compared to combined neurodiverse and maybe neurodivergent (9/34, 26.5%) students.

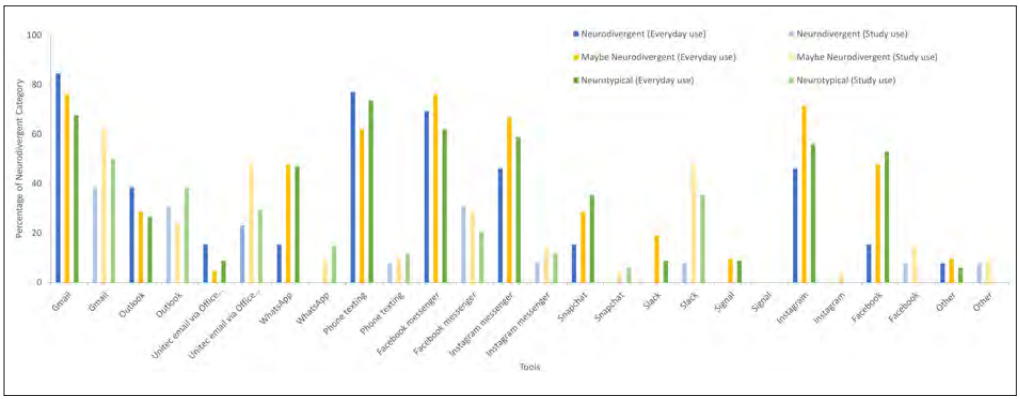

Figure 5. Percentage of respondents in each Neurodivergent category for everyday and study use of communication tools.

Neurodivergent students used learning tools including Kahoot! in class (10/13, 76.9%, z = -3.15, p < .05) and Moodle (11/13, 84.6%, z = -2.06, p < .05) for study rather than Kahoot! (2/13) and in everyday use (6/13, Figure 6). Maybe neurodivergent students and neurotypical students used Kahoot! in their own time (22/55), Kahoot! in class (45/55), Moodle (50/55), Echo (19/55), Zoom (25/55), and the library (43/55, 78.2%, all ps < .05) more for study than they did every day (max 28/55 for using Moodle). Padlet was used by maybe neurodivergent students (7/21, 33.3%) for their study more than neurodivergent and maybe neurodivergent in everyday use (0/21, z = -3.00, p < .05). For neurodivergent students, YouTube was used more for everyday use (12/13, 92.3%) compared to for study (7/13, 53.9%, 53.9%, z = 2.21, p < .05). Whereas for maybe neurodivergent and neurotypical students, YouTube was used a similar amount for everyday (30/55, 55.5%) and study use (32/55, 58.2%).

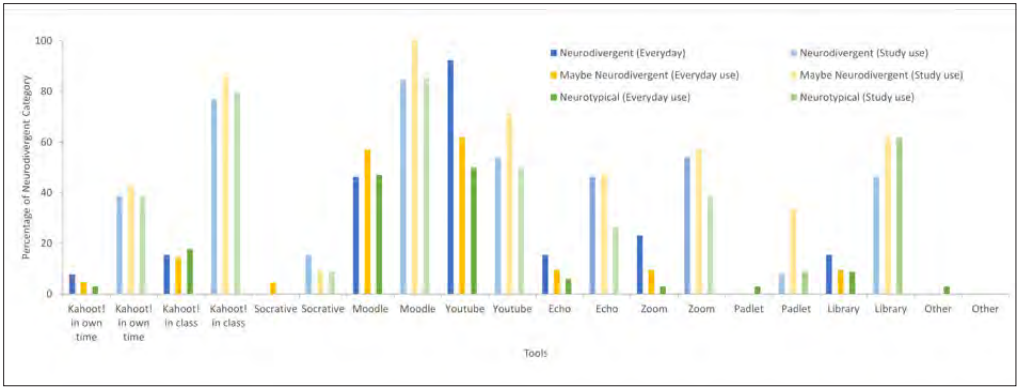

Figure 6. Percentage of respondents in each Neurodivergent category for everyday and study use of learning tools.

Grammarly was a tool used by nearly half of all types of students every day (31/68, 45.6%) and for study (28/68, 41.2%). Neurodivergent students used Grammarly more for everyday use (7/13, 58.3%) compared to for study (4/13, 30.8%) and maybe neurodivergent (14/21, 66.7%) and neurotypical students (20/34, 58.8%) used Grammarly more for study rather than everyday use (24/55, 43.6%), but this was not significant. Furthermore, all students used Grammarly (31/68, 45.6%) over ChatGPT (5/68, 7.4%) every day compared to using Grammerly (48/68, 70.1%) and ChatGPT (11/68, 16.2%) in their study (all ps < .05, except for neurodivergent students in their study).

More neurodivergent students used Google docs (6/13, 46.2%) compared to neurotypical students every day (4/31, 12.9%, z = 2.58, p < .05). Neurotypical students preferred to use the Office365 version of word processing (15/34, 44.1%,) to the Google option (4/34, 11.4%, z = 3.00, p < .05) every day and in their study with 91.2% of students (31/34) preferring to use Word to Google docs (16/34, 47.1%, z = 3.56, p < .05). Combining neurodivergent and maybe neurodivergent students showed a greater number of students used Google docs (15/34, 44.1%) every day compared to in their study (4/34, 11.7%, z = 2.97, p < .05), and Google sheets everyday (7/34, 20.5%) compared to study (1/34, 2.9%, z = 2.26, p < .05). Maybe neurodivergent students used Word (18/21, 85.7%) in their study more than every day (7/21, 33.3%, z = -3.46, p < .05) and used Powerpoint for study (19/21, 90.5%) more than every day (5/21, 23.8%, z = -4.37, p < .05).

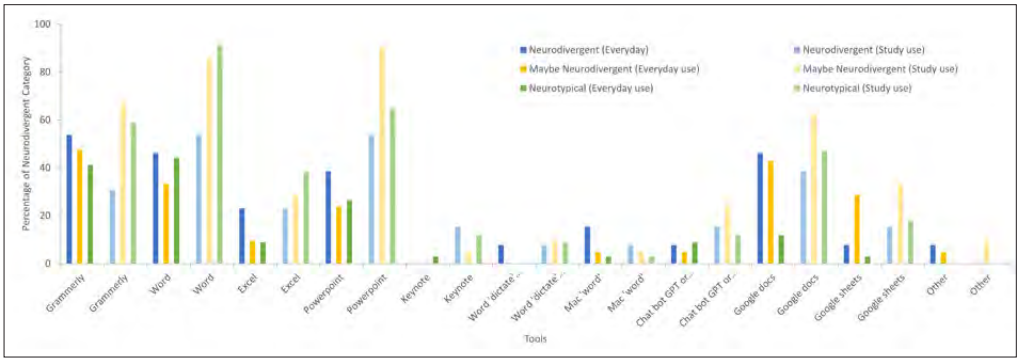

Figure 7. Percentage of respondents in each Neurodivergent category for everyday and study use of software.

Most students used APA referencing guides (58/69, 84.1%), peer reviewed articles (53/69, 76.8%) and journal databases (47/69, 68.1%; Figure 8). There were minimal differences in the percentage of students across neurodivergent categories using all tools.

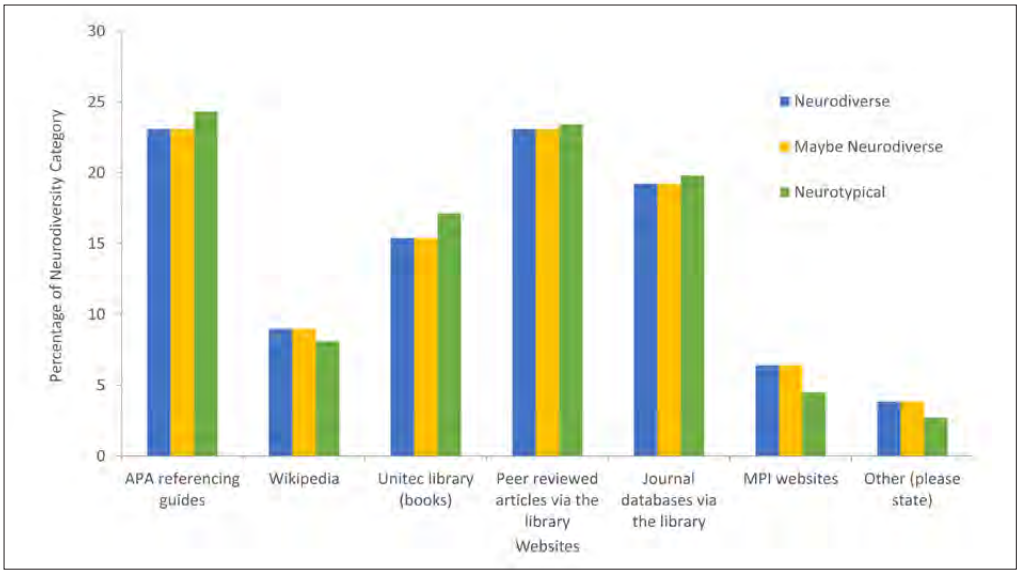

Figure 8. Percentage of respondents in each Neurodiversity category for everyday and study use of internet-based tools.

Half of all students (n = 35) provided specific feedback on their use of digital tools. A third (n = 20) across all neurodivergent categories reported a willingness to learn how to use digital technologies (for example, Word, Excel, Grammarly, Powerpoint, APA referencing and the library resources) but only if it was required. Across all students there were reports of not knowing tools (for example, Signal and Socrative), not liking new tools, or reporting that they were difficult, unreliable, old or unhelpful. Specifically, six neurodivergent students (out of 12) reported not wanting to use AI, Kahoot! and not wanting to use a computer in class. Maybe neurodivergent students (45%, 9/20) reported positive use of an alternative such as Google docs; and did not like unreliable (Wikipedia) or confusing (online APA referencing guides) tools. Neurotypical students (51.6%, 16/31) reported to not like Moodle, Excel or Word, or the library.

DISCUSSION

This study aimed to explore the digital tool use of animal science students in their personal and academic lives at Unitec. The objective was to fill a knowledge gap that could aid educators in leveraging students' digital competency for effective teaching and learning in the animal studies courses.

This study showed use of hardware tools iPads/tablets, laptops, and own desktops for personal and academic use by all students, however, smartphone usage showed significantly higher use in personal compared to that in study. The ubiquitous use of smartphones could be harnessed by educators to increase communication efficacy between students and teachers (Gledhill et al., 2017), via the availability of resources designed for education, such as Moodle® Blackboard® or Google® Classroom, being accessible through platforms that allow mobile-learning through smartphone apps (see for example, Naveed et al., 2023), decreasing the chance of missing important information. The challenge would be to ensure the user interface is intuitive and simple to achieve engagement (Miya & Govender, 2022).

The survey showed greater engagement in social media platforms Instagram and Facebook in personal use compared to academic use, typically accessed by smartphones. Neurodivergent students used Facebook for study more than neurotypical students. Research has indicated that utilising platforms for social media has a significant impact on student engagement, collaborative learning, and knowledge-sharing behaviour (Ansari & Khan, 2020); thus to harness this connection, educators could 'promote' or engage with their students in this way by posting their own work, or pointing their students directly to accurate and relevant posts via hashtags or group mentions.

The findings of the study suggest that digital tools are likely to play a crucial role in supporting neurodivergent students. Neurodivergent students indicated a willingness to learn to use digital tools if they were required for their learning, such as Grammarly. For example, neurotypical students used Outlook (a platform that can use multiple exchanges in one app) and used the institution-monitored communication tool, Slack; however, neurodivergent students did not. It would be interesting to delve deeper into the division in tool use. It could be due to existing usage of communication tools being easier than adjusting to using new technology in addition to challenges within the tertiary system, or because the implementation or interface of Outlook or Slack is not as 'neurodivergent-friendly' as what a student might currently use. Further, neurodivergent students also tended to use desktop computers both at home and on campus but used Google docs, available online anywhere, over that of the downloadable Office365 suite used by neurotypical students. Neurotypical students used more transitive devices such as laptops and tablets and wanted to learn about new tools. This is interesting because it aligns with reports that neurodivergent people are less adaptive to changing situations, thus, using a desktop inherently involves a consistent environment in which to study (Mirfin-Veitch et al., 2020). We could recommend, based on the results of our study, that educators need to be mindful when writing their teaching plans that neurodivergent students might struggle with bringing a range of different devices to their classes. Even inadvertently, expecting students to use devices on a whim might present barriers to students in their engagement and learning of the material. Presenting options for students to engage with the information during class and their independent study within a particular course or module will provide a consistent set of expectations for learning using a small range of technology rather than expecting students to be able to shift attention quickly and adjust to a new task.

Our results indicate that neurodiverse students use a wide range of platforms, phone apps and technologies in their personal life such as YouTube, TikTok, and Instagram. Neurotypical and maybe neurodivergent students use YouTube every day and in study, however, neurodivergent students use it predominantly for everyday use and not for study. Considering this usage, educators could use these existing connections to content in a multi-modal teaching approach. This has been reported as beneficial to neurodivergent students due to its ability to allow students to self-regulate and choose the model of teaching that works for them, for example, watching videos at home when classrooms are over-simulating (Horlin et al., 2023; Skelling, 2020). The authors highlight the importance of the over-educator's role in guiding students on platforms to ensure the information is current,

relevant, and accurate, and also teling students why the tool is beneficial (and necessary) and is worth the effort. For example, educators could explicitly direct students to specific quizzes for a specific test (Socrative) or create a specific page on social media for their students where videos can be shared by the class and checked by the educator for accuracy. Further, as students in the survey indicated wanting to learn how to use software, such as Grammarly, and recent advances in AI, teachers should offer guided instruction for these tools (though in moderation to mitigate overwhelming students).

Educators should continue to implement multi-modal teaching strategies that work for all learners. However, considering the increase in neurodiversity diagnoses (Russell et al., 2022; Sarrett, 2016), it is important that digital tool use is presented in a way that will allows neurodiverse students to excel without also creating challenges to students using technologies. This could be achieved by teaching students to use technology, encouraging educators to be organised and forewarn students of expectations for digital tool use in class, and limiting the use of different digital tools within a class to a few. This will allow all students the opportunity to engage and succeed which is presenting as an issue for graduates.

People who experience adversities, such as living a neurotypical world as neurodiverse, can have greater empathy for others and animals leading them to want to work with populations requiring greater compassion and understanding (Kimber et al., 2023). As an industry, we need to hold on to these individuals. This means supporting neurodiverse people already in the industry but also students during their education. In a 2019 survey by Diversity Works New Zealand, 30 percent of neurodiverse respondents felt their neurodiversity had impacted their career progression with people with autism experiencing difficulties during the hiring process (Davies et al., 2023). As educators of the future veterinary nurses and animal scientists, we need to ensure that neurodiverse students have the opportunity to succeed in their learning by mindfully exercising the use of digital tools, which they have shown competence and preference in using, in order to ensure they have the best chance of success after their study.

There were limitations to the study in the structure of the survey; firstly, the survey was not 'neurodivergent friendly' because students did not follow the instruction for Q6 which asked students to select what they do 'the most' indicating that they select one answer. This needed to be clearer as students selected multiple answers. Secondly, asking students to identify as neurodiverse may have influenced the number of students that selected this option, but may also have highlighted that there are more students unsure of their learning needs. This indicates that a conversation is required to ensure students are aware of the pathways to find help within the institution and that they have the right to communicate what they need to their educators.

In conclusion, this study serves as a starting point for understanding the dynamic relationship between students, digital tools, and learning experiences in the field of animal science. It highlights the importance of teaching students to use technology, encouraging educators to be aware of their students' needs especially as they progress through the levels, and planning teaching around the use of a considered range of digital tools using a multi-modal design. This needs to be a guided approach by the educator to ensure learning directives are effective, safe and achievable without digital barriers for individuals suited to working with animals.

ACKNOWLEDGEMENTS

Thank you to Associate Professor Nigel Adams for his assistance with the human ethics proposal and Ruth Laing for assisting with the list of digital tools available to Unitec students. We also appreciate the time taken by the students to complete the survey and will share our findings with the School of Environmental and Animal Sciences.

Chloe McMenamin is an emerging researcher with an interest in supporting veterinary students in achieving their fullest in their educational journeys. With over a decade of experience in the veterinary industry, Chloe has experience in a variety of veterinary nursing and animal health roles. Currently, a lecturer in applied animal health at Unitec, Chloe's passion for supporting students particularly those with neurodiversity stems from their own struggles in education. Chloe believes that exploring ways to support neurodiverse ākonga in education, will not only support student neurodiverse students but all students.

Kristie Cameron has a PhD and studies animal behaviour and welfare and is an Associate Professor at Unitec. Kristie is an active researcher and is the chair of the Unitec Early Career Researcher forum and the Co-chair of the Royal Society Te Apārangi Early Career Researcher committee.

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NEURODIVERSITY & NEURODIVERGENCE

Article

https://doi.org/10.34074/scop.4013007

NEURODIVERSITY IN TERTIARY EDUCATION – WHAT WE KNOW AND WHAT WE DO

Stella Lange and Rachel van Gorp

INTRODUCTION

In the 30-plus years since Harvey Blume (Silberman, 2016, p. 492) and Judy Singer (n.d.) introduced the term neurodiversity to describe natural and valuable variation in how people experience and perceive the world, published literature on neurodiversity has steadily increased. In higher education, Clouder et al.'s (2020) narrative synthesis reviews publications on neurodiversity, and aims to summarise what is available and what is needed to ensure neurodiverse students succeed. Pollak's 2009 book, *Neurodiversity in Higher Education: Positive Responses to Specific Learning Differences*, sets out to guide educators in how best to accommodate different neurodiversities. In regards to Aotearoa New Zealand, Mirfin-Veitch et al.'s (2020) review provides a snapshot of the education context, from early childhood to tertiary education but, with its focus on children's rather than adult learners' needs, is less useful for tertiary educators. How tertiary educators in New Zealand respond to their neurodivergent students is less well documented and is the focus of this research.

NEURODIVERSITY AND TERTIARY EDUCATORS

Tertiary educators are selected as subject specialists. Implicit in their selection is the assumption that they can easily share their specialist knowledge with all their students. Woodward et al. (2022) highlight that as emergent tertiary educators, they wanted more preparation for creating an inclusive learning environment, and specifically on working with neurodiverse learners. This is a doubly valuable insight. Those authors responded to their studies in a tertiary educator qualification, one that had been revised only a few years earlier. Surprisingly, while neurodiversity has been identified and discussed for over 30 years, it appears not to be a core element of many tertiary education programmes. Colley is adamant that "all staff need training in AD(H)D – especially as many regard it as another name for bad behaviour" (2009, p. 184). If many educators do interpret neurodivergent behaviours as 'bad,' that puts at risk successful outcomes for neurodivergent students. Martin (2009) noted that neurodiverse undergraduate students' hyperfocus is often seen as a problem, yet it is that same ability to hyper focus that is essential to success in postgraduate study. Otago Polytechnic has been accredited the Dyslexia Friendly Quality Mark for some of its programmes (Foundations, Business and Design), as an indicator of its dyslexia- and neurodivergent-friendly practices such as recording lectures. Yet we know that some lecturers look forward to a time when they no longer have to record and post lectures online, seemingly unaware that recorded lectures as a resource that can be repeatedly accessed benefit many neurodivergent and neurotypical students.

IMPORTANCE OF NEURODIVERGENT LEARNER EXPERIENCE

Neurodiversity acknowledges and values natural variations in human cognitive function, which includes individuals with conditions such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD),

dyslexia, and other neurological differences (Clouder et al., 2020). There has been a growing recognition of the need to accommodate neurodiverse learners in vocational education, recognising their valuable perspectives and talents that contribute to the diversity and richness of the academic environment (van Gorp, 2022).

ACCOMMODATING NEURODIVERGENT ĀKONGA

Understanding and accommodating diverse learning styles is one aspect of tertiary or vocational education for neurodiverse learners (van Gorp, 2022). Neurodiverse learners may not always benefit from traditional educational approaches because they process information differently. Mirfin-Veitch et al. (2020) report that neurodiverse learners have advantages in visual thinking, pattern recognition, and problem-solving. These insights can also be valuable for all learners (Mirfin-Veitch et al., 2020). By incorporating a wider range of instructional methods, vocational educators can tap into the strengths of all their learners, not just those who are neurodiverse. This can lead to a more engaging and effective learning experience for everyone. Ultimately, recognising and catering to diverse learning styles benefits not only learners with neurodiversities but also fosters a more inclusive learning environment for all.

