Developing a common practice model for literacy & communication and maths

An overview of the literature

Bronwyn Gibbs, Amanda White, and Sue McDowall

NZCER
Rangahau Mātauranga o Aotearoa

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1. Introduction

In 2022, the Ministry of Education launched the Literacy & Communication and Maths Strategy, followed by the Literacy & Communication and Maths Action Plans. The next priority for implementing the action plans is to develop a Common Practice Model (CPM). The CPM will outline principles and evidence-informed pedagogical approaches to underpin teaching and learning for literacy & communication and maths within *Te Whāriki* and *The New Zealand Curriculum.*

The purpose of this literature overview is to provide the Common Practice Contributors Group with a range of current research on effective principles and pedagogies in literacy & communication and maths in Aotearoa New Zealand. This evidence will support the group to determine effective pedagogies, with the diverse cultural, linguistic, dispositions, and learning backgrounds of ākonga in mind. The literature overview is structured around three broad research questions:

1. What key principles and pedagogies underpin effective literacy and communication teaching from early childhood through to the end of secondary schooling?
2. What key principles and pedagogies underpin effective maths teaching from early childhood through to the end of secondary schooling?
3. What are the common themes relating to key principles underpinning effective pedagogies for teaching literacy & communication and maths?

1.1 Scope

This overview is not intended to be a full and extensive review of all pedagogies and approaches related to literacy & communication and maths. Given the vast amount of research within each one of these fields, we have defined the scope of this overview in the interests of manageability for the purposes of the Contributors Group.

We have prioritised national literature from the past 3–5 years (2017–2022) to provide a contemporary view of current pedagogies and principles relating to literacy & communication and maths in the unique context of Aotearoa New Zealand. Some international literature has also been cited where we thought it was seminal or relevant to establishing context in each section of the overview, but, in the main, we have focused on illuminating New Zealand-based studies wherever possible. In particular, we present research that provokes thinking and discussion around the teaching and learning of those learners who have been underserved by the education system. This includes ākonga Māori, learners from Pacific Island backgrounds, and those with diverse learning needs. In presenting the literature on selected pedagogies, we aim to highlight common principles that matter most for all ākonga across literacy & communication and maths in Aotearoa New Zealand.

1.2 Gaps in the literature

Within the broadly defined scope of literacy & communication and maths in this overview, our search uncovered a mixture of research studies in Aotearoa New Zealand, ranging from small qualitative case studies to larger scale, quantitative randomised control trials and literature reviews. Smaller case

studies in this overview offer valuable insights into specific aspects of practice that matter to kaiako, whānau, and ākonga in local contexts.

Previous literature reviews on literacy and communication (Denston, 2021; McNaughton, 2020; Wilson et al., 2021), and an evaluation of Reading Recovery (Appleton-Dyer et al., 2019), all raised the issue of a general lack of consistent, up-to-date, national data on communication and literacy in New Zealand. This was also our experience with the literature. Literacy and communication research located in this overview was more heavily weighted towards pedagogies in early childhood education (ECE) and primary school contexts, with a smaller number of studies focused on secondary school pedagogies and practices. In addition, most of the research focused specifically on talking, reading, and writing in ECE and school settings, with relatively less known about the broader communication and literacy experiences of ākonga with disabilities and others who communicate in multimodal ways.

In the body of mathematics literature, we noted that there was a heavier weighting on research in primary schools than in ECE and secondary settings. More research appears to have been carried out with Pacific learners than ākonga Māori in mainstream schools. This is perhaps not surprising as there is a large body of literature focused on Pacific learners generated from the Developing Mathematical Inquiry Communities model (e.g., Hunter et al., 2018). Like literacy and communication, there appears to be less known about specific pedagogies to support neurodiverse ākonga in mathematics classrooms.

We believe that the curriculum refresh, and the implementation of the Literacy & Communication and Maths Strategy and Action Plans, provide substantive opportunities for not only exploring the existing research in Aotearoa New Zealand, but also generating new research during a time of significant change within our education system.

1.3 A note about theories

Theoretical approaches shape the way research is carried out, providing lenses with which to determine what is important and effective. Sociocultural and cognitive theories of learning are both prominent research approaches in the three areas being considered, although we acknowledge that these are only two of many possible interpretive frameworks.