CHALLENGES FACED BY NEURODIVERGENT ĀKONGA

It is important to recognise and address the challenges faced by neurodiverse learners in tertiary education. As part of this approach, accessible resources, flexible learning environments, and individual support services should be provided (Rentenbach et al., 2017). Accommodations such as extended exam times, sensory-friendly spaces, and assistive technologies can make a significant difference in enabling neurodiverse learners to reach their full academic potential (van Gorp, 2022). It is unclear how many tertiary educators know this, or if this is something that they are expressly told or encouraged to do by their institutions.

Creating an inclusive vocational education environment requires promoting awareness of neurodiversity among educators, staff, and learners and dismissing myths and stereotypes associated with being neurodivergent (Mirfin-Veitch et al., 2020). According to van Gorp (2022), encouraging an atmosphere of acceptance and support can positively impact neurodiverse learners' well-being and academic performance by making them feel valued and included. Individuals with neurodiverse learning styles often possess exceptional capabilities and insights that can foster innovative thinking and problem-solving. Educating the educators on neurodiversity requires knowing what they know now. Vygotsky's Zone of Proximal Development provides a model for scaffolding educators' development (Shabani et al., 2010) and in this case for understanding neurodivergent students' needs. To scaffold, we must first understand what educators know and do.

THIS RESEARCH

It is here that we began our research. As neurodivergent educators, we were beginning to recognise our own accommodations and adaptations: subtle and at times not so subtle modifications to our teaching as we tried to understand and meet students' needs. We also observed that while these adaptations made sense to us, and were something we saw as essential, this was not true for many of our colleagues in education. We wanted to know how educators across our institution understood, recognised and responded to neurodiversity in their students.

SURVEY OF WHAT EDUCATORS KNOW ABOUT NEURODIVERSITY AND WHAT THEY DO

In this study, we conducted a survey to investigate the knowledge and implementation of strategies by kaimahi/staff at Otago Polytechnic to accommodate neurodivergent learners. The survey was informed by a review of relevant contemporary literature, lived experiences, and input from members of the wider Otago Polytechnic Neurodiversity Community of Practice. The survey comprised a few demographic (identity and college) questions as well as quantitative and qualitative questions about the understanding, experience and accommodation of neurodiversity in tertiary learning environments. These questions are summarised in Figure 1 and Figure 2. Ethics approval was obtained from the Otago Polytechnic Research Ethics Committee (approval number 963).

Challenges educators recognised/identified in their neurodivergent ākonga

ADHD, autism, dyslexia|tīpaopao, dysgraphia, dyscalculia, needs more time, difficulty with social communication, time management, Tourette's, sensory integration issues, a need to fidget, sensitive to lighting, sensitive to noise, poor organisational skills, easily distracted, proprioception difficulties – clumsy/raru kori tinana.

Strengths educators recognised/identified in their neurodivergent ākonga

Hyperfocus, innovation/out of the box approaches, ability to see the big picture, an above average ability to connect concepts and ideas, passion for social justice and fairness, empathy, incredible listening skills, strong memory, very honest, not bound by convention or hierarchy, deep sense of responsibility, good organisational skills, visual thinker, very trusting, attention to detail, good spatial awareness, good with technology, large vocabulary, drive for perfection, a deep approach to learning, strong oral language skills (for example, public speaking, bilingual/multilingual).

Figure 1. Challenges and strengths identified in literature and used in the survey.

Tell us in your own words your understanding of neurodiversity.	Open text field
Have you noticed differences between Māori and/or Pasifika learners with neurodiversity?	Open text field
What challenges do you recognise for kanorau ā-roro|neurodivergent ākonga?	Check list informed by literature
What strengths do you recognise in kanorau ā-roro|neurodivergent ākonga?	Check list informed by literature
What approaches do you use to support kanorau ā-roro|neurodivergent ākonga?	Check list informed by literature
What assessment options do you offer to support Kanorau ā-roro|neurodivergent ākonga?	Check list informed by literature and an open text field asking for more details
How confident are you in providing educational experiences for all your tauira/ākonga?	Yes /No

Figure 2. Questions and response type used in survey.

Our goal was to find out what kaimahi knew and what they did to accommodate neurodivegent ākonga. We wanted to use this for our Otago Polytechnic Neurodiversity Community of Practice (OP NCoP) as we planned hui, education sessions and attempted wider organisational change. Our larger goal was better support for all ākonga, particularly those who were neurodivergent, regardless of whether they identified or disclosed their neuro 'spiciness' or not.

FINDINGS

The survey ran over the months of June to August 2022. Eighty-three participants from five colleges across Otago Polytechnic campuses completed the survey. The largest group of responses was from the College of Engineering, Construction and Living Sciences (22 percent), while the smallest was from the College of Work Based Learning. Sixty-four respondents (77 percent) identified as New Zealand European/Pākehā, 12 (14 percent) as Other, and three (3.6 percent) as Māori, with four (4.8 percent) who did not answer this question. The other identities included Filipino, Samoan, American, Indian, North American, Australian, and Scottish. We analysed the quantitative responses using numerical summaries and graphs to visualise the patterns. We analysed the qualitative responses using the method for thematic analysis set out in Maguire and Delahunt (2017). We individually organised the responses into coded groups, and then met to review and negotiate shared themes or codes. We identified key responses as examples to illustrate each theme. This analysis process took several sessions as individuals and several more working in partnership. Throughout this process we were cognisant of the literature used to inform our study, and also our own lived experiences as late-diagnosed kanorau ā-roro|neurodivergent individuals (ADHD, autism, with communication, sensory and executive function challenges). It was as neurodivergent individuals we decided to sometimes use the popular, commonly-used term neuro 'spicy' to refer to neurodivergent people. We conferred several times with neurotypical colleagues on the emerging themes.

HOW KAIMAHI RECOGNISE AND ADAPT THEIR TEACHING AND ASSESSMENT FOR KANORAU Ā-RORO | NEURODIVERGENT ĀKONGA

Many kaimahi are able to recognise and adapt their teaching to accommodate the challenges and strengths of kanorau ā-roro|neurodivergent ākonga. Over half the respondents recognised many of the challenges and strengths identified in the literature. Many educators recognise when their ākonga need more time, have poor time management or organisation skills, or a host of the other attributes of neurodiversity (Figure 3). There was similar recognition of many of the strengths associated with neurodiversity, including attention to detail, empathy, honesty, organisational abilities, and a drive for perfection (Figure 4). We are heartened to know that educators can recognise these strengths and weaknesses and were interested in seeing how they used this to adapt their teaching to better fit students.

Question: We are interested in seeing if you recognise some of the typical challenges that face our kanorau ā-roro|neurodivergent ākonga at Otago Polytechnic as well as at other educational places and events. Have you had tauira with the following challenges?			
	# responses	Rank	Percentages
Needs more time	58	1	70.7
Time management	57	2	69.5
Poor organisational skills	55	3	67.1
Proprioception difficulties – clumsy	55	3	67.1
Difficulty with social communication	54	5	65.9
ADHD	52	6	63.4
Autism	40	7	48.8
A need to fidget	39	8	47.6
Sensitive to noise	30	9	36.6
Sensitive to lighting	24	10	29.3
Sensory integration issues	22	11	26.8
Executive function	20	12	24.4
Easily distracted	16	13	19.5
Tourette's	15	14	18.3

Figure 3. Typical challenges facing kanorau ā-roro|neurodivergent ākonga.

Question: Kanorau ā-roro|neurodivergent tauira have some incredible strengths. Have you had tauira with the following strengths/behaviour in your classrooms?

	# responses	%	Rank
Attention to detail	56	68.3	1
Good with technology	51	62.2	2
Empathy	51	62.2	2
Very honest	49	59.8	4
Ability to see the big picture	48	58.5	5
Good organisational skills	48	58.5	5
Visual thinker	47	57.3	7
Drive for perfection	46	56.1	8
Innovation/out of the box approaches	43	52.4	9
Passion for social justice and fairness	43	52.4	9
An above average ability to connect concepts and ideas	42	51.2	11
Strong memory	42	51.2	11
Not bound by convention or hierarchy	40	48.8	14
Large vocabulary	37	45.1	15
Strong oral language skills (public speaking, bilingual/multilingual)	36	43.9	16
Hyperfocus	35	42.7	17
Deep sense of responsibility	32	39.0	18
A deep approach to learning	32	39.0	18
Incredible listening skills	31	37.8	20
Very trusting	29	35.4	21
Good spatial awareness	25	30.5	22

Figure 4. Strengths of kanorau ā-roro|neurodivergent ākonga

Half our educators reported they support kanorau ā-roro|neurodivergent ākonga with extra time (51 percent), or through conversations (42 percent), practical tasks (38 percent) or demonstrations (36 percent). There were a few responses reporting that some educators did not expect to modify anything; they scheduled the class and the assessments, and expected students to work.

HOW KAIMAHI UNDERSTAND KANORAU Ā-RORO|NEURODIVERGENCE

We asked our participants to tell us about their understanding of neurodiversity. Of our 83 respondents, 19 did not answer this question. In our thematic analysis, four initial themes emerged, and in finalizing these a fifth theme was revealed (Figure 5).

Neurodiversity affects how people experience the world.
Neurodiversity involves mental health, requires diagnosis, and describes how people are different. It is a difference.
Neurodiversity affects how people learn (and by default how I need to teach).
Neurodiversity is a natural variation of being human, which can be seen in an individual's strengths and areas of challenge.
This is me!

Figure 5. Five themes – Tertiary Educators understanding neurodiversity.

Theme 1: Neurodiversity affects how people experience the world

The responses here were framed in terms of how people experienced the world, that there were differences between people. Some of these responses mentioned learning or education but framed this in terms of the wider world. The final quote in Figure 6 is an example of this describing neurodiversity in terms of the world and adding that "our education system and educators are not well prepared."

We feel that these respondents are informed about neurodiversity and perhaps are also familiar with educational practices. Perhaps they have experienced or seen situations where education has not met the needs of neurodivergent individuals.

Neurodiversity affects how people experience the world
It represents the different neurotypes that are present in the population, for example, people living with ASPD, ADHD, dyslexia, dyspraxia, and so on, that may make aspects of learning, sensory experience and/or communication different from other people not living with these conditions.
Neurodiversity encompasses brains that are outside the standard range of variation – ADHD, autism, dyspraxia, dyscalculia, dyslexia. The way they interact with people and their environment can be varied as well as how they absorb, process and learn new information. Early diagnosis and intervention results in learners with more self-awareness and strategies to employ and knowledge of how to manipulate their environment to their advantage. They often encounter high levels of stress and mental health issues from operating in a world designed for neurotypicals.
My understanding is this relates to the idea that each person relates to the world and their experiences of it in different ways.
No one way of being right or wrong. Unfortunately, our education system and educators are not well prepared to work with this diversity.

Figure 6. Responses representative of Theme 1.

Theme 2: Neurodiversity affects how people learn (and by default how I need to teach)

Responses here positioned neurodiversity as something educators needed to understand. They spoke to neurodiversity as a difference that required educators to be flexible in how they approached learning (Figure 7). Some of these responses mentioned diagnosis or named 'conditions' but these were not framed as negative, or as not-normal. In fact many of these respondents used quote marks around the word 'normal' or 'typical.' We felt this framing questioned the concept that humans were normal or typical by default, and any variation was difficult or a problem.

Neurodiversity affects how people learn (and by default how I need to teach)

My understanding is that we are all neurodiverse, in the same way as we are genetically diverse. Some of us may identify with one or more 'neurotypes' or have a diagnosis of one of the neurodiverse conditions (including but not limited to dyslexia, dyspraxia, dyscalculia, Irlen's, Autism and autism spectrum condition, etc.), in which case they identify as 'neurodivergent.' Because the neurodiverse conditions can create learning differences, it is important that we as educators understand and can accommodate for students with these neurodiverse conditions.

Neurodiversity applies to people who learn in non-typical ways – dyslexia, dyspraxia, dyscalculia, ADHD, hearing impaired, sight impaired, autism.

A spectrum of diverse ways of cognitive functioning can result in range of ways of interpreting data, deciding what data is important, analysing cues and environments. Society and environment can cause disability experience for the neurodiverse, but can also create equitable opportunities. In terms of teaching, need to be aware that some forms of group teaching and feedback are stressful for different students for different reasons.

That people have different ways of learning and expressing themselves. These may or may not have causal factors such as disability or trauma. That neurodiversity is not necessarily a barrier to learning but may require different approaches to the traditional.

People whose brains work differently to the 'normal.'

Neurodiversity to me means that we all think and learn differently. Different options need to be available for learners to be able to understand the content and context, i.e., some learners like to learn visually, others like to read text, some like research, some like videos, some need help reading, some use pictures to articulate their thinking. It also means that some learners like practical aspects over theory. Our current courses offer lots of different opportunities to articulate assessment and portfolio work, and none of my students submit the same thing. They submit what works for them, including audios, videos, presentations, portfolios, etc.

Figure 7. Responses representative of Theme 2.

Theme 3: Neurodiversity is a natural variation of being human, which can be seen in an individual's strengths and areas of challenge

Responses here suggested neurodiversity was a natural variation of being human, and could be seen in an individual's strengths and areas of challenge (Figure 8). This theme was different to Theme 2 in that these respondents specifically mentioned positive aspects of neurodiversity. The responses in this theme were cautious and balanced, sometimes mentioning both strengths and challenges, and always using differences as part of the descriptor. Our respondents here were neutral, maybe deliberately so. Phrases like "what is considered normal" or "just differences" were frequent.

Neurodiversity is a natural variation of being human, which can be seen in an individual's strengths and areas of challenge

Neurodiversity is an umbrella term for a number of different conditions where a person's brain works differently from what is considered normal.

Differences in the human brain, how people view, learn, interact with the world. Neurodiversity is about the diverse ways different people process information and learn, that shows up in particular strengths, creativity and challenges when individuals, wider cultures of education and wider society don't cater to/understand these diverse behaviours and needs.

My understanding of neurodiversity is that it includes the range of different ways in which the brain may develop which can impact on a person's ways of understanding, interpreting, interacting and/or providing information in any variety of forms (for example, written, verbal) or contexts (for example, social, numerical).

Figure 8. Responses representative of Theme 3.

Theme 4: Neurodiversity involves mental health, requires diagnosis, and describes how people are different; it is a difference

The responses in this theme spoke of neurodiversity as a problem or a difference. Some related neurodiversity to mental health issues or mentioned diagnosis (Table 9). Often the framing was "different to ours" or to "normal" which was quite distinct from the responses in Themes 2 and 3 and communicated a stance of othering.

These particular responses were challenging for us as authors and proved the most difficult for us to categorise. We recognised that these were spoken and framed from a position outside of the neurodiversity model that we use, where neurodiversity is a natural variation in human experience and mental processing. However challenging these responses are to read, they are important in revealing the challenges for neurodivergent students as they work with educators who respond in this way.

Neurodiversity involves mental health, requires diagnosis, and describes how people are different; it is a difference
Refers to a range of conditions that are normal variations in brain functioning due to differences in neural pathways. Can occur spontaneously in a person or as a result of an event or illness (for example, an accident or stroke or some illnesses). Can be lifelong or episodic and resolve. Various forms – and may need adaptations to teaching/learning options to accommodate or make achievement/progress more accessible. Impacts on individuals will be diversely experienced so important to individualise to meet the individual's specific need. Can be considered or noted as a potential by an educator but should be formally diagnosed by an appropriate health professional – with a plan from there based on individual circumstance. As will any disorder/condition – for some it may mean that some options or pathways in life are not achievable – but this isn't a deficit and can occur across a range of the population for multiple reasons so most people can find a path that is satisfying and enjoyable.
I understand that these learners have trouble reading and view the world differently to some other people.
Neurodiversity encompasses brains that are outside the standard range of variation – ADHD, Autism, dyspraxia, dyscalculia, dyslexia. The way they interact with people and their environment can be varied as well as how they absorb, process and learn new information. Early diagnosis and intervention results in learners with more self-awareness and strategies to employ and knowledge of how to manipulate their environment to their advantage. They often encounter high levels of stress and mental health issues from operating in a world designed for neurotypicals.
It sounds like a buzz word that encompasses a larger group of people with mental development challenges and mental illnesses.
This is very broad. I understand this means Aspergers, ADHD, or autism and possibly covers other conditions also?
People whose brain works differently to ours.

Figure 9. Responses representative of Theme 4.

We identified a fifth theme: This is me!

In our analysis, we both struggled with theming responses that spoke to the participants' own experiences, either as neurodivergent (neuro-spicy) people or in having family members who were neurodivergent. Reflecting on these responses that did not fit into the other themes we realised that together these made a fifth theme – This is me! (Figure 10). This is not a surprise given the increasing recognition and reporting of neurodiversity. Current estimates are possibly inaccurate and low given the problems accessing diagnosis and what many see as a stigma around identification, but are reported as 10 percent of people being dyslexic (Dyslexia Foundation of New Zealand, n.d.) and an estimated 366 million adults worldwide with ADHD (Song et al., 2021). Some spaces seem more suited to neurodivergent people, with reports of between 40 percent to 70 percent of people in the creative sector being neurodivergent (Universal Music & Welsh, 2020). This recognition, reporting, identification, discovery and identification with neurodiversity is likely to increase as more individuals learn about neurodiversity and recognise themselves and whanau as neurodivergent.

I am neurodiverse, and have spent the past few years looking at a lot of online content that explains differences and experiences, and reading books and journal articles on different forms of neurodiversity. I know that there are various presentations, ADHD, Autism, Irlen's, dyslexia, dyspraxia, dyscalucia, tourettes, which are more or less permanent, and also that there are temporary forms that come from head trauma or illness that neurodivergent people experience the world differently and communicate differently. That there are issues when neurotypical people misread neurodivergent peoples behaviours as rude, or threatening, by ascribing intent that or meaning that is not there. I also understand that sensory information can be experienced more strongly by some neurodivergent people, so bright lights, or the hum of electronics, or background noise or the feel of scratchy clothes labels or textures, or smells can be incredibly distracting and get in the way of learning.

My understanding comes from personal experience of having dyscalculia. There is dyslexia in my family and I have one autistic son. So it is a big part of my life and very familiar to me when helping students.

I have a good understanding, my son has dysgraphia.

Figure 10: Responses representative of Theme 5.

RESPONSES THAT TROUBLED US

There were some responses that puzzled us as neuro-spicy tertiary educators. One example is: "It sounds like a buzz word that encompasses a larger group of people with mental development challenges and mental illnesses." To be faced with a response that equates what we believe is a natural variation in being human with "mental development challenges and mental illnesses" (Figure 9) was shocking to us. Responses like this were in the minority, but are important. These reinforced that while we were familiar with neurodiversity and expected to accommodate the differences people had as we taught, not everyone shared that view. Such responses barely concealed expectations for ākonga to appear as 'normal' students, and that their challenges were their own personal problems and not something educators needed to consider, or that such considerations were biased and unfair.

HIDING IN PLAIN SIGHT – A.K.A. MASKING

One way in many neurodivergent people stay safe is through mimicking neurotypical behaviours (Price, 2022). This constant cognitive monitoring and deliberate mimicking of expected behaviours comes as a huge energy and well-being cost to neurodivergent individuals and is known as 'masking.' Price (2022) sets out the very real cost and need for many neurodivergent people to hide their authentic selves. A second way neurodivergent people stay safe is to withdraw or avoid, deliberately stepping away from challenging situations or environments (Price, 2022). Such choices may make tertiary educators' lives easier but at the very real cost of limiting the achievements of neurodivergent ākonga.

DOUBLE EMPATHY PARADIGM

Understanding and accepting that humans can have very different experiences and can communicate in very different ways by both educators and ākonga must be important for successful learning. Milton et al.'s (2022) Double Empathy Theory proposes that successful communication between neurotypical and neurodivergent individuals requires both to recognise and respect communication differences. The Double Empathy Theory reveals a narrow, flawed, and widespread perspective whereby neurodivergent people have, until now, considered to have failed to understand neurotypical expectations. Milton et al. (2022) propose that for every instance where neurodivergent individuals fail to understand neurotypical expectations, there is a counter explanation that the neurotypical are failing to understand neurodivergent expressions. Milton et al. argue for a more nuanced understanding of human communication that is reciprocal. To do this requires neurotypical individuals to recognise and consider non-neurotypical experiences as valid. Previous work by the authors (Ker & van Gorp, 2023; Lange, 2022; van Gorp, 2023) illustrates an experience where neurodivergent students are often misunderstood or misinterpreted.

Our results revealed that while half of our participants demonstrated an understanding of common strengths and challenges of neurodivergent students, disparities exist in educators' comprehension of neurodiversity and the application of accommodation strategies.

ACCOMMODATIONS AND ADAPTATIONS FOR NEURODIVERGENT ĀKONGA

We were heartened to find that responses spoke to a huge range of approaches to accommodating the needs of neurodivergent ākonga. Respondents are adding audio and video options to traditional written assessments, providing extra time, and using workbooks or journals to document work done. Some wrote of ākonga prerecording presentations as a solution to anxiety, because recording allows for students to submit their 'best take.' Softer adaptations included identifying students who were struggling to communicate in assessment situations and offering a conversation as an assessable record. We are aware of one colleague who uses a TikTok format for students to demonstrate via short videos their proficiency in a practical task. Some responses mentioned reader/writers but many more identified more accessible options like audio recording.

Only 50 percent of respondents are comfortable adapting their teaching to neurodiverse needs! For us this was a notable and sad finding. Educators may be too busy maintaining discipline currency and meeting compliance and administrative demands. Without a clear understanding of how neurodiversity can present or how it can affect the learning of some students, educators may never really consider that minor easy adaptations could make significant improvements for their learners and to their abilities as an educator. Promoting neurodiversity in vocational education prepares learners for the diverse and inclusive work environments they will encounter once they have graduated.

This study highlights the need for ongoing professional development to ensure a supportive learning environment for neurodivergent students at Otago Polytechnic and that development needs to start with education on neurodiversity with a goal of awareness and acceptance.

SUMMARY

In summary, we found that educators in our own institution have some knowledge about neurodiversity, and many educators are adapting their teaching to accommodate individual ākonga needs. We also revealed that, when asked, up to half of our educators are not confident in supporting all ākonga, which would include neurodiverse students. Importantly, our educators do not share a common understanding of what neurodiversity is, and so differ in how they respond to and adapt to neurodivergent ākonga needs and strengths. This surprised us as we have worked since 2020 to build the Otago Polytechnic Neurodiversity Community of Practice and have hosted two symposiums on campus that focused on neurodiversity in tertiary education.

We also learned that many educators do not have a contemporary or informed understanding of neurodiversity. As neurodivergent individuals, we are worried that some educators believe they are not qualified to help or that neurodiversity is a developmental delay or mental illness. We believe that all tertiary educators should be expected to build their awareness of neurodiversity as a natural human variation, and be encouraged to adapt their teaching and assessment practices in ways that support ākonga to achieve.

Educators need to have an understanding of concepts like the double empathy problem (Milton et al., 2022) and masking. This is important for them to develop and understand that being 'normal' is overrated (Stockman, 2018), and variation is to be expected. Empowering educators to adapt and accommodate neurodivergent ākonga through being flexible about attendance and timing and format of classes and assessments is a low-stakes strategy for improvement. By encouraging educators to be informed, accepting, and supportive of neurodiverse learners' diverse learning styles and strengths, educational institutions can improve their academic success rates and improve the experiences of all ākonga.

Understanding and educating neurodivergent ākonga is not only about providing accommodations, it is an investment in creating a reasonable, more innovative learning environment that benefits everyone.

Stella Lange, a transplanted scientist working in the School of Design, worked to set up a Neurodiversity Community of Practice, Otago Polytechnic. Her research interests include a recent hyper-focus on Neurodiversity in tertiary education and she has introduced neuro friendly options for teaching and assessment in undergraduate and postgraduate courses in Design.
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LEARNING FROM OTHERS IN THE NEURODIVERSE SPACE – REFLECTION ON PRACTICE

Rachel Byars

INTRODUCTION

In the evolving landscape of education and diversity, the shift towards a more inclusive approach to the unique strengths and perspectives of neurodivergent individuals is at the forefront of applied tertiary education. My colleague, Rachel van Gorp, has been part of the Neurodiversity Community of Practice which has been championing the understanding of neurodiversity within our tertiary education setting for the past few years. It has been hard not to be involved in the dialogue without her mentioning something around the topic. As an experienced educator, did that mean that I knew and understood what all this meant? No! It was time for me to stop, take note, and understand this discourse so that I could better comprehend and reflect on my teaching practice to enhance my support of our learners.

My focus was to explore the significance of neurodiversity within the educational context and embark on a transformative journey inspired by a colleague who has emerged as a champion in the neurodiversity space. The educational landscape has long been characterised by a quest for innovation and a commitment to fostering an environment where every learner can thrive. However, the narrative surrounding neurodiversity has gained momentum only recently, challenging conventional norms and prompting educators to reassess their pedagogical approaches.

One of the most enriching aspects of working in tertiary education is the incredible diversity of our learners. We have opportunities to facilitate their learning and watch them develop their skills over one to three years. As an educator, I take the time to reflect on my practice regularly and through this consider my own self-development and learning journey. Reflective practice allows thinking and feeling about an event or an experience that can be developed by steering learning and enhancing professional development and practice. Reflective thinking is personal and empowering, not self-indulgent (McMillan & Weyers, 2013). It is a form of mental processing that can aid learning and can be undertaken to gain further consideration of something in more detail. As an educator, it is important to consider continuous improvement, reflective practice, and professional development which allows for the opportunity for self-development. Therefore, I aim to gain new insight and understanding into past teaching practices along with new enquiries into improving future practice. This is a useful way of looking back and identifying what I know, what I need to learn and understand, and what can be carried out differently to make future improvements to my personal performance and teaching practice.

My journey started by fostering self-awareness and recognising the need to have an improved understanding of neurodiversity, ensuring clarity about the terminology used in the neurodiversity space, and then asking how, as an educator, I could facilitate or improve my teaching style and the strategies that might assist my learners in the future. When I first encountered the term "neurodiversity," I was largely unfamiliar with its implications and significance. I felt a mix of curiosity and uncertainty, as the idea of embracing neurodiversity seemed important. I needed to have a better understanding of how I could incorporate strategies into my teaching practice which would encourage individuals to celebrate and share their unique perspectives and talents.

UNDERSTANDING THE TERMINOLOGY

The first step was to gain knowledge of the terminology that is used and to increase my understanding of the terms. I found that there was not necessarily a widespread understanding of the terms neurodiversity and neurodivergent, nor that they were the only terms to use. Regardless, it became clear that neurodiversity is not a diagnosis, but a broader term which is used to encompass a wider range of specific or non-specific diagnoses. Early literature referred to neurodiversity as naturally occurring diversity in human cognition (Singer, 1999), with it being used as an umbrella term for a range of neurocognitive disorders (Doyle, 2020; Kapp et al., 2013). Clouder et al. (2020) suggest that the umbrella term includes dyspraxia, dyslexia, attention deficit hyperactivity disorder, dyscalculia, the autistic spectrum, and Tourette syndrome. From a neurodiverse perspective, these differences in the way people perceive, learn about, and interact with the world are conceptualised as naturally occurring cognitive variations, which may bring unique strengths and challenges for those individuals (Hamilton & Petty, 2023), rather than being framed as disorders or disabilities. Within the broad spectrum of neurodiversity, some people are labelled as neuro-typical (or NT), that is, those whose way of processing information matches the assumed societal 'majority' or 'norm,' and others as neurodivergent (or ND), those whose processing differs from this expected norm (Spaeth & Pearson, 2023). The way that neurodivergent learners are likely to learn will deviate from the expectations that we may have as educators of the 'typical' (or neurotypical) learner.

UNDERSTANDING THE LEARNERS

It is estimated that 15 to 20 per cent of the global population today falls within the neurodivergence spectrum (Daher, 2024). For some time the true figure has been hidden, with individuals often going to great lengths to mask their characteristics to conform, rather than embracing the exceptional skills, such as pattern recognition, memory and mathematics skills, that can significantly benefit their learning (Daher, 2024). Research has shown that most learners with learning disabilities experience frustrations in higher education if the necessary learning tools are not readily available, and that for those who may also leave behind familiar structures and environments, this also adds to the challenges that they can face (Clouder et al., 2020). Clouder et al. (2020) highlight the need for a better understanding from the perspective of neurodivergent learners who feel anxious when interacting with others and are inclined to isolate themselves from peers despite a strong desire to make friends. Vincent et al. (2017) highlight the perceived sense of *difference* which is a prominent part of the self-concept of neurodivergent learners which often makes their transition into higher education challenging, with many feeling out of place in what could be seen as a competitive environment (Shaw & Anderson, 2018). For many learners, their apprehensions are clouded by past experiences (Kwon et al., 2018). Neurodivergent learners are likely to learn and behave in ways that may deviate from the expectations of the implied (or neurotypical) learner (Spaeth & Pearson, 2023). Despite this, neurodiversity plays a significant role in shaping the learning landscape for all learners. It is not just about accommodating differences, it is about embracing them and creating an environment where every learner can thrive.

COLLEAGUE TO COLLEAGUE

The next stage of my journey was to be guided by the appreciation of others' talents and abilities (Ghaye & Lillyman, 2010), namely those of my colleague Rachel. It was through her sharing of her journey, and her experiences as an educator (and learner) with neurodivergent traits, including Irlen syndrome and dyslexia, that I chose to take the time to have further conversations, having sought ethics approval. Rachel has certainly championed and fostered the sense of belonging for our learners within the academic community by getting to know the learners and encouraging all team members to do the same. Before presenting at the Neurodiversity Symposium in 2021 where she shared her own story, Rachel felt extremely vulnerable and had complete empathy with neurodivergent learners in a new learning environment (van Gorp, 2022). While she may advocate for our

neurodivergent learners in our School (Otago Polytechnic School of Business), Rachel is eager to empower colleagues to be better informed so that, as individuals and as a team, we can support and recognise our learners with various neurodivergent profiles and assist in providing them with the best possible learning environment and outcomes.

When you start to listen, you understand from Rachel the significance of proactive support and the role it plays in fostering an inclusive learning environment that meets the unique needs of our neurodivergent learners. She highlights that "by being aware of our learners' neurodivergent profiles, we can anticipate challenges they might face and offer tailored support." You gain the sense of embracing, rather than merely accommodating, neurodiversity within the pedagogical landscape. Often learners will have a sense of being lost in the system as they may not always have had the best education experiences in the past, or they may have had people assisting them and some 'real micro-managing,' whether they required it or not. Rachel addresses this by stating that "in the big wide world, we throw a lot of information at them, which generally neurotypical learners can take, but for others it is little bit too much." We must consider the amount of information shared and how this is disseminated. Rachel stresses how important it is that learners are aware of the support channels that are available, and to ensure that they are asking for assistance early if needed.

TAKING ACTION

Part of the learning was to trial initiatives, to see what worked and then further reflect and adapt. The implementation of flexible teaching methodologies is paramount and the opportunity to trial and adopt practices that accommodate varied learning styles is key to providing options for learners to express their understanding through alternative learning and assessment methods. This is in favour of more adaptable approaches and transparent communication channels, which would lead to a learning environment that minimises potential sources of confusion and overwhelm for our learners. This change is supported by the Community of Practice and the institutional culture and values that champion neurodiversity.

The Individual Learning Plans (ILPs) project was introduced to our year one learners at the start of 2023 as a catalyst for building and enhancing the connections of our learners, after the impacts of COVID-19 over the previous three years. The ILP was designed to help the learner set goals and achieve academic and professional success while prioritising personal wellness. The tool was also an opportunity to engage and connect with learners face-to-face and understand what their individual needs and goals were, providing a safe space for learners to share their past experiences and the learning support they might require. These meetings were conducted by a couple of team members, which Rachel said could be expanded with increased coverage across team members to provide an improved understanding of some of the challenges our learners can face. This was successfully managed to allow the wider team to engage one-on-one with learners, providing an opportunity to share information and to provide guidance on the support available to learners, such as assistive technology, learning tools and spaces available. Signalling that you are open to students engaging in different ways and giving them ways to get in touch if they have learning needs ensures the prioritisation of creating an environment where students feel comfortable to engage (Burgstahler, 2015).

My colleague emphasised the need to incorporate different teaching strategies; for instance, providing visual aids such as videos and handouts for those who need them, incorporating hands-on activities, and allowing for flexible pacing can benefit learners with different cognitive profiles. Starting with easy, practical steps such as consideration of the colour and font used in PowerPoint slides and any handouts, or having lights on or off in a classroom, were all useful ways to accommodate different learning styles and enhance engagement. Whilst these strategies are still in the early stages of implementation, the initial reaction from learners was acknowledged. Building in flexibility will enable students to work to their strengths and meet their challenges more safely and constructively (Spaeth & Pearson, 2023).

Although some of these strategies may be viewed as personalising teaching methods to support neurodivergent learners, they can enhance the overall learning experience for the entire classroom.

WHAT DID I LEARN AND WHERE TO FROM HERE?

This reflective journey has provided a range of learning opportunities and valuable insights. What I have learnt so far is that eliminating unnecessary barriers to learning for our learners means they have a far better chance of success with our support. This realisation dovetails with actionable strategies, such as the integration of visual aids, provision of explicit instructions, and flexibility in seating arrangements, all of which collectively serve to enhance the neuro-inclusive quality of the learning environment. This approach is not about compromising academic rigour; rather, it engenders an environment conducive to the diverse cognitive and learning styles that are inherent within the neurodivergent learner population as well as enriching the learning experience for all learners, prompting a broader reflection on inclusive pedagogical practices.

My colleague is committed to fostering an environment of genuine comprehension and compassion. As an educator, it is important to have an informed approach, so that we can acknowledge the neurodivergent strengths of our learners and support them alongside the wider Student Success support services that are available to them through their academic journey. There are parts of this that are still a work in progress as we challenge the status quo. However, if we can signal to our learners that we can engage with them in different ways, it shows them that we genuinely care. We need to provide flexibility in how learners can participate (both in the classroom and online and in assessment practices).

Continual education, awareness and building on the initiatives that are provided can ensure that we are working as a team towards cultivating an environment that recognises neurodiversity as an opportunity to enhance the academic experience. Encouragingly, Rachel commented on a more personal level that "I have watched our whole School just slowly, but surely, change over time."

In conclusion, the insights shared from my colleague Rachel's experiential knowledge, along with taking action, emphasise the critical need for continued professional development in tertiary education towards a more inclusive, understanding, and responsive approach to neurodiversity, and the significance of embracing our learners by incorporating key action points that can serve as a roadmap with tangible practices. The team approach is a testament to the power of shared knowledge and learning from others. Embracing the unique insights of a colleague deeply engaged in the neurodiversity space will provide further opportunities in the future.

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EXECUTIVE FUNCTIONING: WHAT IT IS AND WHY IT MATTERS

Rebecca Gilbertson and Tania Allan Ross

There has been an increase in reported additional learning needs across Aotearoa New Zealand in the last 30 years, largely due to increased knowledge in this space (Bourke et al., 2021). It is well known that students with disabilities are among the groups of people most commonly excluded from education (Slee, 2018) and this has the potential to create a huge impact on life outcomes. Therefore, educators must be equipped with an understanding of the range of learning needs in classrooms today. Sadly, many Initial Teacher Education (ITE) programmes in Aotearoa New Zealand lack the depth of training required for educators to feel confident in meeting additional learning needs (Attwood, 2017), which does a disservice to students who have such needs.

In the tertiary space, students need to be self-advocates with strong metacognition and executive functioning skills, given the teaching style at this level. The increase in reported additional learning needs in Aotearoa New Zealand has drawn attention to students who struggle with executive functioning skills and how this can impact their learning outcomes. Kenworthy et al. (2012) note that there is evidence to suggest some, but not all, executive functioning skills are challenging for neurodiverse individuals such as those with autism and attention deficit hyperactivity disorder (ADHD); however these challenges can vary between individuals. To explore this further, a workshop was developed as part of the Neuroability Symposium in 2023, hosted by Otago Polytechnic and Ako Aoteatoa, titled "Executive Functioning: What it is and Why it Matters." A range of attendees participated, including those with lived experience, social workers, students, and educators from early childhood, primary, and tertiary sectors. This article reflects on the workshop content and the discussions with the attendees.

WHAT EXECUTIVE FUNCTIONING IS

Executive function is an umbrella term that encompasses the cognitive skills that are part of human behaviour (Andrés et al., 2019). These skills allow us to complete everyday tasks such as focusing, remembering instructions, completing multiple tasks at once, and planning (Moyes, 2014) which are essential for school and educational success as they empower students to engage in learning actively (Andrés et al., 2019). Executive functioning enables students to be attentive, resist distractions, follow instructions, plan and organise activities, and solve problems.

NEUROTYPICAL DEVELOPMENT OF EXECUTIVE FUNCTIONING SKILLS

Executive functioning skills for neurotypical people begin to develop in the early years of a child's life (Best & Miller, 2010; McClelland et al., 2019; Taylor et al., 2012). Some research indicates executive functioning skills develop at different rates and reach optimal levels at different ages. Best and Miller (2010) explore a range of executive functioning development models and note that inhibition develops rapidly in early childhood followed by slower improvements in adolescence, while working memory typically improves linearly from early childhood through to adolescence. Taylor et al. (2012) examine studies of neurotypical development from ages

five to 22 and propose that environmental and social changes in late adolescence and early adulthood may have an influence on non-linear development of executive functioning skills during this time. It appears that, while executive functioning skills are linked and can be built upon, they are required at all stages of development. The support of educators, family, and trusted adults is required to embed these skills throughout a person's life.

HOW EXECUTIVE FUNCTIONING IMPACTS LEARNERS

When students have strong executive functioning skills, they will be more readily able to meet the academic demands of tertiary education as they have developed the skills necessary to meet this high-demand environment (Coşkun, 2018). They are more likely to be able to work independently, plan effectively, self-monitor progress, and prioritise, which are all foundation skills for academic success (Coşkun, 2018). In addition, they will have likely developed skills in working memory which relates specifically to their ability to engage with information, manipulate it, and use it for other purposes, allowing them to digest information from multiple sources effectively (Coşkun, 2018; Waterman & Miller, n.d.).

Students who experience executive functioning difficulties may find their learning journey challenging. They may feel a strong desire to feel accepted and mask their difficulties to fit in (Neurodiversity in Education Coalition, 2023). This could prove successful in the short term but possibly lead to barriers to success as academic demand increases when they enter tertiary education. Levine (1994) proposes that difficulties with executive functioning skills have a huge impact on learning. A lack of such skills may prevent students from dealing effectively with the equipment needed to learn efficiently, cause confusion about time and the sequencing of tasks, and make it difficult for students to 'shift gears' smoothly or remember to do something that had been planned (Levine, 1994). Neurodiverse students may find all this particularly challenging to manage.

HOW TO SUPPORT EXECUTIVE FUNCTIONING SKILLS

Having a strengths-based approach to teaching and learning allows people to utilise their strengths and resources as part of the process. McCashen describes a strengths-based approach as power-sharing, stating:

> The Strengths Approach emphasises people's ability to be their own agents of change and is applied by creating conditions for people to identify, value and mobilise their strengths, capacities and resources. A core principle of this approach is working from values, beliefs and actions that share "power-with" rather than exerting "power-over" others. (2005, p. 19)

Once a strengths-based approach has been established, through the building of a teacher and student relationship where they begin to know and understand each other, and once specific learning needs are known, there are a wide range of executive functioning skills that educators can support students with, for example through modelling and explicit teaching. Given the time constraints, the workshop focused on three key skills: working memory, planning, and organisation. The challenges around these skills and strategies for supporting them were discussed.

Working memory

Working memory can be likened to a temporary sticky note in the brain. It is the ability to hold important information in your mind and manipulate it over short periods (Gathercole & Alloway, 2007). Working memory is a predictor of academic success (Sankalaite et al., 2023; Waterman & Miller, n.d.), alongside teacher-student relationships (Sankalaite et al., 2023), yet it appears educators often overestimate the capacity of working memory in students. Waterman and Miller's (n.d.) research found that over 75 percent of educators surveyed overestimated the time working memory remained effective. Educators need to be mindful of the limits of

working memory in the classroom setting, and how they can support the development of working memory skills. Workshop participants talked over the variations within students' abilities to recall taught tasks. Strategies used to support working memory were noted, including the repetition of taught content, the implementation of varied teaching methods such as the introduction of visual prompts, flow chart listing, and additional time to help students better process and retain new knowledge.