Table 1 gives examples of ways that learning is conceptualised within the two different theoretical stances. The table highlights contrasting priorities that might shape views and values regarding the development of literacy & communication and maths. This list is not exhaustive but rather designed to illustrate some of the ways that different lenses might influence our interpretations of effectiveness in teaching and learning in those domain areas.

TABLE 1   **Sociocultural and cognitive theories of learning**

Sociocultural theories	Cognitive theories
Learning is situated in social and cultural contexts, with no "one size fits all" approach. Knowledges and pedagogies are culturally bound (e.g., Macfarlane & Macfarlane, 2019; Macfarlane et al., 2015; Rogoff et al., 2017).	Learning involves cognitive processes of learning in the individual, with universal ages and stages of development (e.g., Piaget & Inhelder, 1969).
Learning takes place through social relationships and interactions (e.g., Rogoff, 1998; Vygotsky, 1978) and often during informal, authentic learning contexts (e.g., Rogoff et al., 2016).	Learning focuses on the deliberate, structured teaching of component skills, with a focus on individual competencies for learning (e.g., Scarborough, 2001).
Learning leads development, rather than being dependent on readiness to progress to new stages (e.g., Vygotsky, 1978; Wells & Claxton, 2002).	Learning takes place when there is readiness to progress through a sequence of stages or skills, with increasing levels of complexity (e.g., Piaget & Inhelder, 1969).
Learning draws on funds of knowledge, recognising the external social and cultural resources learners bring with them from their homes and communities to their educational settings (e.g., Gonzales et al., 2005; Hedges, 2022).	Learning is sometimes explained in terms of biological resources within the individual, including early brain development and neural connections (e.g., National Scientific Council on the Developing Child, 2020; Shonkoff & Phillips, 2000).

In this literature overview, we have not prioritised either theoretical lens in our search or presentation of current research in Aotearoa New Zealand. We acknowledge that different theories of learning are not necessarily mutually exclusive; for example, it is possible to think about the development of cognitive processes within cultural contexts, or to interweave different systems of knowledge across more than one cultural stream (Macfarlane et al., 2015). Some pedagogies draw on more than one theory, and many ākonga learn in ways that cannot be explained by a single perspective. These examples call for nuanced understandings of learning, rather than inflexible binary positions. We recognise that kaiako will need to have access to a range of information in order to make pedagogical decisions to best serve ākonga in their particular contexts, and that there is no "one size fits all".

1.4 Positioning Universal Design for Learning (UDL)

As we've just noted, it can be helpful to consider the theoretical framing of research about pedagogies of learning. Is learning framed as a cognitive act (largely located in the brain) and/or is it positioned as an act that is socially embedded in the surrounding environment? Now we need to take these layers of complexity several steps further. Even within a largely cognitive framing, we now know that learning is a complex act in which the brain interacts with the rest of the body. Guy Claxton uses the phrase "brain-body" to emphasise the idea that the brain does not act in isolation from everything that is happening in the body that supports it (Claxton, 2015). The theoretical term for this idea is "embodied cognition". Neuroscience research takes the idea of embodied cognition a step further again. This research field has revealed the complexity of the neural pathways that collectively make up the activity we simply call learning. The research has sought to explain conditions such as dyslexia, which add additional challenges to the already formidable feat of learning to read, and dyscalculia which makes learning mathematics even more challenging than it already is. The concept of UDL originated in this detailed neuroscience research, and so we have positioned it as an overarching framing that has implications for all the pedagogies we investigated.

The concept of UDL has parallels to, but is distinct from, the concept of Universal Design (UD) that emerged in the field of architecture. In architecture, the principle is that buildings should be designed in ways that allow access for people with the widest possible range of mobility issues, without needing any special accommodations to be made. UDL similarly posits that learning experiences should be designed in ways that take account of neurodiversity in meaning-making, and hence in learning. Both UD and UDL draw on a socio-ecological theoretical framework. In this framing, diversity of abilities is seen as a part of human functioning and is not treated as atypical (Karvonen et al., 2020).