Planning

Planning skills are like a road map to a destination; they allow us to look to the future. Planning skills are crucial for the efficiency of learning (Kostromina, 2013); however, different environments and situations can impact a person's ability to plan, particularly when it comes to learning. Petersen et al. (2006) acknowledge the many demands of tertiary study and how balancing these demands can impact a person's ability to plan and set goals. Explicitly teaching planning skills was viewed by workshop participants to be one of the key factors for successful learning outcomes. Teaching these skills from a young age was viewed as important so students have strengths in this area by the time they reach the high-demand environment of tertiary study.

Organisation

Organisation skills can be linked to planning, and are required to deliver on short and long-term responsibilities. Tertiary students have a range of deadlines and responsibilities, both within their learning journey and their wider lives. Teachers who teach organisation skills to their students are imparting important lessons for education as well as for life (Gambill et al., 2008). Participants at the workshop discussed how these skills could develop over a person's life and how they were valuable in a range of capacities. It was noted how important it was for students to have a range of supports and structures in place to develop organisational skills. Educators felt they could not be solely responsible for supporting development in this area and students needed a range of supports such as family and friends. Both high-tech and low-tech tools such as diaries, calendars, apps, and reminders were viewed by participants as supporting the development of organisation skills across a range of contexts.

It is important to acknowledge that executive functioning skills develop at different rates for different people, and different levels of support are needed to ensure students can access learning. Students with additional learning needs such as autism, ADHD and specific learning difficulties such as dyslexia, often have difficulty with executive functioning skills and may find it challenging to develop skills such as organisation, planning, and working memory strategies (Mirfin-Veitch et al., 2020; Watson et al., 2016). These students may require additional support and time to develop and strengthen such skills and educators can use modelling, repetition, and explicit teaching of executive functioning skills in their practice as part of this process. Regardless of the time and level of support required, it will surely benefit the academic progress of students if they have stronger executive functioning skills (Alloway & Alloway, 2010; Watson et al., 2016).

REFLECTIONS FROM WORKSHOP PARTICIPANTS

Participants brought a wealth of personal and professional experiences with them, and a rich discussion resulted. Educators knowing their learners and being able to identify potential successful strategies and use these in their practice was noted to be an important first step in supporting students to develop executive functioning skills. Participants who were educators noted the particular importance of supporting their neurodiverse students as they were a group particularly at risk from exclusion from education. A common theme of the discussion was the challenges that students faced with executive functioning, particularly if these skills were not developed early on in the learning journey, as such challenges could pose an ongoing barrier to their learning. It was acknowledged that neurodiverse learners often struggled with developing executive functioning skills.

Experience from early childhood sector participants highlighted the importance of teaching executive functioning skills from a young age. These participants described the successes they had seen as young children moved through life with these strong foundations. It has been observed that a student may recognise indicators of neurodiversity in themselves while studying in learning environments which are aware and understanding. Those with lived experience spoke passionately about needing support from a range of sources such as family, friends, and their tertiary institution's learning support department, as well as executive functioning tools both low- and high-tech, to develop their executive functioning skills. They also highlighted strategies they had found successful such as minimising sensory input, and using visuals and diaries to help with organisation.

The availability of resources and sources of support were discussed at length. While early intervention was unanimously agreed to be essential, those with experience in the early childhood sector described a lack of resourcing in the early years. These participants felt resourcing in this area needed to be reviewed, especially as they viewed early intervention to be essential for developing the executive functioning skills required to progress to tertiary education. Those working in the primary and secondary sectors noted long wait times to access support; however, when support for educators did arrive, the resources and personnel made a huge difference in educators' ability to support students. The expertise in learning support found through organisations such as the Ministry of Education, and tertiary learning support departments, was viewed as valuable by educators in this workshop, as many felt they had received inadequate training in this area during their ITE programme.

Twelve key strategies to support working memory, planning, and organisation in learning environments were provided in the workshop as discussion points based on research (Leaver, 2019; Ministry of Education, n.d.; Obaid, 2013) and the experiences of the educators who ran the workshop. Participants broadly agreed these strategies were effective in supporting learners with executive functioning and learning and were the main ones discussed in the limited time of the workshop. Stories of personal experience were shared relating to these twelve strategies.

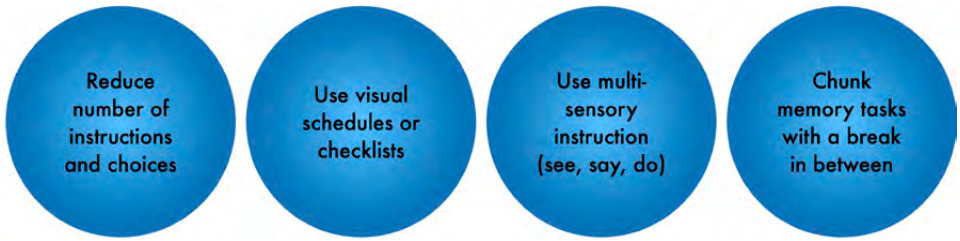

Figure 1. Working memory strategies.

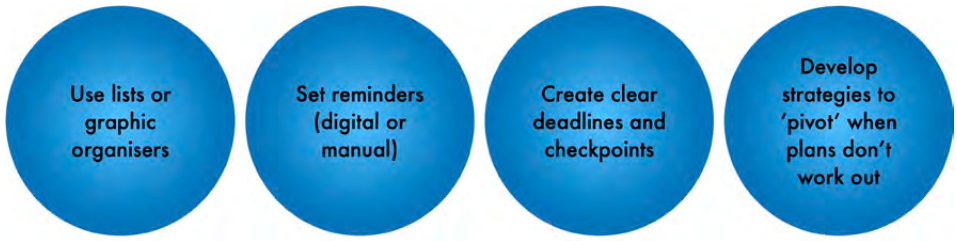

Figure 2. Planning strategies.

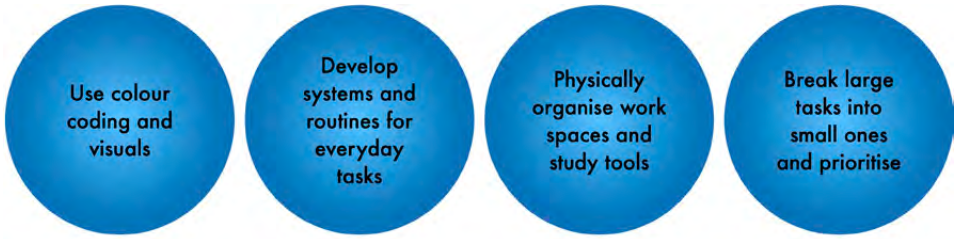

Figure 3. Organisation strategies.

Above all, participants agreed that the ability to self-advocate and the development of metacognition skills were key indicators for success in students, particularly at the tertiary level. They generally felt when students could articulate the areas in which they needed support, when they actively sought help when required, and when they knew their strengths and how to utilise these in their learning, those were key indicators for success. This observation is supported by several researchers (Coşkun, 2018; Gambill et al., 2008; Kane et al., 2014; Mirfin-Veitch et al., 2020), emphasising the importance of self-advocacy and the deliberate teaching of executive functioning and metacognition skills for students today.

CONCLUDING REMARKS

Executive functioning skills are important for both academic success and everyday life. With the rise in reported additional learning needs across Aotearoa New Zealand, educators need to be prepared to meet the needs of students present in today's classrooms. Executive functioning skills develop at different rates for different people and can be delayed for those with additional learning needs. Through explicit teaching, modelling, and encouraging self-advocacy focused on executive functioning skills, educators can support students in their learning journey to experience success. Developing strategies to support working memory, planning and organisation in particular will provide a strong platform for this.

The purpose of the workshop was to ignite discussion around the important topic of executive functioning in education. Participants brought a range of experiences to the discussion. It became apparent that executive functioning is an area where further support for educators is required. This support would enable them to feel confident in their practice and understand effective strategies to meet the diverse needs of students and achieve the ultimate goal of inclusive education: a position where "all children and young people are engaged and achieve through being present, participating, learning, and belonging" (Ministry of Education, 2023). Future research into how to support tertiary learners to develop the executive functioning skills needed for successful academic experiences would be beneficial, with a particular focus on strategies that are successful for neurodiverse learners.

Rebecca Gilbertson is tumuaki ki te Kura o Whakaohorahi – principal of Broad Bay school. She holds a Master of Inclusive Education and her experience as a Learning Support Coordinator for Ōtepoti ki te Raki Kāhui Ako, and her teaching background, has fostered a particular passion for empowering teachers to become inclusive practitioners. Rebecca's work is centred around identifying and removing barriers to education for rangatahi and she has recently been part of a city-wide dyslexia initiative to develop teacher capability and community awareness of support for tamariki with specific learning difficulties.

Tania Allan Ross is a Principal Lecturer in the School of Design, Otago Polytechnic. As a teacher Tania brings her lived experience working within neurodiverse and mental health settings to both her classroom and pastoral care roles. Tania holds a Master of Design Enterprise, and her research focuses on adaptive, inclusive apparel specifically addressing sensory integration differences.

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Article

https://doi.org/10.34074/scop.4013002

NEURODIVERSITY-AFFIRMING APPROACHES: DISCOVERING INSPIRATION AND INTERSECTIONS WITHIN '10 HABITS FOR PHENOMENAL EDUCATORS'

Victoria Beckwith

INTRODUCTION

Inspired by a webinar and a conversation with colleagues, this article explores the Kato Toolkit and its *10 Habits of Phenomenal Educators for Pacific Learners* (Chu-Fuluifaga & Ikiua-Pasi, 2021b) through a neurodivergent lens. Utilising a strengths-based philosophy and a Pacific research methodology, the ten habits intersect with neurodiversity-affirming approaches. The ten habits' descriptions encourage reflexivity and reflection, which could challenge and inspire educators who are supporting and teaching neurodivergent learners. Relationality, belonging, story-telling, kindness, clarity, trust, and creativity encourage positive engagement for both Pacific and neurodivergent learners and educators. Knowing ourselves and our learners supports diversity in our organisations and provides inspiration for our communities.

Attending the *Phenomenal Educators PLD Framework Research – Initial Findings* webinar in 2023 (Ako Aotearoa, 2023), I could see the intersections between supporting Pacific learners and supporting neurodivergent learners. The webinar inspired me as an educator and as a neurodivergent person. A later conversation with two colleagues sparked an idea for this article. We spoke about neurodivergence and what the reality of living with neurodivergence was like for our communities: rural, migrant, Pacific, and Māori. Afterwards, I reflected on our conversation and the significance of how we understand the different contexts people inhabit, across the spectrum of neurodiversity and neurodivergence. This reflection reminded me of the webinar and how communities can engage and inspire.

Supportive and inclusive communities utilise the strengths of each person for the benefit of the collective. Each member of a community has a role to play at different times – some will be needed in the present, but others will come to the fore at times of emergency or urgency. Communities are intertwined, like a rope, and the strength of that rope depends on the fibres. There is potential for everyone to play their part: the creators, the initiators, the reflectors, the listeners, the practical, the thoughtful, the negative, and the positive; those who rush forward, those who are patient and those who are reticent. These are the people who pace each other, provoke discussion, create space for thinking before doing, and provide a balance in the community.

Communities can enable belonging and promote inclusion. Communities can encourage people to be themselves; to feel seen and heard; to be engaged; to be celebrated, and to be supported during hard times. Educators are part of these communities and can strengthen learners' outcomes by creating inclusive environments which engage and stimulate learning (Fletcher et al., 2023). This article explores how two communities, neurodivergent and Pacific, could come together and support learner success through scaffolding with kindness, awareness, and trust, grown from a foundation of high expectations and belief.

NEURODIVERSITY-AFFIRMING APPROACHES

Neurodiversity refers to the differences in how people's brains function and process information across our whole human society (Dyslexia Scotland, 2022c; Singer, 2017). Neurodiversity-affirming approaches are ones where different ways of thinking are accepted and framed in a positive or strengths-based way. This includes neurodivergences, such as dyslexia, dyscalculia, attention deficit hyperactivity disorder (ADHD), and dyspraxia, which process information differently (Dyslexia Scotland, 2022c; Lange, 2022). Neurodivergency is often framed negatively, with stereotypes, stigma and intergenerational challenges resulting in deficit-outlooks and impacts on wellbeing (D'Arcy et al., 2023; Nalavany et al., 2023). Neurodiversity-affirming approaches change a deficit paradigm into an inclusive and compassionate one, where differences are accepted and seen as strengths rather than a problem (Cherewick & Matergia, 2023; Hamilton & Petty, 2023).

Understanding, acknowledgment, and the capacity to embrace neurodivergence are often luxuries, in conflict with the basic human needs of food, shelter, and safety. The daily reality for many neurodivergent households consists of challenges including inaccessible or limited pathways to services, friction with education, tension within employment, exhaustion, and a feeling of being lost or alone (Buckley et al., 2022; D'Arcy et al., 2023; Nalavany et al., 2023; van Gorp, 2022). However, these challenges are tempered by wins, small to some but huge to neurodivergent families. These wins can include children trying new things or staying in school, an educator or medical practitioner actively listening and responding respectfully, or an employer seeing the skills you bring to their business (Fletcher et al., 2023; van Gorp, 2022).

In reality, not every neurodivergent family is aware of their neurodivergence (van Gorp, 2022). Intergenerational issues persist without appropriate support or resources, and neurodivergent people might have negative or traumatic experiences in school or family contexts (Nalavany et al., 2023). Through activating neurodiversity-affirming approaches in education and the workplace, some of the challenges associated with neurodivergence could be reduced, and awareness and understanding could increase (Welton & Dettmer, 2023).

The generosity of the Kato Toolkit has enabled me to reflect on its gift of the 10 Habits (Chu-Fuluifaga & Ikiua-Pasi, 2021b) through a neurodivergent and neurodiversity-affirming lens. The synergy and intersections of this gift will be explored in the next sections.

The 10 habits of phenomenal educators for Pacific learners

1.	Fenua:	The pedagogy of reflection.
2.	Moana:	Know your Pacific learner and context.
3.	Vaka:	Educate with phenomenal Pacific-centric methods.
4.	Le Teu le Va:	Build teaching and learning relationships with Pacific learners.
5.	Ola:	Develop phenomenal practices.
6.	Teatea:	Instil motivation and good work habits.
7.	Aupuru:	Cultivate creativity and enthusiasm.
8.	Putuputu:	Construct a Pacific learning community.
9.	Arofa:	Enable mentoring to be a natural part of your teaching and manage the 'wobbles' that arise.
10.	Ti'ama:	Deconstruct and emancipate your Pacific learners' experiences.

(Chu-Fuluifaga & Ikiua-Pasi, 2021a, p. 102)

SYNERGY AND INTERSECTIONS

There is synergy between the 10 Habits of phenomenal educators for Pacific learners and a neurodiversity-affirming approach. Drawing on these 10 Habits will support not only Pacific learners but also neurodivergent learners and their families. Educators will be able to reinforce their existing good practices through engagement with the Phenomenal Educators PLD Framework (Chu-Fuluifaga & Ikiua-Pasi, 2021a) and apply their reflections positively when supporting their learner communities. The synergy provides inspiration for a more diverse and inclusive education environment where learners and educators engage with learning, collaborate, and evolve together.

Intersections between the Phenomenal Educators PLD Framework and a neurodiversity-affirming approach are explored by looking at each Habit separately. Some Habits also contain challenges for neurodivergent people and alternative suggestions from a neurodivergent viewpoint have been included. The discussion has been written with respect for Pacific spaces and the principles that shape the Kato Toolkit.

Habit 1. Fenua: The pedagogy of reflection

Habit 1, Fenua, highlights the importance of self-awareness, self-analysis, and reflection. Awareness of your positionality as an educator grounds you and it is an important nexus for reflexivity and reflection. Identifying your subjectivity and bias offers an opportunity to explore your own attitudes and bring objective approaches to your work (Hamilton & Petty, 2023). Habit 1 also encourages educators to look beyond and identify opportunities for professional development.

A point of difference for a neurodiversity-affirming approach can be gleaned from the example given of a Pacific learner sitting in the back row of a class. An educator may assume that the learner is disengaged. Habit 1 highlights the "cultural principle of respect" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 6) as a reason for the learner's position. However, neurodivergent learners may be seated at the back to enable a quick exit from the classroom; to stim without disturbing others; to have a holistic view of the room and the people in it; to avoid sitting close to others or in front of others, or because they are frightened, lack confidence, have low self-esteem, or are situated in a complex history of prior experiences as a neurodivergent person (Hamilton & Petty, 2023).

Educators could consider these reflective questions:

- What lens do you view your learners through?
- What awareness of their way of being do you have?
- What assumptions are you making?

From my experience in neurodivergent classrooms, I have seen relationships and belonging develop when a neurodiversity-affirming approach is employed. A neurodiversity-affirming approach incorporates mutual respect, honesty, and reliability gained through an understanding of positionality and reflexivity. "Being sincere will enable you to guide your learners and gain their trust" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 6).

Habit 2. Moana: Know your Pacific learner and context

Many questions and reflections in Habit 2 could be considered within a neurodiversity-affirming approach, shifting the focus towards neurodivergence. There is often relief and excitement when you talk with a person who shares your way of thinking, especially as "neurodivergent individuals have no problem communicating with other neurodivergents" (Lange, 2022, p. 115). Connection and context are important for developing these communities.

Each nation or territory will have its own interpretation of neurodiversity and their own stories. Cultural understanding of neurodiversity and its history of recognition within policies and education would support continued reflection, knowledge, and awareness. As described in Habit 2, being aware of your organisation's policies, strategic plans, and support services enhances your capability for signposting appropriate resources.

The section "Preparation for your teaching" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 10) could be used successfully for educators supporting and working with neurodivergent learners.

For a neurodiversity-affirming approach, further consideration should be given to intergenerational neurodivergence, prior experiences, and the potential for trauma-related responses (Hamilton & Petty, 2023). Educators could also reflect on the experiences and education of learners who discovered their neurodivergence at different life stages, learners who hide their neurodivergence, and learners who are unaware of their own neurodivergence.

Habit 3. Vaka: Educate with phenomenal Pacific-centric methods

Neurodivergent learners work best when there is clarity, and when intentions and planning are purposeful, unambiguous, and clear (Fletcher et al., 2023; Hamilton & Petty, 2023). Habit 3 talks about these ideas and offers discussion points to encourage successful planning. Responsibility and respect are valued by both Pacific and neurodivergent communities and are important aspects in a neurodiversity-affirming approach. Habit 3 also includes practical advice which could equally apply to neurodivergent learners and support their development. Story-telling, connection, community, innovative assessment measures, and inviting guest speakers are also areas where the values of a Pacific-centric approach overlap with a neurodiversity-affirming approach.

As with Habits 1 and 2, reflection around respect may be different when considering neurodivergent learners. As discussed previously, prior experiences and intergenerational challenges may exist. Additionally, respect could be impacted by a perceived or real lack of safety, experience of deficit mindsets, exclusion, or living on the outside fringe of families, peers, or school. For some neurodivergent learners, an educator's voice may be the only thing in their life that shows respect for them as a person.

Habit 4. Le Teu le Va: Build teaching and learning relationships with Pacific learners

Habit 4 is particularly important for a neurodiversity-affirming approach. Education can be challenging for many neurodivergent people. Academic discrimination can be experienced through bullying (from peers and teachers) and interacting with indifferent teachers who lack awareness, have low expectations or lack belief in their neurodivergent learners' capabilities and potential (Hamilton & Petty, 2023; Nalavany et al., 2023).

Important Pacific and neurodiversity-affirming intersections include relationship-building, trust, honesty, respect, empathy, and belief (van Gorp, 2022). Maintaining clear boundaries, keeping the focus on learning, actively listening, and being practical and professional educators are also key for successfully supporting neurodivergent learners (Hamilton & Petty, 2023).