UDL is underpinned by three basic principles. Each principle takes account of neurodiversity in a distinct type of meaning-making neural network (Glass et al., 2013). Glass et al. categorise these three principles as addressing: the *why* of learning via the affective neural network; the *what* of learning via the representation neural network; and the *how* of learning via the strategic neural network. The TKI guide to UDL[1] summarises these three principles as follows:

- Students should be able to *engage* with the learning in multiple ways. Suggested strategies include focusing on affective aspects of engagement and being flexible in the provision of learning options; ways of sustaining effort; and opportunities for self-regulation.
- Students should be able to access multiple ways of representing learning. This principle supports *meaning-making* for students who perceive and understand information and ideas differently.
- Students should be able to use a range of ways to *do things and to express their ideas.* This principle focuses on students' active role in learning.

These principles aim to ensure that the design of learning affords students who have specific learning needs the same opportunities to participate as students who do not have such needs, without any sense of being singled out. At this high level, UDL sounds logical and straightforward. However, one recent small-scale analysis of National Certificate of Educational Achievement (NCEA) assessments suggests that applying the principles could be easier said than done. NCEA Subject Expert Groups (SEGs) participated in an introductory UDL workshop and were then asked to apply the principles to their design of innovative NCEA assessment tasks. Analysis of several of the science tasks that were subsequently created indicated that the SEG teams had tried to do this, but also that the resulting tasks were unlikely to be more equitably accessible, for a variety of reasons (Lee & Hipkins, 2022). It seems likely that sustained, concrete professional learning support will be needed if UDL is to truly become universal in teachers' pedagogical thinking and acting.

We believe it will be crucial for the Common Practice Contributors Group to consider not only the connections between pedagogies, but also the principles of UDL that support effective teaching and make learning engaging and accessible for all. There is an opportunity in this work to bring UDL to life in concrete scenarios that will help teachers to translate the principles to practice in their own contexts.

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1   https://inclusive.tki.org.nz/guides/universal-design-for-learning/

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2. Literacy and communication overview

Varying definitions of literacy and communication exist in national and international research literature, spanning from broader conceptualisations of multiple literacies encompassing diverse meaning-making modes, through to a more specific focus on the linguistic modes of talking, reading, and writing. For the purposes of this overview, we begin with the definitions provided in the Literacy & Communication and Maths Strategy, which take a wide view of literacy to include oral language, speaking, listening, viewing, presenting, and digital literacy alongside reading and writing. Being literate in Aotearoa New Zealand today involves an understanding of diverse cultural perspectives, privileging te ao Māori and Pacific worldviews (Ministry of Education, 2022, p. 15).

In providing this overview of literature, we acknowledge the wide and comprehensive range of current and past resources available to kaiako in relation to literacy, oral languages, and communication in both early childhood education (ECE) and school sectors in Aotearoa New Zealand. These resources include *Te Kōrerorero: Talking Together* (Ministry of Education, 2020) and *Much More than Words* (Ministry of Education, n.d.-b) in early learning settings; *Learning Through Talk* (Ministry of Education, 2009a, 2009b); *Effective Literacy Practice* (Ministry of Education, 2003, 2004, 2006); *Effective Pedagogy: Teacher Actions Promoting Student Learning in the New Zealand Curriculum* (Ministry of Education, 2007, pp. 34–36); and recent literature reviews commissioned by the Ministry of Education focused on school-based pedagogies for *Speaking and Listening* (Denston, 2021), *Viewing and Presenting* (Williams et al., 2021), *Teaching Reading for Understanding* (Wilson et al., 2021), *Teaching and Learning in Writing* (Parr et al., 2021), and *Digital Literacy* (McNaughton, 2021).

In parallel with seminal international literature (e.g., Dickinson et al., 2012), recent research in Aotearoa New Zealand suggests that oral language, reading, and writing are closely intertwined aspects of literacy that develop together over time (McNaughton, 2020; Parr, 2022; Suggate et al., 2018). Critical factors underpinning the development of communication, oral language, and literacy include rich, responsive kaiako–ākonga interactions, and the importance of sharing conversations and stories to provide opportunities for ākonga to learn about using nonverbal and verbal aspects of communication and literacy such as vocabulary, speech sounds, symbols, and print in their own and other languages (Denston, 2021; Ministry of Education, 2020).