Ideas for Pacific spaces for Pacific learners could be used to develop neurodivergent spaces for neurodivergent learners. A shared space for learners, staff, and families to talk about and engage with neurodiversity and neurodivergence could alleviate stigma and stereotypes by building supportive and collaborative communities (Dyslexia Scotland, 2022a; Fletcher et al., 2023; Hamilton & Petty, 2023). "As an educator, expect the best from your students and provide the best teaching for your students. Demonstrate your 'heart' for educating through your behaviour and language" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 13).

Habit 5. Ola: Develop phenomenal practices

A neurodiversity-affirming approach would greatly benefit from the ideas shared in Habit 5. Communicating enthusiasm, visual imagery, interaction, connection, discussions, comfort, music, flexibility, and respect are all key aspects of working with neurodivergent learners and are included in Habit 5 (Cherewick & Matergia, 2023; van Gorp, 2022).

From a neurodivergent perspective, the 'fun icebreaker' suggestion could create challenges for neurodivergent learners. There are two parts to this. Firstly, a suggestion of 'fun' may cause concern and anxiety over expectations, behaviour, interpretation of the word 'fun' and an escalation of internal questioning around what 'fun' means and looks like in the classroom. Secondly, before an icebreaker, anxiety may develop from anticipating the activity which could lead to avoidance through absence, cause physical illness, or affect mental well-being. 'Fun icebreakers' are usually used at the start of an education programme which is also where the learners engage with peers and educators. If neurodivergent learners experience anxiety or avoidance because of the icebreaker activity, this can intensify feelings of exclusion, isolation, and disconnection. Neurodivergent learners may also find the focus on them as an individual too challenging in a new group or may have had previous negative experiences (Cherewick & Matergia, 2023; Lange, 2022). Consideration for intergenerational issues, family challenges, prior experiences, self-esteem, and self-confidence could be included when planning introductory activities. "Your objective is to make the students glad they came to your class, that they learned something, and that the content of the lesson was relevant for them" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 17).

Habit 6. Teatea: Instil motivation and good work habits

As Habit 6 describes, navigating a tertiary education landscape can be challenging. Navigation of different spaces plays an important part in engagement and retention for neurodivergent people. Neurodivergent learners and staff are more effective and connected when the parameters and expectations are clear (Hamilton & Petty, 2023). Habit 6 also contains practical ideas for developing skills and good work practices which underpin and scaffold self-regulation and executive function, supporting a neurodiversity-affirming approach (Benians, 2022).

One area that would need a different lens is reading aloud. It is important to be able to read aloud, as Habit 6 highlights. However, reading aloud can be problematic and anxiety-inducing for neurodivergent people. One practical alternative I have suggested to learners and educators involves developing self-confidence in reading the words, speaking aloud, and hearing your own voice. This alternative awareness arose from my own lived experience and the difference I have seen across more than a decade of reading aloud.

Prior to discovering I was dyslexic in my 30s, I did not read aloud unless I had to. When my child was born, I read books aloud every night. Over the years, the books evolved from one or two words per page to a few sentences then on to chapter books. This experience of reading aloud enabled me to develop confidence in speaking written words because it began with the basics. My audience in the early years was also supportive as they did not correct my pronunciation or mind how I jumbled up sentences or forgot where I was on the page. In later years, I was corrected, as most parents are when reading favourite or familiar stories! However, I could also develop my child's reading ability and literacy skills, alongside my own, by asking them to help me read new or difficult words or discuss details found within the stories.

My suggestions for developing reading aloud skills involve reading to children, pets, or plants, and using funny voices for different characters in books. Building up confidence in reading texts aloud and hearing your voice speaking the words on a page will support reading aloud in the classroom or workplace. It may be a long process, but it is something that can be completed every day using a variety of texts from our homes, schools, and workplaces.

Habit 6 also discusses the importance of taking cultural differences into account. For a neurodiversity-affirming approach, educators should also take neurodivergent differences into account, including consideration for learners' ages, prior learning experiences, intergenerational issues, and how neurodivergence is situated in their culture.

This habit supports group work, discussions; focussing on strengths; belief in learners' abilities and capabilities; identification of how skills and experiences outside the classroom are transferable skills, and how to feed-forward to encourage success. These are beneficial to neurodivergent learners. Goals and milestones, combined with reviews and reminders, support the management of neurodivergent success and mitigate anxiety (Buckley et al., 2022). Encouragement and praise are important to provide, and educators should be aware of their neurodivergent learner's ability to receive these (Dettmer & Welton, 2023). Knowing your learner will support the level of praise offered, and the way praise is delivered, in a respectful and empathetic manner. "Educators need to reach beyond the student's self-doubt" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 26).

Habit 7. Aupuru: Cultivate creativity and enthusiasm

"The meaning of the Tahitian word, Aupuru, is to 'treat with kindness'" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 27). Aupuru can also be transformational in a neurodiversity-affirming approach (Cherewick & Matergia, 2023; Hamilton & Petty, 2023). It includes kindness to learners, educators, families, and communities; kindness in recognising people's skills, capabilities, aspirations, and inspirations, and kindness in acceptance, tolerance, and support. Kindness can bring belonging and encourage inclusion which in turn can develop confidence.

Creative teaching increases the mosaic of experiences that learners can reference and use to expand their thinking and connections. For neurodivergent learners, providing creative and multi-sensory ways to learn brings additional dimensions and touchpoints for them to focus on or build into holistic pictures (Dyslexia Scotland, 2022b; Fletcher et al., 2023). Additionally, the educators' experiences and outside interests enable them to be flexible in the classroom when supporting neurodivergent learners. This could be evidenced by answering learners' questions on a diverse range of subjects, transferring ideas to different contexts to enable learners to make connections and visualise the learning, or having the knowledge to signpost for further information and guidance (Lange, 2022).

Enthusiasm for your subject and for education has a place in a neurodiversity-affirming approach but should also be seen through a neurodivergent lens. Reflecting on what enthusiasm might look like in a classroom will create a space where educators could pause and ascertain how they are communicating their enthusiasm and how it could be received by their learners (Hamilton & Petty, 2023). For example, neurodivergent learners may respond unexpectedly or may not understand the concept of enthusiasm. It may also not be appropriate to enforce making and maintaining eye contact as this could cause anxiety or a reduction in focus (Cherewick & Matergia, 2023; Lange, 2022).

The statement "[learners] appreciate teachers whose classes have surprises and elements of fun" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 27) is usually the opposite of what a neurodivergent classroom prefers. However, surprises and fun can be managed respectfully and appropriately when a psychologically safe environment has been grown through honesty, professionalism, and appropriate support.

Incorporating guest speakers into a programme should be managed in the same way. Some learners may be uncomfortable with visitors to the classroom depending on prior experiences or how their neurodivergence responds to new people or changes in routine (Fletcher et al., 2023). When you know your learners, you are able to prepare for these events appropriately. Maintaining awareness during fun activities or guest speaker visits could include checking in on learners who may need reassurance, or offering break-out spaces, and remaining calm and pragmatic. Clear explanations and expectations combined with time to answer questions can build

positive professional relationships with learners (Hamilton & Petty, 2023). Mutual trust that can develop from these relationships encourages questioning and honest discussions, where educators are able to learn more about their learners and the lens learners bring to the classroom. A consistency of approach, where educators are open, honest, objective, practical, and creative, enriches a neurodiversity-affirming environment.

Habit 8. Putuputu: Construct a Pacific learning community

"Foster connectedness and belonging … as a cornerstone of your course" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 30). Habit 8 describes building connections that ripple outwards from the learner, which are equally important for neurodivergent learners. The educational community includes learning designers and educational software developers who could support co-design and collaboration with neurodivergent learners (Benians, 2022; Dettmer & Welton, 2023) and has supportive Communities of Practice to engage with (van Gorp, 2022; Welton & Dettmer, 2023). The suggestions highlighted in Habit 8 include a diverse range of opportunities for connection in a classroom, at home, in the community, and in the workplace.

Engaging and retaining neurodivergent learners involves an intricate maze of awareness, knowledge, and confidence. Reflexivity is important for supporting an educator in understanding this multi-layered maze. Educators need to have an awareness of, and confidence in, their ability to work within the following layers:

- Practical
    - Resources
    - Accessibility
    - Teaching capabilities
    - Policies and procedures
- Pastoral
    - Support and wellbeing services
    - Context
    - Community
- Neurodiversity
    - Neurodivergent experiences
    - Masking
    - Learning differences
    - Confirmed, unconfirmed, unknown, or undisclosed neurodivergencies
    - Intergenerational challenges
- Professional development
    - Currency in education
    - Currency in understanding neurodiversity
    - Widening professional networks
    - Collaboration
    - Communities of Practice.

As a dyslexic and visual educator and learner, I picture a delicate, but strong, piece of refined and skilled lacework representing the outcome of a phenomenal educator who is walking through the maze with their successful and confident learners. Alternatively, when awareness, knowledge, and confidence are out of kilter, the ball of thread is just a ball of thread, often knotted or squashed, with its potential lying dormant until recognised by an artisan.

Habit 9. Arofa: Enable mentoring to be a natural part of your teaching and manage the 'wobbles' that arise

Mentoring has been used to support neurodivergent people in different contexts and is a useful educational skill for working within neurodiversity-affirming approaches (Buckley et al., 2022; van Gorp, 2022). Habit 9 builds upon Habit 8, demonstrating how an educator's awareness and knowledge can be utilised and enhanced through mentoring. "Make students' challenges into learning opportunities" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 33).

The theme of 'know your learner' runs through Habit 9, reminding us to engage fully with our learners. For neurodivergent learners, an educator who knows their learners will be able to encourage them in the most appropriate and respectful way for the individual and the context. Habit 9 highlights the importance of this when learners may be "lacking self-confidence or have become disoriented in their educational journey" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 34) or may over-analyse. Managing expectations is also a consideration when working with neurodivergent learners (Buckley et al., 2022).

Habit 10. Ti'ama: Deconstruct and emancipate your Pacific learners' experiences

"By focusing on the learner's strengths, you can help them to fully believe in what they have rather than what they do not" (Chu-Fuluifaga & Ikiua-Pasi, 2021b, p. 35). Habit 10 is inspirational and demands high expectations from educators and learners alike. It clearly identifies what an educator's role is, and what their responsibilities are. The questions that Habit 10 challenges us with could be used as a foundation for a neurodiversity-affirming exploration of equity and inequity, policy, practice, and programmes.

DISCUSSION

Through my multiple lens of neurodivergent person, educator, and learner, the Phenomenal Educators' Framework appealed to my teaching and learning approaches. The ideas and values within each habit would be beneficial for all learners, including neurodivergent learners supported by educators with appropriate understanding of the neurodivergent community. The imagery, associated with how the habits are named and described, offers creative and visual focal points. These focal points encourage sense-making, meaning-making, and schema development for neurodivergent learners. Imagery can be used to stimulate mind-maps, discussion, and connections, which are practical ways to engage neurodivergent learners and encourage cognitive learning.

CONCLUSION

The Phenomenal Educators' Framework challenges educators to be better, to become Phenomenal Educators, and accept the passion and responsibility which that transformation entails. The importance of 'know your learner' is apparent across the 10 Habits and is essential in supporting neurodivergent learners. Awareness and knowledge create a sound foundation for educators and learners to develop their skills and move into the future successfully. Highlighting caring, clarity, and creativity, the Phenomenal Educators' Framework could significantly inspire a neurodiversity-affirming approach.

ACKNOWLEDGEMENTS

Thank you to my friends and colleagues for raising the questions that inspired this paper. The author did not use generative AI technologies in the creation of this manuscript.

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FUTURE-FOCUSED ORGANISATIONS AND NEURODIVERSE LEARNERS

Marianne Cherrington

INTRODUCTION

Tertiary learning organisations are rethinking and adapting to the needs of business and industry. It is critical to align teaching and learning to modern organisational requirements (Ganeshan et al., 2021). This article outlines a reflective and ethnographic inquiry into organisational diversity and considers how to create more future-focused organisations with relevance for current and lifelong learning. In particular, the research explores issues facing learners in this new post-COVID era, such as resilience, wellness, and neurodiversity, and learner-focused perspectives that can evolve organisations in the future.

A forward-looking approach can inspire creativity, expand knowledge, and redefine meaning revealing new touch-points for industry and employability (Cherrington et al., 2021). This investigation sourced multifaceted and collaborative viewpoints that were initiated for training improvements. This research considers that diversity can be an approach for re-energising learning environments, to create true value as well as enhanced well-being and resilience. New approaches also hold promise of building capabilities for a new era of work.

The world of work has never been more dynamic and uncertain, yet foundations that are authentic and trusted allow for sureness that can inspire courage, and creativity with new, meaningful interactions (Detert & Bruno, 2017). This research investigates contemporary workplace diversity issues and ponders how tertiary learning providers can address issues. With the tertiary sector in flux in New Zealand, it is apt to reflect on where we are, and to progress with aspirations. To create a culture of life-long learning, environments which welcome diversity and inclusivity must be considered, evolved, and championed (Ossiannilsson, 2019).

This article specifically considers organisational diversity and neurodiversity, especially in tertiary education leading to the workplace. The topics are researched in the context of the new, post-COVID era and include the issues of resilience and wellness. Reflections are given from the author's experience in the electrical training industry, in which learners must achieve via technical learning, hands-on training and on-job workbook requirements for qualification. Reflections focus on a six-month period which culminated in Cyclone Gabrielle and two major flood events and created enormous contextual challenges to overcome for learning and teaching.

Formalised ethics approval was granted for a rudimentary tally of learner responses regarding learning style and attendance preference, improvement ideas and progress perceptions (permissions and ethical approval, Electrical Training Company, Rowhani, L. LR12.11.22).

This article is not prescriptive, but aims to promote reflective action along diversity pathways. A topical review was undertaken from a modern management perspective, to gain valuable insights for decision-makers. The approach permits a contextual review and progressive, long-term interpretation of what is most relevant when training electricians, but also for future-focused organisations to improve resilience, and real support for neurodiverse learners and instructors for organisational wellness from the viewpoint of a learning support manager.

Neurodiverse learning is a growing research field and, as such, not widely understood. While it may be true that 'not all smart students go to university,' many highly intelligent students train to be electricians. Electrical training is both theoretical and applied; specific issues arise, but begin with existing training models that need to be updated within existing frameworks.

THEORETICAL BACKGROUND: ASSESSING DIVERSITY AND INCLUSIVITY

Workforce diversity themes consider comparisons amongst employees regarding cultural background, race, physical abilities and disabilities, religion, gender, and sexual orientation (Saxena, 2014). Increasingly, motivation exists for organisations to manage and champion diversity in the workplace; research establishes the need for diversity and inclusion for dynamic organisational success (Trenerry & Paradies, 2012). Diversity "leads to more and better innovation and improved financial performance," with 19 percent higher revenue, innovation and creativity (Lorenzo et al., 2018); top quartile companies for racial and ethnic diversity have financial returns 35 percent above industry medians (Hunt et al., 2015). Diversity and inclusion matter.

Diversity, work relationships and inclusion are also needed in top level positions (Combs et al., 2019). Workforces evolve, yet many employees are hidden, unable to exercise strengths and potential, so team synergies rarely optimise (Hughes, 2019). Without opportunity, excellent employees resign; action on diversity is required (Cox, 1991; Ng & Sears, 2020).

Measuring diversity can be complex, with various metrics, indices and techniques which sometimes add bias (Freire et al., 2020). Organisations jostle to be seen as diverse and transparent, and research on the topic is escalating as the implications are immense and compounding (Volpe, 2019). Multifaceted 'openness' can manifest in many veiled ways (Montgomery et al., 2019) so technology is used to search for diverse views in organisations and to stimulate value-in-diversity or detect anomalies in practice (Bader et al., 2019).

The evidence supporting diversity in the workplace is irrefutable (World Economic Forum, 2019) with a strong alignment to the United Nations Sustainable Development Goals (Miotto, 2018). Simply, organisations should reflect societies they serve; hiring practices should mirror labour market demographics (Wilson, 2010). Measuring for gender, age, disability, ethnicity, and so on, can assess if organisations are as diverse as their environments, with similar ratios (Stats NZ, 2013); it is easy to measure, distort and mask glass ceilings (Lewellyn & Muller-Kahle, 2019). Perhaps the bigger question is 'when equality?' (Wingfield, 2020). Strategies should recognise cultural diversity with fair and equitable processes (Bourke & Dillon, 2018), as it is a legal requirement (Human Rights Act, 1993).

Yet our current tertiary education system "does not adequately cater for diverse students or encourage new models to emerge to meet evolving needs and opportunities … [and] that excludes some people from participating at all" (New Zealand Productivity Commission, 2017). As a result, our learning organisations will not have their needs met, and businesses will lack the benefit that diversity offers.

NEW DIVERSE LEARNING AND TEACHING PERSPECTIVES

In a post-COVID learning and teaching environment, a re-evaluation of 'successful outcomes' is needed. The necessity of online learning suits some learners more than others so that achievement metrics are re-interpreted with a lens of resiliency for a myriad of valid reasons.

The purpose of education is to create possibilities, "to awaken and develop powers of creativity" (Robinson & Aronica, 2016), but standardisation thwarts meaningful possibility. Education and learning differ, but intertwine, as "schools drive public education and reflect our social values." But do we value an education system that fosters diverse relationships, enables us to engage with society and prepares us for action (Witehira, 2019)?

Young people want education to be relevant to the world they live in. They are adept at using new media and community engagement for "individual action, collective impact, and system change." This generation is "being the change they wish to see" (Pipiri Ki A Papatūānuku, 2020).

Tertiary education is broken, expensive, takes too long and disadvantages those who need it most, and innovations are thwarted by opposing agendas (Ramsey & Khan, 2020). Post-COVID value versus cost trade-offs will be made (The Economist, 2020). Online education promises to be more flexible, inclusive and affordable; the tertiary sector is ripe for disruptive innovation. Transformational innovation is *by design* and educational design must be more available, accessible, acceptable, and adaptable (Westwood, 2018) using diverse academic sectors, to overcome common assertions of 'leaking pipelines' (Wingfield, 2020).

Inclusion implies equality of access. These are issues of sustainable development; the United Nations' Sustainable Development goals include #10 *Reduced Inequalities,* #5 *Gender Equality* as well as #4 *Quality Education* that lead to #8 *Decent Work and Economic Growth* (United Nations, 2015).

Diversity benefits can energise and enliven our learning organisations by design; this includes schools and workplaces as sites of life-long-learning. Over three quarters of organisations are expecting complex change, of which cultural change ranks first. Conversations about diversity can unlock talent to celebrate who we are; these conversations can be formal and informal, and lead to informal coalitions and dynamics to hasten change (Rodgers, 2007).

NEURODIVERSITY, WELLNESS, AND RESILIENCE

At best, most of our organisations and tertiary institutions clumsily add on strategies for neurodiverse learners. Yet strength is within people. Organisations grapple with inclusivity, but it is part of sustainable practice. Our job is to protect and watch over our every resource (Marae, 2014), a challenge that is ongoing and aspirational. Educators must reflect ever more deeply and act diligently on these challenges and opportunities, because what we do and how we do it matters. From the lens of ako (facilitation) we can re-energise our learning environments with more holistic approaches. From the lens of akoranga (learning), knowledge links learner and teacher, both of whom are recognised as knowledgeable, in the fullness of who they are (Marshall, 2014). Reflecting upon suitable learning, teaching styles, and context chosen can and should edify and benefit communities (Doesburg & Bull, 2019).

The neurodiversity paradigm considers variations in the way people perceive and interact in environments within normal cognitive variation. The term is linked with terms such as autism, attention deficit hyperactivity disorder (ADHD), dyslexia, and developmental language disorder (DLD) as examples (Hamilton & Petty, 2023). Neurodiversity can be associated with unique strengths.

It is estimated that 15 to 20 percent of the population is neurodivergent (Turner, 2021). The New Zealand Workplace Diversity Survey 2022 (Tolooei, 2022) revealed that about two thirds of neurodiverse people often mask it in the workplace, so our organisations are often unaware. Organisations must ask: What is it that our people need and how can we respond to that need?

The author confronted this conundrum as a learning support manager at an electrical training firm. Moving to data-driven decision-making and planning (Pace & Cherrington, 2020) it was clear that:

- data veracity and reliability is an ongoing task; data cleaning for analysis is vital.
- achievement and 'at risk' metrics conflicted, using three diverse 'at risk' definitions.
- management had been upskilling/workshopping for neurodiversity with no progress.
- some simple solutions, embedded in how we taught, would benefit all of our learners.