Research in New Zealand primary schools has identified that ākonga progress in literacy depends on having a positive school culture, with a strategic focus on literacy, and a coherent purpose with literacy goals that involve the whole school community (de Waal & Eyre, 2019). Effective literacy practices build upon the background knowledge, cultures, vocabulary, phonological, and phonemic awareness of ākonga, as well as opportunities to hear, tell, and read stories independently and in small and large groups (Carroll & Breadmore, 2021; The Education Hub, n.d.).

In this overview, our intention is not to replicate information about effective principles and practices for literacy and communication identified in existing resources but, rather, to add fresh insights from the most recent empirical literature in Aotearoa New Zealand to highlight the experiences of particular groups, including ākonga Māori, Pacific learners, and those with additional learning needs. In doing so, we aim to highlight evidence about principles and pedagogies that have been shown to be effective, allowing those working in the field to make decisions around how best to support all ākonga in the local communities they serve.

2.1 Culturally sustaining pedagogies

Culturally sustaining pedagogies seek to foster, value, and sustain the diverse linguistic, literate, and cultural practices of all ākonga (Paris & Alim, 2017). In Aotearoa New Zealand, te reo Māori, the Indigenous language of tangata whenua, is recognised as a taonga to be prioritised and sustained in educational settings as part of honouring bicultural commitments stated in Te Tiriti o Waitangi (Skerrett & Ritchie, 2021). Furthermore, recent increases in superdiversity due to migration in New Zealand (Royal Society of New Zealand, 2013; Spoonley, 2014) have resulted in cultural and linguistic diversity in communities, raising challenges for kaiako to find ways to equitably ensure that the languages, cultures, and identities of all ākonga are also supported and nurtured in educational contexts (Chan & Ritchie, 2020).

Key themes were evident in current literature exploring culturally sustaining pedagogies for literacy and communication in Aotearoa New Zealand.

Research suggests that learning is likely to be effective when kaiako are enabled to:

1. develop strong partnerships with whānau to learn about home cultures, languages, identities, and literacy practices
2. adopt strengths-based approaches that build on what ākonga already know about communication, languages, and literacies
3. use instructional approaches that support and sustain the languages, cultures, and literacies of all ākonga

2.1.1 Develop strong partnerships with ākonga and whānau to learn about home cultures, languages, identities, and literacy practices

Studies in ECE settings have highlighted the importance of relational pedagogies that are characterised by kaiako using their knowledge of ākonga and whānau to build and sustain communication, languages, and literacies. In one study in a multicultural ECE setting in Auckland, kaiako carried out visits to family homes to learn about home languages and cultural literacy practices, with positive benefits for strengthening a sense of ākonga belonging and identity (Cooper & Hedges, 2022). In another study of infant–toddler communication in an ECE setting, social and cultural relationships between parents and kaiako were critical to making sense of a 1-year-old child's multimodal contributions to sharing stories (White et al., 2021; White & Padtoc, 2021). In a refugee ECE centre, the actions of kaiako in noticing, recognising, and responding to culturally nuanced communicative interactions strengthened a sense of belonging for ākonga and their whānau (Mitchell & Bateman, 2018).

Home-education partnerships, based on mutual care, respect, and collective vision, have also been identified as a critical factor in supporting ākonga Māori and Pasifika learners to learn and thrive in school settings (Alansari et al., 2022). In a comprehensive literature review of speaking and listening in school settings in Aotearoa New Zealand, Denston (2021) emphasised the fundamental importance of drawing on ākonga backgrounds in order to support their culture and identities, including Indigenous knowledge systems, home languages, and multimodal forms of making meaning. Similarly, partnerships between home and school were found to be an essential aspect of effective literacy practice for Pasifika learners in English-medium settings (Si'ilata, 2019; Si'ilata et al., 2018).

2.1.2 Adopt strengths-based approaches that build on what ākonga already know about communication, languages, and literacies

Drawing on funds of knowledge is a pedagogical approach that builds on a strengths-based view of ākonga and their whānau "to recognise and incorporate family-based knowledge and expertise in educational settings in order to improve outcomes for children" (Hedges, 2022, p. 84). In a community-led parenting programme, Quigan et al. (2021) used a strengths-based whānau coaching model, informed by He Awa Whiria/The Braided Rivers approach (Macfarlane et al., 2015) to support the early oral language development of babies and young children. Combining the lived experiences of whānau with Indigenous Māori and Western knowledge systems, the programme built on the strengths and assets of whānau to enrich the language environments of young ākonga.