As a catch-all term, neurodiversity is rather vague; this can pose challenges within tertiary learning organisations, but the term can help focus learning and teaching strategic direction. Facilitators often face learners with neurodiverse traits or unidentified learning challenges; creating supportive strategies and learning environments is beneficial (Ker & van Gorp, 2024). Developing modes and choices in which to 'attend to learning' can be valuable (see Figure 1).

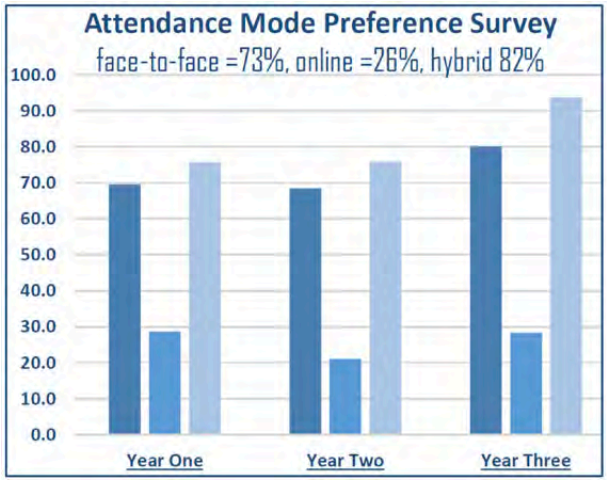

Figure 1. Student learning preference by year of study (multiple response permitted).

Whenever data-driven decisions are needed, data integrity is vital before creating models that lead to more innovative, effective solutions (Cherrington et al., 2020a, 2020b, 2020c). Consultants are not required to create a strategy, if neurodiverse youth are allowed and able to articulate, in detail, how their learning can be supported (via a learning plan, for example).

It is for management to translate this in an organisation, within training and learning settings.

STUDENT-CENTRED TEACHING MODES, IDEAS AND PROGRESS

As a learning support manager for budding electricians who made myself available onsite and in our many external locations, I felt that about one fifth of our learners were neurodiverse. I felt this was a higher percentage than in other tertiary organisations and hypothesised that electrical training is difficult, but also hands-on with work-based assessments (to which neurodiverse learners might be partial). Regardless, our learners said action was needed.

Permissions were approved for an onsite tally of students' response to several proposed changes. From five different centres in Auckland and Northland, over one thousand learners were asked in evening classes for their partiality to several stated choices as in Figures 1, 2 and 3.

Extra-curricular, in person, and online evening classes were created in that last quarter of 2022 so *any learner* could get extra support for whatever reason, outside of a classroom. Approval was gained for an onsite tally of students' responses to the current perception of evening classes. Subjectively, I had spoken to many neurodiverse learners who could not learn online. They needed face-to-face teaching (even if they did not 'connect' with their teacher for various reasons); we encouraged them to bolster their learning with online support (Figure 1).

Also, tutor training began (it had long been requested) to build awareness of the needs of neurodiverse learners, some simple strategies (low hanging fruit) were implemented. Concurrently, specialists were advancing neurodiversity expertise to senior management.

Extra-curricular classes were intended to help 'at risk' students but often ended up being used as reinforcement learning for any challenged students. A 'solution' was a relatively easy and cost-effective programme. Anecdotally, many students came to be in a learning atmosphere to do assessments in a communal learning atmosphere (like a library milieu). Many students were 'all good' (Figure 2). Some students could not learn online; others (often older learners) preferred the online options to get support for specific queries or for career guidance! It made me wonder how comfortable students felt to 'speak up' in a classroom setting.

In debrief, the sessions were under-attended but highly successful. They became a pilot for a cut-down, extra-curricular support programme in 2023. I felt the hard-yards would pay off, yet in 2023, the teaching year began a week early. Many students were not enrolled yet!

- In the first week, 23– 27 January, two-thirds of new learners missed a week of learning.
- On 27 January 2023, a one-in-200-year rain event hit Auckland and its surrounds.
- On 1 February 2023, intense rainfall hit again (aggravating infrastructure hurdles).
- From 5 February 2023, Cyclone Gabrielle struck New Zealand, creating havoc.

Our learning and teaching strategy had hit a squally front. Power and roads were out for our Northland learners. Learners and teachers had insurance claims, no wifi, and cleanup urgency. Despite 70-hour work weeks and recording intense periods with a dozen actionable requests every five minutes, there was no way to get learners on track.

It was then that I realised that neurodiversity is also a wellness and resilience issue.

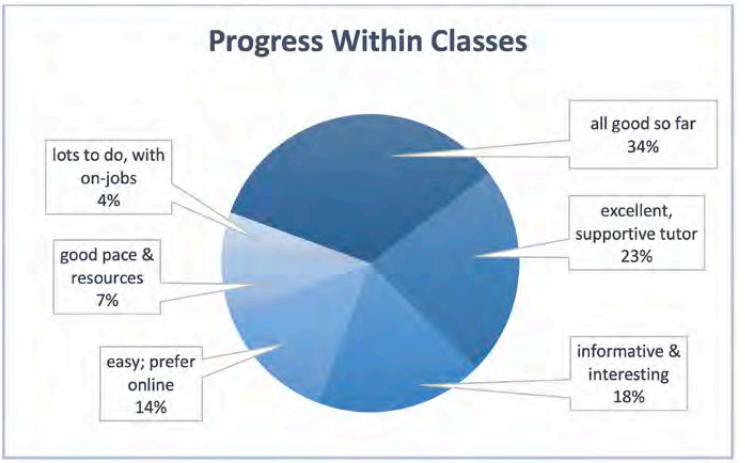

Figure 2. Student response regarding in-class progress.

Until then, I had 'oiled the squeaky wheel' and 'kicked the can' up the management chain while promising to address teaching, training, and learning environment issues in a strategic way.

Simple, cost-effective tactics that support neurodiverse learners exist (Takabayashi, 2024). Such scholarship can be used and tailored to needs. So, we communicated with our learners. For example, if I sent emails to all

my learners, I colour-coded and aligned them, paring them down to the most important, unmissable details; I asked their trainers to reinforce messages. Neurodiverse learners came to specifically tell me that highlighting key points was beneficial. We also instigated term-wise training for our trainers on ways to deliver in diverse classrooms. I established online catch-up classes each week using only the best trainers to summarise and deliver key concepts from each in-class sessions each week. Reinforcement learning worked!

Neurodiverse learners often associate with more than one 'label.' They may benefit from access to you or to mentorship to address issues before they become mammoth. Realise that 'solutions' come at a cost (in time, people, or money) so advocacy will be required.

A comfort is that solutions are often ways of learning, teaching and being that will support atmospheres of learning for all. That realisation creates a compelling cost-benefit analysis. Old, ineffective ways can create space and resources for more inclusive ways to deliver life-long learning organisations where the learning/teaching line is shared (Cherrington, 2019).

Neurodiverse learners have good resiliency to persist with slow moving frameworks. Many have tried (through trial and error) to discover ways to learn that work *for them.* We can:

1. Talk to our learners in non-confronting after-class spaces before they are 'at risk.'
2. Talk to our trainers and address their concerns (they tend to be older than learners).
3. Listen and action easy and cost-effective 'solutions' quickly and monitor their value.
4. Research nascent topics in neurodiversity; reflect on 'solutions' within organisations.

Some learning challenges go undetected for years. While training tertiary-level electrical students, we found many of our neurodiverse learners struggled with classroom pace; some were on learning plans. Many already knew and articulated the support they needed, seeking out the learning support managers for that support, or stating it, as in Figure 3.

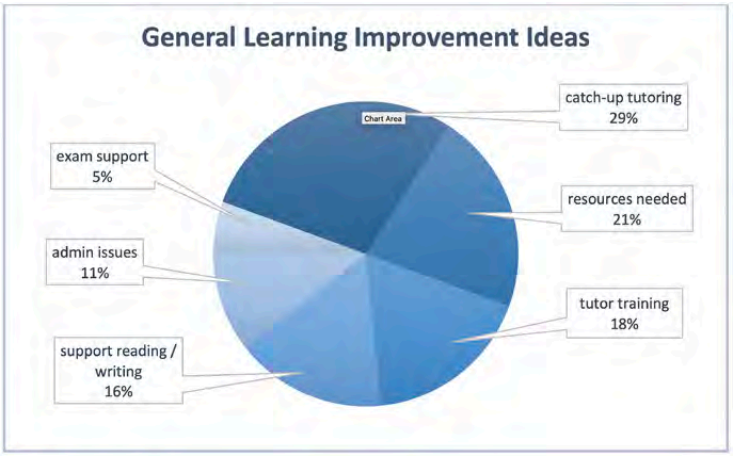

Figure 3. Improvement ideas to improve learning.

Neurodiverse learners have good resiliency to persist with existing qualification frameworks.

We are all 'at risk' and need to manage our wellness. I learned how to smile more and greet those around me with aplomb, even in extremely challenging circumstances and contexts. That bolstered my 'wellness and capacity.' No one has an endless well of resilience; without seeing real progress our capability, wellness and

resilience takes a hit. I learnt to speak up. I safe-guarded my wellness and resiliency because they are not infinite. Neurodiversity is the reality in our organisations now; we are just beginning a better journey.

VALUING INCLUSIVITY: ENERGISING LEARNING ENVIRONMENTS

Holistic pedagogical values can underpin culturally inclusive learning, fixed in our practices, policies, and management systems (Dreamson et al., 2017). We can aspire to be continuous learning organisations, adding value to our communities and society, making experiential learning a routine (Cherrington et al., 2020f), using organisational knowledge and visionary collaborations to share wisdom and values that align with culture (Fox, 2011).

Applied learning is the kind of learning that we need to solve the "wicked problems" of this world (Edmonstone et al., 2019), like poverty, inequity, and pandemics. Because youth influence their peers, communities and even the heads of big corporations or governments (Goodall, 2020), relevant and energised learning environments are vital in our society. When programmes invoke disparate conversations, they shape a richer vision of the future without waiting for the system to catch up (Our programmes – Untouched World Foundation, 2020). Engagement can be built into the experience and conversation (Cherrington, 2020). This can be challenging in polytechnics, depending on subject or 'linear perspectives' of how knowledge and wisdom are attained (Figure 4) (Duan et al., 2017).

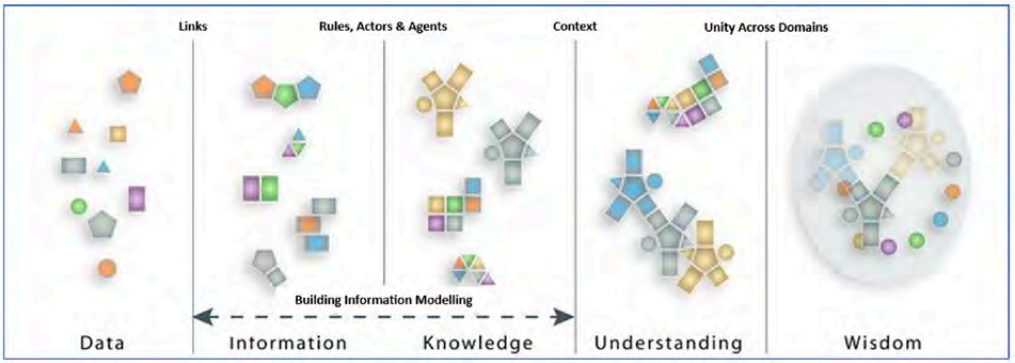

Figure 4. D-I-K-U-W progression with BIM/knowledge overlay (BIM ThinkSpace, 2011).

Similarly, industry placements and internships foster connection, partnerships and relationships; they support learning and attainment of qualifications and often lead to positions within the firm after graduation. It is another pathway to more diverse and inclusive workplaces. Aotearoa is more diverse than ever, so our life-long learning environments must reflect and value diversity. It can be as simple as breaking out of silos to work interdepartmentally on a campus with co-research projects (Cherrington et al., 2022).

An interesting elaboration of the D-I-K-U-W progression is given in Figure 4. It adds points of connection and perspective in the progression with examples that consider data types and industry sector or knowledge domains. Seeking and exploring intersections in organisations is where diversity benefits are found, to create transformational results (Benschop et al., 2015).

Diversity and inclusion policies and indigenous frameworks can create a basis for individual, collective and societal well-being (Harding & Oetzel, 2019) and as a metric for success in applied foundational formats for schools and research for collective well-being (Bouvier et al., 2016; Zhukov & Cherrington, 2020). Performance as a sole-metric is outdated (Cherrington et al., 2020d, 2020e).

CONCLUSION

This article is not a prescription for energising polytechnic environments. It re-establishes the value of diversity, from a scholarly and organisational perspective, considering contemporary diversity issues in a New Zealand context. It develops a progression of diversity from tertiary learning and teaching, towards a view that organisations must wake up to the needs of our neurodiverse learners and our peers in places where we work. Communication and inclusion count. Developing understanding, knowledge and wisdom need not be linear.

Diversity of thought and of talent is vital to overcome the challenges we face. Diversity challenges the status quo, requires dialogue and is part of life-long learning. Diversity makes communities and organisations stronger, into sustainable futures (Chen, 2018). As we seek to energise our learning environments, let us learn to be more open, inclusive and diverse.

A great poet (Shevchenko, 1845) tenderly advised us to

> Gain knowledge, brothers! Think and read,
> And to your neighbours' gifts pay heed,
> Yet do not thus neglect your own.

The purpose of education is to create untold possibilities, for us all.

Marianne Cherrington is a researcher in the stability of high dimensional machine learning algorithms and a business lecturer with a focus on Sustainability. A recent focus on applied problems in the electrical training industry has led to research projects generating exciting peer collaborations, sharing diverse interests and perspectives in learning and teaching.

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Article

https://doi.org/10.34074/scop.4013013

NEURODIVERSITY IN VOCATIONAL EDUCATION: OBSERVATIONS AND LEARNINGS FROM TEACHING HEALTHCARE ASSISTANT PROGRAMMES

Elizabeth Youard, Lizzy Guest, Carolyn Wilson and Mary Cooper

INTRODUCTION

Neurodiversity is an umbrella term that describes the natural variation in how human brains think and learn. It includes neurotypical brains, which are assumed to be 'normal,' and neurodivergences, which are differences in neurological functioning compared to the norm (Fletcher-Watson, 2020). Conditions such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD) and dyslexia fall under the heading of neurodivergence (University of Auckland, n.d.).

When neurodivergence is associated with difficulties in learning, an individual with neurodivergence may experience a learning disability (Ministry of Education, 2020). Under the social model of disability, this learning disability is caused by barriers in the educational system, not neurodivergence itself (Office for Disability Issues, 2024). The New Zealand Disability Strategy recommends identity-first language instead of person-first language to describe disability; for example, "neurodivergent learners" is preferred over "learners with neurodivergence" (Ministry of Social Development, 2019).

This article explores the authors' combined experiences teaching neurodivergent learners in healthcare assistant programmes at one institute of technology in New Zealand. Our experiences have led to insights as a team on how we can best support the individual needs of neurodivergent learners. We discuss our collective learnings in the context of neurodivergence in vocational education and propose future research opportunities based on our experiences.

CONTEXT

We work as kaiako at an institute of technology in regional New Zealand. Our teaching team is multidisciplinary in nature, with the authors having nursing, physiotherapy and speech language therapy professional backgrounds. In addition, all of us have personal and/or whānau experience of neurodivergence that we believe helps us to be aware of the inclusion of neurodiversity in our teaching mahi.

Our institute currently offers two programmes for healthcare assistant training. The New Zealand Certificate in Health and Wellbeing (Health Assistance) (Level 3) is an entry level programme for people interested in entering the health industry. This programme is taught in classroom and clinical laboratory settings. The New Zealand Certificate in Health and Wellbeing (Advanced Care and Support) (Level 4) is a more advanced programme for those already working as healthcare assistants who are looking to upskill. It is taught in a classroom setting, with students applying learning directly in their workplace. Both programmes have online content using Moodle as a learning platform and are offered at multiple campuses across our region.

OBSERVATIONS AND LEARNINGS

Identifying neurodivergence

Our anecdotal evidence is that in recent years a higher proportion of learners entering our healthcare assistant programmes are identifying as neurodivergent. Gathering data to support this belief would need to account for learners identifying in different ways and at different times. Some learners state a diagnosed learning disability on their enrolment application and may request disability accommodations through our institute accessibility services. Others do not identify as having a disability on enrolment forms but may engage with accessibility services at a later time. Still others do not identify as having a disability or request formal accommodations, but tell us about their neurodivergence when informally discussing their learning needs during their studies.

Physical environment

The physical set up of our classrooms can help or hinder neurodivergent learners. On one campus, our classrooms have floor-to-ceiling glass walls which look out on other classes and hallways. We have found learners with ADHD are easily distracted (as are many neurotypical learners) by the background visual 'noise.' However, the environment can also be helpful. In one classroom we use there are bean bags. Learners can lie down on a bean bag when they need some time out and come back to their seat when they are ready. For tasks that require concentration, such as completing clinical paperwork, we purposely book a quiet classroom so learners experience less distractions. It is important to be aware of the sensory processing needs of neurodivergent learners and to provide breaks from overwhelming sensations in educational environments (Health Education England, 2022).

Clinical laboratories

We use clinical laboratories to simulate real-life scenarios for healthcare assistants. These are high-pressure environments requiring constant group-based mock clinical activities, role playing as both a client and a healthcare assistant. At the end of our Level 3 programme, there is an Objective Structured Clinical Examination (OSCE) in the clinical laboratory to assess practical skills. We have observed that the clinical laboratory environment and OSCE assessment are challenging and overwhelming for neurodivergent learners. This is backed by research on medical students with ADHD that found OSCEs are particularly disabling methods of assessment (Godfrey-Harris & Shaw, 2023). We have trialled a variety of accommodations in the clinical laboratory environment to facilitate learning for neurodivergent learners, which are described in the following paragraphs.

Firstly, we used mind maps as a visual resource to show that practical skills learned separately in clinical sessions are later assessed together in the OSCE. Mind maps help to show how all pieces of learning over the programme fit together.

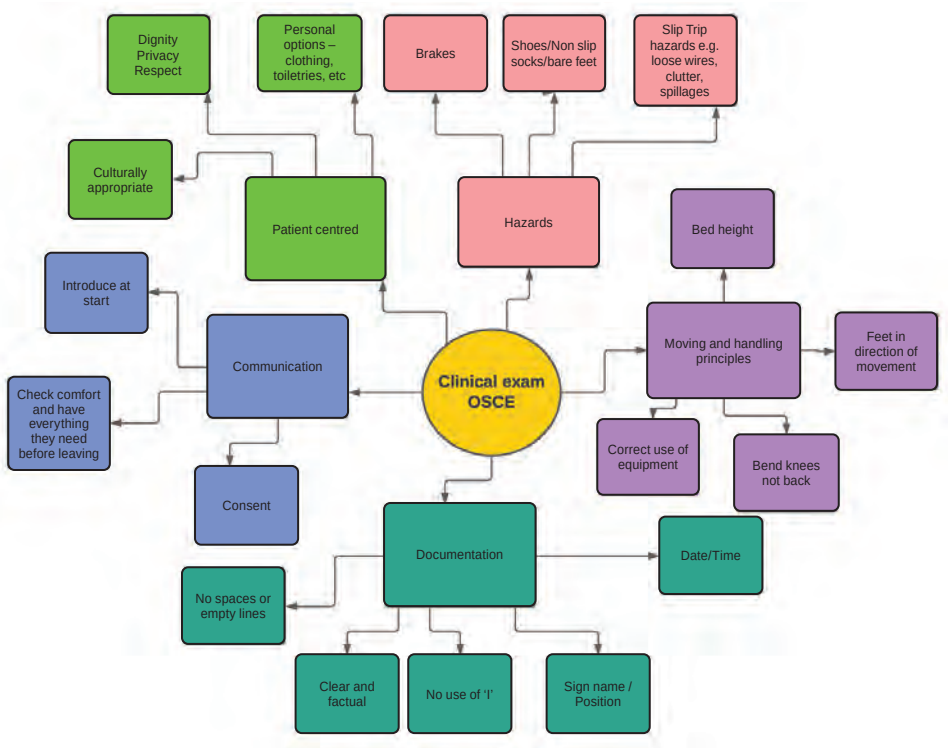

Figure 1. Example mind map of skills learned in clinical laboratories that are assessed in the OSCE.