Two other recent studies in ECE settings found that picture books in Pacific languages (Foe et al., 2022) and pukapuka pikitia (picture books) in te reo Māori (Brouwer & Daly, 2022) offered potential to validate and extend the languages, literacies, and identities of ākonga through the sharing of books that reflected familiar cultural knowledges and relationships.

In school settings, recent literature reviews on speaking and listening (Denston, 2021), reading comprehension (Wilson et al., 2021), viewing and presenting (Williams et al., 2021), and writing (Parr et al., 2021) have emphasised the importance of culturally sustaining pedagogies that build from what ākonga already know and can do. Wilson et al. (2021) found that the reading comprehension and motivation of ākonga in Years 4–8 is affected by the knowledge they bring to the text, including their knowledge of the text structure, genre, topic, domain, and culture. Williams et al. (2021) also highlighted the need for ākonga to see themselves represented and validated in culturally appropriate visual tools and resources used in schools. In Si'ilata's (2019) research, teachers' positive expectations of Pasifika students in Years 1–8 supported them to create opportunities for students to build on their existing knowledge of languages and literacies, leading to accelerated gains in reading and writing on nationally standardised asTTle measures.

2.1.3 Use instructional approaches that support and sustain the languages, cultures, and literacies of all learners

Research has highlighted the importance of culturally sustaining approaches to support the communication and literacy development of ākonga. Gillon and Macfarlane (2017) proposed a framework to enhance the early literacy development of ākonga with speech and language difficulties, drawing on He Awa Whiria/The Braided Rivers approach (Macfarlane et al., 2015), blending Western and Indigenous knowledges to support learning. Denston (2021) also argued that it is critical for kaiako to understand the cultures, languages, and identities of ākonga Māori and Pasifika learners in order to select strategies to support speaking and listening in school classrooms, including decisions on groupings (e.g., some ākonga Māori often feel more comfortable sharing ideas in smaller groups, compared to whole-class interactions), or employing different modes of communication (e.g., some Pasifika learners might engage more in listening than talking as a sign of respect to teachers). Translanguaging, a pedagogical approach that encourages bilingual and multilingual students to leverage their whole linguistic repertoires, has also been identified as important for many Pasifika learners (Si'ilata, 2019) and ākonga Māori (Seals & Olsen-Reeder, 2020; Seals et al., 2019).

One theme running throughout recent studies is the value of reading and telling stories as a culturally responsive approach to supporting communication and literacy. Pedagogies involving stories have been found to be an effective approach to sustaining languages and cultural knowledges in ECE

settings, including the use of varied story forms such as waiata, pūrākau, and whakapapa for ākonga Māori (e.g., Rameka et al., 2017; Skerrett & Ritchie, 2021). Stories also underpin the development of literacy learning and wellbeing in older students, as demonstrated by Cunningham et al. (2022) who explored family stories in Years 8–9 Pasifika learners. Intergenerational family stories were found to be a critical source of support for education, through which learning expectations, reciprocity, and values were expressed by both parents and learners.

2.2 Play-based pedagogies

Play-based learning (sometimes called "learning through play") is a pedagogical approach centred around play as the valued mode of learning. Play-based pedagogies are at the heart of *Te Whāriki*, the early childhood curriculum (Ministry of Education, 2017), and have recently also become a focus in some school classrooms. Definitions of play-based pedagogies vary in the literature, although many agree that there is a continuum ranging from open-ended, child-led play through to more purposefully framed and teacher-guided play. Multiple approaches are often combined (Aiono et al., 2019). Connections between play, communication, and literacy are well established in ECE literature in New Zealand and internationally (see, for example, Stagg Peterson & Friedrich, 2022). Through play, ākonga have opportunities to explore and develop literacy and communication for a wide range of purposes, using both embodied and verbal modes of making meaning.

Key themes were evident in current literature exploring play-based learning in relation to the development of literacy and communication in Aotearoa New Zealand.

Research suggests that learning is likely to be effective when kaiako are enabled to:

1. understand connections between play, literacy, and communication within contexts for learning
2. develop strong partnerships to promote play, literacy, and communication by building on ākonga funds of knowledge
3. use intentional and responsive play-based approaches to support and develop the communication, languages, and literacies of all ākonga.

2.2.1 Understand connections between play and the development of literacy and communication within contexts for learning

Most research on play-based learning, literacy, and communication in New Zealand is situated in ECE contexts, with evidence that ākonga develop communication and literacy skills through everyday interactions with their peers, kaiako, and the environment. In one study, Bateman and Gunnarsdóttir (2017) illustrated how stories for ākonga aged 2–5 years were co-constructed during pretend play, where ākonga had the time and space to develop relationships with their peers and kaiako. Similarly, Davis (2020) described her experience of using "Helicopter storytelling" (Paley, 1990) to support ākonga to be storytellers and story actors through playful collaboration with their kaiako and peers. In this approach, kaiako invite ākonga to tell their stories using embodied actions and spoken words, and ākonga observe as teachers write down their stories. Finally, ākonga and their peers re-enact their stories, taking on character roles to play out their stories together.

A small number of case studies in school settings have also shared experiences of using play pedagogies to support the communication and literacy of ākonga. O'Neil (2018) found that changing to a play-based approach supported the writing development of ākonga Māori aged 5–7 years, providing them with opportunities to explore sound discrimination and print symbols in authentic contexts, like playing shops. In another study, kaiako of Years 1–3 ākonga noticed that a play-based approach

positively impacted on their reading and writing, due to the increased creativity and risk-taking that supported areas of literacy such as phonological awareness. Older Years 4–5 ākonga in this study had more opportunities to focus on vocabulary through provocations during play (Davis, 2018).

One research study investigated play as pedagogy in a secondary Year 11 English classroom (Holloway, 2018). In this setting, the kaiako recognised the potential of a play-based approach to support language comprehension and expression through increased opportunities to play with language and to explore different ways of thinking and communicating using LEGO, playdough, puppets, and magnetic poetry. While positively received by ākonga, the change in approach raised questions for the kaiako around how best to document and assess play-based learning within the secondary context, an issue that has also been highlighted in primary school settings (Aiono et al., 2019).

Hedges (2018) argues that increased interest in the use of play pedagogies in school settings in New Zealand affords an important opportunity for ECE and school kaiako to engage in collaboration and critical discussions around play, while also sharing expertise around the role that kaiako might have in supporting literacy and other domains through play across the different settings.

2.2.2 Develop strong partnerships to promote play, communication, and literacy opportunities by building on ākonga funds of knowledge

Recent research has highlighted the importance of kaiako learning from families about play practices at home to understand the broader context of cultures, languages, and identities that drive ākonga interests and identities. Mitchell and Bateman (2018) used video to capture ways that kaiako used the nonverbal cultural gestures and languages of ākonga and their families during play and conversations to enact a sense of belonging and wellbeing in a refugee ECE setting. Hedges et al. (2019) illustrated the power of play in providing opportunities for ākonga to engage in conversations about their own lives, supporting the role of ākonga as competent, confident communicators and learners. Cooper and Hedges (2022) emphasised relational pedagogies, and the importance of knowing multilingual ākonga and families well, in order to support and sustain their languages and identities through play. Jacobs (2022) further illustrated ways that ākonga aged up to 5 years drew on their diverse family languages and literacy practices at home to make meaning in a multilingual playgroup setting.

In a new entrant classroom, Milne and McLaughlin (2018) also emphasised the importance of kaiako knowing ākonga well and understanding what they know, in order to plan learning goals and then purposefully partner with them during play. Both Williams et al. (2021) and Wood et al. (2020) also highlighted the role of multimodal literacy practices at home, including digital play, game-based learning, and dramatic inquiry. In reality, the home experiences of ākonga with these kinds of play may be well in advance of kaiako pedagogical approaches around incorporating different technologies, media, and popular culture in ECE and school literacy teaching (Wood et al., 2020). Williams et al. (2021) emphasised the need for initial teacher education and professional learning development around how to use multimodal literacy tools creatively and critically to build on ākonga strengths in ways that are not only limited to spoken and written literacies.