Secondly, we added more structure in clinical laboratory sessions. This was achieved by following a set format for each class that included karakia, demonstration of skills, practising skills, applying skills to a scenario, and completing clinical paperwork. Clear timeframes and marked transitions between activities help to keep neurodivergent learners on track to finish all tasks (Health Education England, 2022).

Thirdly, we aimed to create a safer environment for learning in clinical laboratories. Some of our neurodivergent learners have told us they were victims of abuse and found the clinical laboratory environment triggering. Multiple studies have found that autistic people, especially autistic girls and women, are more likely to be victims of sexual abuse than neurotypical people (Autism Research Institute, 2024). We talked with learners who reported experiences of abuse to find out what would make them more comfortable. Solutions included being placed in groups with other women and being able to opt out of role playing the client in a scenario. On reflection, while these strategies helped our learners participate in activities, high levels of anxiety remained and further ways of creating safe learning environments for victims of abuse could be investigated.

Fourthly, as some of our neurodivergent learners experienced sensory discomfort wearing a mask, we provided extra masks for these learners to practice wearing at home. This gave our learners the opportunity to become more comfortable with the sensation of wearing a mask so that they could meet infection control standards during the OSCE. Mask wearing was an ongoing challenge for these learners but they were able to manage wearing the mask when required.

Finally, to reduce information overload, we have scheduled more practice of clinical skills in the Level 3 programme. In addition, we have occasionally voluntarily increased staffing of clinical laboratory sessions to

above the standard staff to student ratio used by our institute, although this is not sustainable in our workloads. These changes allow more time to break down skills and learn each building block and more individualised attention, and help to reduce the pressure on learners (Health Education England, 2022).

Structure and routine

We have observed that unpredictability in daily routines (for example, room changes or a surprise guest speaker) creates unneeded stress for neurodivergent learners so we plan for as much structure as possible in our programmes. The calendar is referred to often to show learners where they are in the programme journey, what activities to expect that week, and to remind them of important milestones. This assists neurodivergent learners to feel organised with their studies (Health Education England, 2022). This adherence to structure means we sometimes have to turn down unexpected extra-curricular learning opportunities. Diverting from the routine to incorporate a well-meaning activity can cause unintended disruption for neurodivergent learners and may not be worthwhile overall.

Assessment strategies

As well as the OSCE assessment described earlier, our healthcare assistant programmes contain other types of assessment tasks. A number of assessment strategies are recommended by Health Education England (2022) for working with neurodivergent learners and we have found the following tips useful. Firstly, to break assessments down into manageable chunks and progress through parts of the assessment one step at a time. Also, to provide templates and exemplars as resources so requirements are clear and learners are confident with task parameters. These strategies can complement any formal assessment accommodations in place for disabled learners through accessibility services.

Feeling overwhelmed

We have observed that some of our neurodivergent learners feel overwhelmed by their studies. This is an observation supported by research into disabled learners' experiences of vocational education in New Zealand (Cleland, 2021). Being overwhelmed combined with inadequate support has an impact on mental health and can spiral into a further lack of coping (Godfrey-Harris & Shaw, 2023). To help learners experiencing these emotions, more support from staff generally and mental health services specifically is recommended (Cleland, 2021). We have attempted to indirectly address feelings of overwhelm through the strategies described in previous paragraphs, such as adding structure. To address mental health specifically, we have organised workshops for our programmes conducted by institute mental health clinicians. These workshops cover topics such as mindfulness, emotional resilience, and healthy relationships. Learners can self-refer for individual sessions with the mental health clinicians for more support.

Professional development

With our increasing awareness of the needs of neurodivergent learners in our programmes, we have prioritised upskilling our knowledge in this area. Management organised a team workshop facilitated by a representative of a registered charity providing support for whānau with neurodiversity. The facilitator shared insights from their years of experience and suggested helpful strategies for us to use with our neurodivergent learners. We have also completed individual professional development; for example, one of the authors has attended seminars on Universal Design for Learning (UDL). In addition, we have sought advice from a senior mental health clinician working for our institute, who has supported us with strategies for managing behaviour and communicating effectively with neurodivergent learners.

Diversity

Neurodiversity in educational spaces brings new ways of seeing the world which is beneficial for all involved (Montgomery, 2023). For example, during one class discussion about why clients may not want to shower, a learner with autism suggested one reason could be the uncomfortable sensations of water on the skin. This was a fresh perspective on the topic that other learners had not voiced and led to a class discussion that facilitated understanding of sensory issues. Neurodiversity among learners helps to prepare our graduates for the diversity of clients they will work with in industry.

DISCUSSION AND CONCLUSION

Our experiences have led to new insights, but we recognise there is more we can do to help neurodivergent learners achieve their educational goals. We also aspire to uphold the New Zealand Disability Strategy, which states that learning journeys for disabled people can lead to not only academic success but also the development of social skills, relationships, confidence, and resilience (Office for Disability Issues, 2016).

An ongoing challenge is identifying which of our learners are neurodivergent in order to best understand and support their learning needs. Disabled learners may delay or decline stating their disability on enrolment forms for reasons that include stigmatisation (Lisle & Wade, 2013), fear of discrimination that may impact on future employment opportunities (Martin, 2010), and previous experiences of dealing with negative perceptions of disabilities (Demery et al., 2012). These findings suggest that tertiary institutions may be seen as challenging and hostile environments for neurodivergent learners seeking to further their education. Our experiences of learners delaying telling us about their neurodivergence reinforce the findings of van Gorp (2022), who highlights the importance of building whanaungatanga with new learners in order to create a safe space for them to share their learning needs. In addition, the perception of experiencing disability may also change over an individual's lifetime. A longitudinal study of tertiary students with disabilities found that 63 percent who were known to have a disability throughout their school years no longer identified as having a disability on entering tertiary study (Newman et al., 2011).

Whaikaha Ministry of Disabled People (n.d.) states that tertiary education providers should provide disability support to learners. Having a single point of contact via accessibility services to arrange supports and accommodations is recommended in literature on inclusivity for neurodivergent learners (Dwyer et al., 2023). However, disability support services at tertiary institutes in New Zealand are being overwhelmed by the demand for services (Cleland, 2021). Furthermore, some of our neurodivergent learners who would like assessment accommodations are not entitled to these because they do not have a formal diagnosis that qualifies as a learning disability. There are significant barriers to accessing funding for diagnostic assessment of learning conditions as adults (Cleland, 2021). These are systemic issues that impact on our learners.

An ongoing area of work is providing multiple ways for students to demonstrate their learning in assessments, as recommended in UDL guidelines and in research on neurodivergence (Anderson et al., 2018; CAST, 2018). We have redeveloped our healthcare assistant programmes to include different types of assessment modes but more could be done to be truly inclusive. In addition, there are limitations to how flexible we can be for practical assessments due to healthcare industry standards. For example, mask wearing in the OSCE is a requirement despite the sensory issues it causes for some learners.

Our vocational educational system in New Zealand is designed for neurotypical minds. Disabled people continue to experience inequities in educational outcomes such as qualification achievement compared to non-disabled people (Office for Disability Issues, 2022). Neurodiversity is not equally represented across all tertiary education levels and subjects. In post-secondary education, disabled learners are more likely than non-disabled learners to study at sub-degree level instead of degree level (Ministry of Education, 2020). A longitudinal study following

learners with disabilities attending higher educational institutions in America found that most (67 percent) were students with a learning difficulty, and enrolment in health-related programmes was the most common educational pathway for disabled learners (Newman et al., 2011). These research findings may explain our belief that increasing numbers of neurodivergent learners are choosing to study healthcare assistant programmes. With these statistics in mind, we would like our programmes to not only equip graduates to become healthcare assistants but also provide a positive learning experience that may encourage progression to higher level health qualifications.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Our observations and learnings are anecdotal and based on the kaiako perspective only. Formal research on neurodivergence in healthcare assistant programmes across a range of educational contexts in New Zealand is needed. Accurate data on the prevalence and type of neurodivergence among learners in vocational education could be collected. Research should centre the perspective of learners as authorities on their own experiences and learning needs. Research could also examine the positive qualities neurodivergent individuals bring to healthcare assistant roles, as has been found in other research on neurodivergence generally (Godfrey-Harris & Shaw, 2023; van Gorp, 2022), and investigate graduate outcomes.

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Article https://doi.org/10.34074/scop.4013008

THE ROLE OF TERTIARY EDUCATION IN OUR LIVES AS AUTISTIC STUDENTS | ĀKONGA

Nicolina Newcombe

INTRODUCTION

This article describes the purpose, process, and implications of a poster titled *The Role of Tertiary Education in Our Lives as Autistic Students/Ākonga*. The poster was constructed by five autistic people with experience of tertiary education for the Neuroability Symposium held at Otago Polytechnic | Te Pūkenga in 2023. All poster co-authors agreed to have their content quoted in this article. The author of this article was the first author of the poster.

The poster project was initiated by my desire to contribute to the Neuroability Symposium. On searching for a topic, I noticed a discrepancy between how autistic tertiary students were being characterised in existing literature and my personal experience based on nearing completion of my eleventh qualification, a doctorate in education.

Problematic issues are undoubtedly a component of tertiary education for autistic students (Cox et al., 2017; Elias & White, 2018; Knott & Taylor, 2014; Nuske et al., 2019; Van Hees et al., 2015; VanBergeijk et al., 2008). Yet many of us love tertiary education and become highly qualified (Connor, 2013; McMahon-Coleman & Draisma, 2016). As Cai and Richdale (2016) note, we present with a high potential for educational success. *The Role of Tertiary Education in Our Lives as Autistic Students/Ākonga* challenges existing literature about autistic tertiary students by exploring *why* we choose to engage in tertiary education in Aotearoa New Zealand. The implications for educators are to revisit their assumptions about autistic tertiary students and to value the purposes and benefits of tertiary education that are relevant and meaningful for us, rather than solely focussing on qualification completion.

LITERATURE REVIEW

The relevant existing literature mainly reports on the challenges, risks, and barriers of tertiary education, as well as the needs of autistic students (Cox et al., 2017; Elias & White, 2018; Nuske et al., 2019; Van Hees et al., 2015). This includes our ostensibly excessive demand for support (Knott & Taylor, 2014) and our so-called dependence on non-autistic people to enable our success (VanBergeijk et al., 2008). At the same time, autistic strengths are under-reported. For example, participants in Knott and Taylor (2014) discussed the impact of time management deficits on their tertiary education experience, but the study failed to select participants whose autistic traits confer on them exceptional time management. Such negative bias in the literature could have resulted from a lack of autistic authorship (Botha & Cage, 2022). While some of the literature includes autistic people (Anderson et al., 2018; Bolourian et al., 2018; Bruwer, 2019; Cai & Richdale, 2016; Cox et al., 2017; Knott & Taylor, 2014; Nuske et al., 2019; Van Hees et al., 2015), I did not find any peer reviewed research on this topic with an autistic author.

Published information about autistic tertiary students in Aotearoa New Zealand focusses on guidelines for support (Altogether Autism, 2022b), the effectiveness of peer and academic supports (Bruwer, 2019), and the impact of those interventions on qualification completion rates (Broadstock, 2022). Altogether Autism (2022a) interviewed an autistic tertiary student about her experience where she discussed the impact of hypersensitivity on her learning opportunities. The interviewee also identified her autistic strengths as being beneficial in tertiary education: "if I can use those traits, my work is easier, I do it faster and I get better grades," although use of a pseudonym in this article could imply that the author or interviewee considered autism to be stigmatising (Altogether Autism, 2022a). Altogether Autism has published guides for supporting autistic tertiary students in Aotearoa New Zealand by autistic authors Timothy Folkema (2022a, 2022b) and Rachael Wiltshire (2022a, 2022b, 2022c).

Autistic tertiary students have strengths that provide advantages in a learning environment. In terms of executive functioning advantages, autistic people often have outstanding focus, with enhanced memory capabilities and attention to detail, the benefits of which are compounded by our consistency and determination (Anderson et al., 2018; Anderson & Butt, 2017; Broadstock, 2022; Van Hees et al., 2015). We also have personal attributes that support excellence in tertiary education, such as creativity, originality, and passion (Anderson et al., 2018; Anderson & Butt, 2017; Broadstock, 2022). Alongside our strengths, autistic tertiary students do experience additional challenges in education, including one or more problems with social communication, managing change, executive functioning, and sensory sensitivities.

Tertiary education can be an overwhelming source of social and sensory demands (Altogether Autism 2022a; Anderson et al., 2018; Corlett, 2022), loneliness, and psychological distress (Bolourian et al., 2018; Connor, 2013) for autistic students. These experiences can result in lower completion rates (Cox et al., 2017) and underachievement (Elias & White, 2018). Anderson and Butt (2017, p. 3036) illustrate the impact of withdrawal and failure on family members of autistic tertiary students, naming their key theme "crises at college." Yet tertiary education can also confer key benefits for us.

The tertiary environment can form a sanctuary for autistic students. Universities and institutes of technology are places where people who feel different are more likely to blend in (Cox et al., 2017) and many autistic students find friendship in courses and clubs related to shared interests, such as information technology (McMahon-Coleman & Draisma, 2016). The student role is widely accepted and provides a respectable opportunity to explore our special interests (Bolourian et al., 2018). For many autistic students, "college can be about as close as you can get to Heaven on Earth" (Perner, 2002, as cited in McMahon-Coleman & Draisma, 2016, p. 16). Responding to the existing literature, I initiated the process of recruiting co-authors to answer the question, "What is the role of tertiary education in your life?"

METHOD

The recruitment of co-authors and the poster making happened simultaneously as co-authors self-selected based on their internal motivation to take part in this project. Firstly, I advertised the poster project on a Facebook event page I made for a party at my house. Some poster drafting occurred at that party, and I also used the event to inform other potential co-authors about the poster. Secondly, I organised a watch party for the Yellow LadyBugs Conference, an organisation that supports autistic girls and gender diverse students, and some attendees worked on their contributions to the poster on that day.

Five autistic co-authors created three images and two written responses. Salient points were extracted from the written responses and recorded on digital sticky notes. I printed the written components from the poster, cut them into sentences or small chunks, and took them to Mates Space, a fortnightly get together at a peer support organisation run by and for autistic people called Voices from the Spectrum. Those of us who were involved in the project discussed the excerpts and wrote down some early themes. These themes included tertiary

education as an organising structure, motivator, and way to measure progress, as well as a place to find fun, activities, purpose, and money. I subsequently reviewed these initial themes and constructed four overarching themes for the excerpts that were ultimately used in the poster. These were:

1. A structure and setting:

   "Tertiary education grounded me after school ended."

   "I need a structured plan for learning."

2. Self-actualisation:

   "Uni makes you feel good. Lots of little achievements every day and that's important."

   "Problem solving is fun."

   "To find myself and my passions."

3. The path of least resistance:

   "I didn't know what else to do."

   "It was easier than getting and maintaining a job and way more satisfying."

   "A source of income."

   "It is easier for me to get a scholarship than a job."

4. To meet my autistic needs:

   "My sensory needs were significantly better met at uni than they had been at school and my supermarket jobs."

   "More social opportunities for shared activities, like using the same study rooms at uni, workshops, projects."

Tertiary education fulfils special roles in the poster's co-authors' lives. Briefly, Josh Cole is an autistic ADHDer with a Bachelor of Science (Ecology). Sarah Hoefhamer is autistic and has a Post Graduate Diploma in Science with distinction. Anita Lee is autistic with a Bachelor of Civil Engineering. Leanne understands herself to be on the autism spectrum; she has a Master of Psychology and specialises in the science of behaviour. We have all demonstrated significant achievements in the tertiary education arena. As noted, this project was initiated in response to a call for voices by the Neuroability Symposium. Unlike many posters that communicate completed research, we undertook this project as recreation, ultimately demonstrating our love for academic thinking.

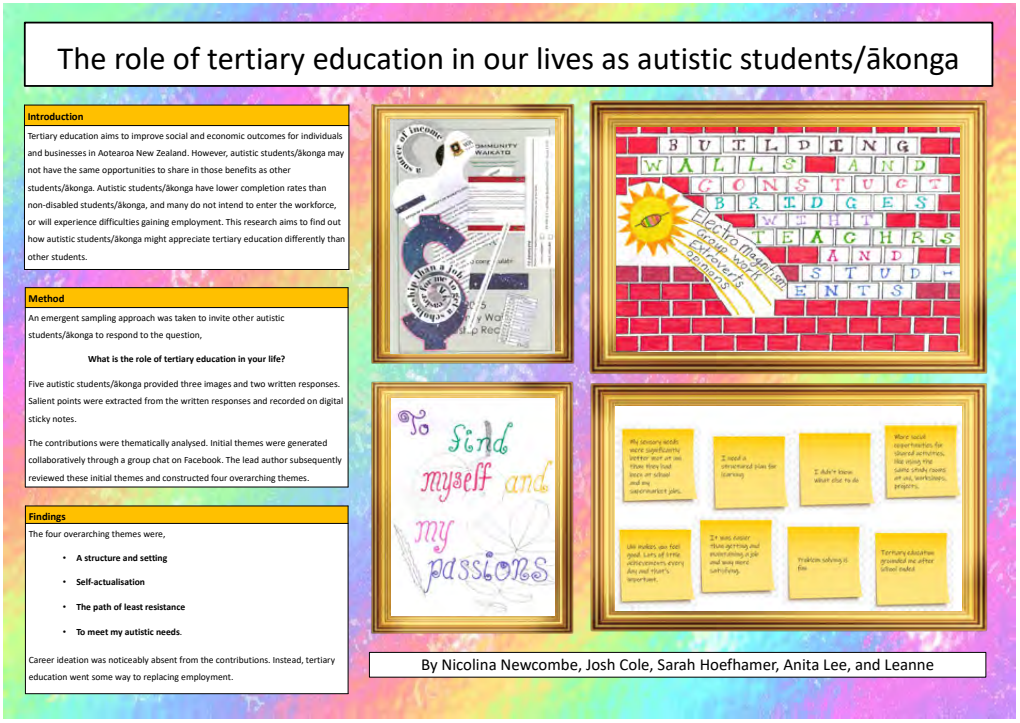

Figure 1. Poster created for the Neuroability Symposium 2023 by Nicolina Newcombe, Josh Cole, Sarah Hoefhamer, Anita Lee, and Leanne.

DISCUSSION

Our small sample size of five autistic co-authors revealed a favourable perspective on tertiary education compared to what was discussed in the peer reviewed literature. My personal enthusiasm as an autistic student coupled with sampling among peers may have introduced a positive bias into this project. Like autistic traits, which can be advantageous or disadvantageous within a given setting (Russell et al., 2019), the limitation of this project also comprises its value by contributing the notions of tertiary education being "ground[ing]," "feel good," "fun," "important," "easier," "better," "satisfying," and providing "more social opportunities" to an area of research that is dominated by negative discourses.

In addition to portraying tertiary education as a favourable experience, this poster also illustrates its comparative advantage over alternative pursuits. While Altogether Autism (2022a), Anderson et al. (2018), and Corlett (2022) have discussed sensory challenges in the tertiary environment, they did not compare it with other places where adults are normally expected to be. Tertiary education can be the optimal choice for autistic people who are seeking "achievement" and "satisf[action]." Furthermore, the co-authors of this poster agree with McMahon-Coleman and Draisma (2016) in asserting that tertiary education often meets our need for desired social contact through structured social activities that are provided on campus.

Career ideation was noticeably absent from contributions. This aligned with Anderson et al. (2018) and Bolourian et al. (2018) who noted that many autistic tertiary students do not intend to enter the workforce or will experience difficulties gaining employment. Instead, tertiary education went some way to replacing employment.

While tertiary education offers numerous benefits to us as autistic students, it typically has a limited duration. Therefore, it remains imperative that we seek or create additional opportunities that align with our unique ways of being beyond the limits of what is practicable within tertiary education.

The implication for educators is to see autistic tertiary students not necessarily in terms of challenges and needs, but also in terms of strengths and motivations. We are asking educators to engage with us in the process of education, rather than only the outcome, as this opportunity might be our central goal and not intended to be a conduit to something else. Finally, we ask that educators recognise and foster the special role of tertiary education in our lives.

ACKNOWLEDGEMENTS

I acknowledge my supervisor Dr Gretchen Good for reviewing our poster abstract.

Nicolina Newcombe has a PhD in Education and is a late diagnosed autistic woman. Her research interests span inclusive research, models of disability, learning (intellectual) disability, autism, and Te Tiriti o Waitangi. She also has a Master of Māori and Pacific Development.

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DEVELOPING AND DISSEMINATING GUIDES FOR TERTIARY EDUCATORS ON AUTISTIC LEARNERS' NEEDS IN AOTEAROA NEW ZEALAND: REFLECTIONS AND RECOMMENDATIONS

Rachael Wiltshire, Joanne Lawless, Rebekah Corlett, Timothy Folkema and Luella Wheeler

INTRODUCTION

Over the past two decades, researchers have paid increasing attention to the experiences of autistic students in tertiary education (Accardo et al., 2019; Anderson et al., 2017, 2020b; Anderson et al., 2018, 2020a; Cai & Richdale, 2016; Sarrett, 2018). Much of this research has focussed on the US and UK, whereas research into the tertiary education experiences of autistic students in Aotearoa New Zealand has been limited. Anderson et al. (2020a) surveyed autistic university students in Australia and New Zealand; as only 13 of the 102 respondents had studied in New Zealand, the data from both countries was combined for analysis. In a separate study, the same authors interviewed 11 autistic people who had previously studied at an Australian or New Zealand university, with only one participant having studied in New Zealand (Anderson et al., 2020b). Finally, a thesis submitted for the Master of Applied Psychology in Behaviour Analysis at the University of Waikato examined distress and coping skills in students who had an autism diagnosis, and those who had no diagnosis but showed high levels of autistic traits (Bruwer, 2019). The vast majority of the 430 respondents were studying at universities in Aotearoa New Zealand, with two studying at polytechnics.

The Tertiary Education Commission | Te Amorangi Mātauranga Matua (TEC) is the Crown entity responsible for funding and monitoring the performance of Aotearoa New Zealand's tertiary education sector (Tertiary Education Commission, 2021). The TEC's Ōritetanga Learner Success programme acknowledges that the sector does not work well for many groups of learners, including disabled learners, and aims to create a tertiary education system that works for everyone (Tertiary Education Commission, 2022). As part of this work, the TEC recognised that information for tertiary educators in Aotearoa New Zealand about best practices for supporting autistic learners was lacking. They approached Altogether Autism, a New Zealand-based autism information and advisory service, to create appropriate resources for this audience ('Guides').

The Guides were developed throughout the first half of 2022 and were published on Altogether Autism's website in September 2022 (Corlett et al., 2022). Since their publication, we have delivered workshops to raise awareness about the Guides amongst tertiary educators in Aotearoa New Zealand. Here we reflect on what we have learnt from the process of writing and publicising the Guides, and make recommendations for others seeking to translate research on autistic learners' tertiary experiences into practice.

AUTHOR POSITIONALITY

This project involved surveying and analysing data from autistic tertiary learners, their support people and tertiary staff in Aotearoa New Zealand, using that data and other research to develop the Guides, and increasing awareness about the Guides by delivering workshops to tertiary educators. Rachael Wiltshire wrote this paper. She has been involved in all stages of the project: providing feedback on the proposed survey questions and on the initial data analysis, writing three of the Guides ('Communication,' 'Mental Health' and 'Social Interactions') and designing and presenting all the workshops that we have delivered on the Guides. Rachael is autistic and has studied at both university and polytechnic in Aotearoa New Zealand. The challenges she faced during her own tertiary study, and her deep desire to see the system improve for future students, have necessarily shaped her approach to writing the Guides and delivering workshops. Joanne Lawless analysed the survey data that was used to inform the Guides. She is the mother of two autistic adults and is passionate about increasing awareness and creating systemic change in the way autistic people are supported in the education system. Rebekah Corlett and Timothy Folkema both provided feedback on the proposed survey questions and on the initial data analysis, as well as writing Guides. Rebekah Corlett wrote 'Sensory Experiences' and Timothy Folkema wrote 'Executive Function' and 'Self-Advocacy.' Rebekah is a parent and activist who became a Member of the New Zealand Order of Merit in 2022 for services to education. Timothy has studied at a polytechnic in Aotearoa New Zealand up to a postgraduate level and has worked alongside many other autistic and disabled tertiary students in his career. He feels a lack of understanding about autism meant he did not fully benefit from the tertiary experience and hopes this project will result in better outcomes for autistic students. Luella Wheeler has provided an external review of the conclusions drawn in this paper, having not been involved in the initial writing of the Guides. Luella is Māori and autistic, has studied at two universities and one wānanga in Aotearoa New Zealand as an on-campus student and as a distance learner, and has experienced first-hand some of the barriers and challenges presented to autistic learners.

WRITING THE GUIDES

Given the lack of existing research into the experiences of autistic tertiary learners in Aotearoa New Zealand, we began the process of developing the Guides by consulting with autistic students who either had studied or were currently studying at a tertiary education organisation in Aotearoa New Zealand, whānau members who had supported an autistic person through tertiary study, and tertiary staff in Aotearoa New Zealand. Background information on the project and links to the surveys were hosted on Altogether Autism's website, and the survey was advertised through Altogether Autism's networks, including our social media and email list. The surveys were open from 11 February to 7 March 2022. All data were anonymous.

The survey of autistic learners included questions about demographics, study history, how challenging different aspects of tertiary study were, and where support was needed. The survey of whānau included questions about demographics, the respondent's relationship to their autistic learner, the challenges their learner had faced, how they had supported their learner, and what support they would like to see tertiary education organisations provide. Some questions asked participants to identify how challenging something was on a three-point scale; others asked participants to rank challenges or support needs from "most challenging"/"most support needed" to "least challenging"/"least support needed." All questions included space for respondents to comment further on the support they felt tertiary education organisations should provide.

The survey of tertiary staff began with a question asking respondents what type of tertiary education organisation they worked at, and what their role was. Respondents were asked what areas they supported autistic learners with, what support they provided teaching staff to help them understand autistic learners, and where they felt more support for autistic learners was needed. These questions asked respondents to rank each area from "most support needed" to "least support needed." Space was provided so respondents could elaborate on their rankings.

We received responses from 99 autistic learners, 47 whānau and 11 tertiary staff. The low response rate from tertiary staff was disappointing. We think it might have been because the survey ran at the beginning of the academic year, when staff are particularly busy. Further, in February 2022, Aotearoa New Zealand was experiencing widespread community COVID-19 transmission for the first time, so tertiary staff were busy adapting their programmes to this new environment. Thus, staff may not have had time to respond to a survey. Following consultation with the TEC, we decided not to keep the survey open longer to seek further responses. The survey helped us understand what support autistic tertiary learners needed, so that we could frame the Guides around these areas; the responses from autistic learners and their whānau were more helpful in answering this question than the responses from tertiary staff were.

Our analysis of the survey responses focussed on identifying key areas where support was needed and quotes and experiences that illustrated learners' needs in these areas. However, two other themes emerged from the data which are worth noting, even though they were not related to specific support needs and thus did not form the basis of a Guide.

Firstly, there was a significant gap between the support tertiary staff thought they provided, and the support that autistic learners and their whānau experienced. Staff felt that they made sure communication and educational needs were supported, whereas autistic learners and their whānau generally did not feel they received clear communication or good support from their tertiary education organisation. It would be worth exploring this discrepancy in future research. It might be that learners experience different levels of support depending on what type of tertiary education organisation they study at. Only three of the 11 respondents to the survey of tertiary staff worked at a university, with the remaining eight working at Te Pūkenga. We did not directly ask autistic learners what type of institution they had studied at (many respondents had multiple enrolments and may have studied at more than one type of institution). However, in 46 cases it was possible to ascertain what type of institution(s) respondents had studied at from their open-ended responses. Of these 46 respondents, 32 had studied at university, nine had undertaken some form of vocational training (for example, at Te Pūkenga) and five had studied both at a university and at Te Pūkenga. Thus, it is possible that the difference between autistic learners' experiences of support and the perceptions of tertiary staff about the support they provided is because the support provided by Te Pūkenga, where most of our staff respondents worked, is better than the support provided by universities, where it seems that most of our autistic learner respondents studied. However, our data does not allow us to fully examine the relationship between institution type and experiences of support, and it would be worth exploring this relationship in future research.

Secondly, 18.2 percent of our autistic learners did not have an autism diagnosis, but did self-identify as autistic (note that we did not verify diagnostic status). Previous research has largely focussed on those with a confirmed autism diagnosis (Accardo et al., 2019; Anderson et al., 2017, 2020b; Anderson et al., 2018, 2020a; Cai & Richdale, 2016). This suggests that many students who identify as autistic but lack a formal diagnosis may have been missed in previous research. Autistic learners who lack a formal diagnosis are often not eligible to receive the formal supports offered through their institution's disability services, but still need support. Respondents who did not have a formal diagnosis whilst they were studying explained that without support they risked mental health challenges and withdrawing from or failing their course. They also pointed out that only offering supports to students with a formal diagnosis is an equity issue, as costs, wait times, and stereotypes about how autism presents can make a diagnosis difficult to access. Thus, future research should consider the unique challenges that autistic learners who lack a formal diagnosis face in tertiary education and how their support needs can best be met.

Given respondents were asked to opt-in to participating in the survey, it is also important to acknowledge that the sample may not fully represent the experience of all autistic tertiary learners. In terms of ethnicity, European learners were overrepresented, with 87.9 percent of our autistic learners identifying as European, compared to 57.3 percent of all tertiary students in 2022 (total tertiary population percentages from Education Counts

(2023)). Pasifika and Asian learners were underrepresented, accounting for 2.0 percent and 9.1 percent of our sample respectively, compared to 9.2 percent and 24.1 percent of the total tertiary student population. The percentage of our sample who identified as Māori was 14.1, which is similar to the 18.8 percent of the total tertiary student population who identify as Māori. Respondents were also asked about other aspects of their identity – "nonspeaking," "AAC user," "migrant," "refugee," and "LGBTQIA+" were given as options and there was also an "other" box where respondents could write in aspects of their identity, with "ADHD," "gifted," and "dyslexic" given as examples. It is difficult to find out what percentage of the total tertiary student population identifies with any of these options, and the phrasing of the question may have affected responses (for example, respondents may have been more likely to write "ADHD" into the "other" box as this was one of the examples). However, of the 99 respondents, 45 identified as LGBTQIA+, 31 as having ADHD, 6 as gifted, 12 as having a mental health condition, 14 as having a learning disability, 2 as being AAC users and 3 as migrants. Finally, it is important to note that completing the survey required respondents to read and answer questions online, and thus it may have been inaccessible for some people.

Our analysis of survey responses revealed six key areas where autistic tertiary learners needed support: executive function, communication, mental health, self-advocacy, sensory experiences, and social interactions. These themes aligned with support needs identified in other studies of autistic tertiary learners (Accardo et al., 2019; Anderson et al., 2017, 2020b; Anderson et al., 2018; Cai & Richdale, 2016; Sarrett, 2018). A Guide was written for each area. We primarily used the stories that learners had shared with us to inform the Guides, and used quotes from survey respondents to ensure that learner voice was a strong feature of the Guides. We also incorporated other research where this was necessary: for example, autistic burnout emerged as an important mental health challenge for autistic tertiary learners, so the Guide on mental health references research on autistic burnout to help tertiary educators understand this phenomenon.

The intended audience for the Guides was tertiary educators; that is, people working in a teaching role at a tertiary education organisation, such as lecturers and tutors. Whilst we realised the Guides would likely also be of interest to staff working in disability services and learning support, they were not our primary audience; this project specifically aimed to address the paucity of information available for tertiary educators. Recognising that tertiary educators are busy people, we made the Guides as user-friendly as possible. Each Guide begins with an introduction explaining the challenge that the Guide addresses and finishes with a list of actions tertiary educators can take to support their autistic learners. This means readers can easily navigate to the actions if they are short on time.

PUBLICISING THE GUIDES

The Guides were published on Altogether Autism's website in September 2022 (Corlett et al., 2022). Since then, we have undertaken outreach activities designed to increase awareness of the Guides amongst tertiary educators. In 2023, we ran two seminars on the Guides for Ako Aotearoa, a government-funded organisation that provides professional learning and development for tertiary educators. In the same year, we were contracted by three tertiary education organisations to deliver training on the Guides directly to their staff and presented on the Guides at two conferences.

We noticed two key trends in undertaking this work to publicise the Guides. The first is that educators working at Te Pūkenga have been much more interested in learning about the Guides than educators working at universities. All three of the tertiary education organisations that contracted us to deliver workshops directly to their staff were subsidiaries of Te Pūkenga. Of the 33 people registered to attend our seminars with Ako Aotearoa, just four worked at a university. Secondly, although the Guides are aimed at an audience of tertiary educators, attendees at the Ako Aotearoa seminars (the only presentations where we were able to record people's roles) were more likely to work in a student support role than in a teaching role: only ten of the

attendees at these seminars worked in a teaching role. This suggests more work needs to be done to increase awareness in universities of the importance of supporting autistic learners. Teaching staff must be encouraged to understand that supporting autistic learners is an important concern for them as educators, and not something that should be left to disability services and learning support staff.

RECOMMENDATIONS

The following recommendations are based on what we learnt from our survey data and delivering training sessions.

Engaging teaching staff in training about autistic learners' needs

The biggest challenge we have faced since publishing the Guides has been getting the resources directly in front of teaching staff; people working in disability services and learning support have been more interested in learning about the Guides. It is possible that disability services and learning support staff are attending our presentations and sharing information about the Guides with teaching staff at their institutions. It may also be that teaching staff cannot find the time to attend our seminars. However, there may also be an attitudinal problem; it is possible that teaching staff do not view the needs of autistic learners as their responsibility, and instead rely on disability services and learning support to look after the needs of these learners. Our survey data showed that autistic learners found dealing with the attitudes of teaching staff was one of the hardest aspects of studying; in contrast, the support that disability services or learning support provided was generally considered good. Thus, changing the attitudes of teaching staff towards autistic learners could make a significant difference to their experience of tertiary study.

Previous research has advocated for more resources and training to be provided to tertiary educators (Anderson et al., 2020b; Sarrett, 2018). Our experience shows that simply providing resources and training is not enough; the resources must get to their intended audience. We recommend further research into what prevents tertiary educators from engaging with resources and training on the needs of autistic learners, so that resources and training can be developed that will engage tertiary educators.

Support needs may differ depending on institution type or subject

Much previous research has only looked at autistic university students or, when students at other types of tertiary education organisation were included, data was not examined to see whether students' experiences differed based on institution type (Anderson et al., 2018, 2020a; Cai & Richdale, 2016). However, our data suggests that autistic learners at university might have different support needs, and different experiences of the quality of support they receive, from autistic people undertaking vocational education. Further, after two decades of research looking at the experiences of autistic learners in tertiary education, broad themes (such as the heterogeneity of autistic learners and the need for increased understanding among tertiary staff) have largely been established. We suggest that it is now time for researchers to turn their attention to the different types of institution that make up a tertiary education system, and how autistic learners' experiences differ based on the type of institution they attend. Similarly, researchers should explore the unique challenges that different subjects pose. For example, some of our respondents reported that they encountered stigmatising attitudes about autism when they were studying psychology, and this presented a barrier to them continuing with the subject. Such research will enable tertiary education organisations to provide supports for their autistic learners that best suit the needs of students at each specific institution type and within each subject.

Lack of diagnosis should not be a barrier to support

Students who identify as autistic, but do not have a formal diagnosis, have been largely ignored by previous research. However, our survey showed that self-identified autistic people make up a significant proportion of autistic tertiary learners (nearly one-fifth of our sample). They also face unique challenges, as without a diagnosis they are often unable to access formal supports through their institution. Limiting support to those with a formal diagnosis is an equity issue; people may have been unable to receive a formal diagnosis because of cost barriers, wait lists, or because they do not fit within the stereotypical view of autism. Further, some students might not know enough about autism to recognise that they could be autistic. We thus have two recommendations. Firstly, rather than excluding self-identified autistic learners from their studies, researchers should investigate what specific support needs this group has and how tertiary education organisations can better meet these needs. Secondly, tertiary education organisations should offer needs-based, rather than diagnosis-based, support. In many cases, a tutor or lecturer can accommodate an autistic learner's needs without needing formal accommodations through the institution's disabilities office. Teaching staff can approve accommodations such as making changes to groupwork requirements or enabling someone to participate in a class discussion by writing their answers rather than speaking, for example. All tertiary learners, regardless of diagnostic status, should feel empowered to have a discussion with their teachers about what they need to be able to do well in their course. For this to happen, teaching staff need more understanding about the needs of autistic learners, which is why researching the barriers to tertiary educators engaging with resources and training on autistic learners is our first recommendation.

Small changes can make a big difference

Many autistic learners' needs can be met with relatively small changes. For example, lecture recordings made a major difference for many of the participants in our survey. They helped with both mental health and sensory challenges; if a student was unable to attend class in person due to anxiety, autistic burnout, or the campus sensory environment, lecture recordings enabled them to still learn the course content. Lecture recordings also helped with executive function challenges. Many learners mentioned that they had trouble with notetaking because they struggled to keep up with the lecturer and felt anxious when they missed something, meaning they found it harder to take in the rest of the lecture. Lecture recordings can enable autistic learners to more fully engage with the course content, because they know that if they do miss something they can refer back to the recording of the lecture later.

Universal provision of lecture recordings is a small change to make. The barrier is generally attitudinal, with some tertiary educators worrying that if students are not attending class in person, they are not engaged in the course. However, our results show that lecture recordings can be as useful for people who do attend class in person as they are for those who do not, and that autistic people can experience real barriers to attending classes on campus but still engage well online. Thus, universal provision of lecture recordings is an example of a relatively small change that tertiary education organisations can make that makes a major difference for autistic learners. As well as being easy to implement, small changes such as this can generally be made available to the whole class, which removes barriers for those students who need support but do not have a formal diagnosis.

Listen to individual autistic learners

Previous research has highlighted the heterogeneity of the autistic population and the need for supports to be individualised (Accardo et al., 2019; Anderson et al., 2018, 2020a). Our survey data backed this up. For example, because our study took place in early 2022, many respondents reflected on how the transition to online learning because of COVID-19 impacted their studies. Many respondents found online learning much easier than on-campus learning, as it meant they did not have to deal with the sensory and social challenges

that being on campus posed. Others found learning online much harder than learning on campus had been; without the routine and contact with tutors that being on campus provided, they found it harder to engage with their learning. This heterogeneity means that there is no one-size-fits-all approach to supporting autistic tertiary learners. Rather than trying to provide standardised supports for autistic learners, tertiary education organisations should take the time to have a conversation with each learner to identify what type of support they need to do well in tertiary education. This should not be a one-off conversation, as students' support needs evolve as they move through their studies.

We recommend that learners have the option to be matched with a single person who can remain their key point of contact throughout their studies. This person could be someone who works in disability services or learner support, or it could be a tutor or lecturer. Having a single point of contact reduces communication barriers for autistic learners, as it means they know exactly who they should contact when they need help. An ongoing relationship enables the key point of contact to better understand the learner's challenges and suggest appropriate supports, thus supporting the learner to develop confidence in advocating for themselves as they are not constantly having to explain their needs to new people. Given the barriers to diagnosis discussed previously, we recommend this support be available to anyone who feels they need it, regardless of whether they have a formal diagnosis. Making this support available as an opt-in for students who need it makes it feasible regardless of the size of the student population, as it is unlikely that all students would choose to use this support.

CONCLUSION

Autistic tertiary learners in Aotearoa New Zealand have similar support needs to those identified amongst autistic tertiary learners in other countries. Previous research has identified that more resources and training are needed to help tertiary educators better understand the needs of their autistic learners. However, our experience of developing such resources shows that simply providing resources is only part of the challenge; getting the resources in front of the people who need them is also important. We also found that autistic learners' support needs and the quality of the support they receive may differ depending on what type of institution they study at. We thus recommend that future research should investigate barriers to tertiary educators participating in training on autism, and how autistic learners' support needs differ depending on what type of institution they study at. We also recognise that many autistic tertiary learners do not have a formal diagnosis and recommend that future research takes these learners into account. Finally, we suggest two supports (lecture recordings and a key point of contact) that tertiary education organisations can implement that both make a significant difference for autistic learners and can be made available to all students, regardless of diagnostic status.

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