2.2.3 Use intentional and responsive play-based approaches to support and develop the communication, languages, and literacies of all ākonga

While learning though play allows for flexible, enjoyable engagements where ākonga can lead the play, research suggests that a child-centred approach can be easily misunderstood if kaiako are not clear about their role, resulting in kaiako taking a "hands-off" approach to learning (Aiono et al., 2019; Hedges, 2018). One challenge identified in primary school settings is for kaiako to find

balance between explicit teaching of literacy and other domain knowledge, while also allowing for child-guided learning experiences during play. Findings from small studies in primary schools have illustrated the importance of intentional teaching in using play pedagogies, and the need for kaiako to have strong knowledge of curriculum and learning progressions in order to recognise learning opportunities to integrate literacy skills into play with ākonga (Aiono et al., 2019; Milne & McLaughlin, 2018). Milne and McLaughlin (2018) shared an example of a kaiako being planful, thoughtful, purposeful, and responsive in the way she organised a learning experience to focus on oral language and literacy with new entrant ākonga during play with shaving foam. In this interaction, the kaiako repeated descriptive words while commenting on sensory aspects of the exploration, while also acknowledging attempts by an ākonga to write letters in the foam.

Quality, responsive kaiako–ākonga interactions during play, conversations, and stories that are child-oriented, interaction-promoting, and vocabulary-rich have been linked to positive communication and literacy outcomes for young ākonga in international literature (e.g., Weitzman & Greenberg, 2002, 2010). In New Zealand, small studies have highlighted examples of kaiako responsiveness during play-based story interactions. By engaging in play with ākonga, kaiako help them to facilitate and negotiate stories with others (e.g., Bateman & Gunnarsdóttir, 2017; Davis, 2020). Kaiako play a critical role in noticing, recognising, and responding to opportunities for teaching literacy skills within authentic play contexts (O'Neil, 2018). Playing together with ākonga allows kaiako to incorporate the principle of ako into their pedagogical practice (O'Neil, 2018), recognising that kaiako responsiveness includes warm, attuned, reciprocal relationships as well as specific instructional strategies centred on communication, language, and literacy learning.

2.3 Universal, tailored, and targeted pedagogies

Universal, tailored, and targeted pedagogies are oriented towards ensuring equity and inclusion for all learners. Recognising communication and literacy as being fundamental to human rights (Doell & Clendon, 2018; McLeod, 2018) underscores the importance of supporting ākonga to express themselves freely in educational settings, and using any media that they choose (United Nations, 1989). In this section, we use the terms "universal, tailored, and targeted" to reflect the range of pedagogical approaches and interventions employed in one-to-one (targeted), small-group (tailored), and whole-class or school-wide (universal) designs for literacy and communication in Aotearoa New Zealand.

Universal, tailored, and targeted approaches for literacy and communication are diverse, with differences in the structure, scope, and sequence of teaching and learning. Recent changes in New Zealand have seen shifts in the way that traditionally targeted literacy interventions, like structured approaches to literacy and Reading Recovery (RR), are now also embedded in tailored and universal approaches with the potential to support all ākonga (Education Gazette Editors, 2021; Ministry of Education, 2021a). In addition, a small body of literature has also considered other communication and literacy approaches for ākonga with additional needs, beyond the teaching of reading in Years 0/1. For these reasons, we present extant literature on structured approaches to literacy, Reading Recovery, and other inclusive pedagogies under this heading of "universal, tailored, and targeted pedagogies". The structure we have chosen is intended to reflect the potential of these approaches to extend beyond one-to-one interventions to support the literacy and communication of *all* ākonga. The terms "universal, tailored, and targeted" also align with Te Tūāpapa o he Pikorua (Ministry of Education, n.d.-a), a model for learning support that ensures mana-enhancing experiences for ākonga and their whānau within inclusive learning communities.

Key themes are evident in current literature exploring universal, tailored, and targeted interventions for literacy and communication in Aotearoa New Zealand.

Research suggests that learning is likely to be effective when kaiako are enabled to:

1. understand the potential of targeted interventions to accelerate the communication and literacy of all ākonga
2. receive professional learning and development (PLD) and support to provide inclusive literacy and communication instruction for all ākonga
3. consider the specific needs of individual ākonga in order to flexibly plan and support their literacy and communication abilities.

2.3.1 Understand the potential of targeted interventions to accelerate the communication and literacy of all ākonga

Structured approaches to literacy and Reading Recovery are two approaches that have been traditionally delivered as one-to-one interventions for ākonga requiring additional support for literacy in New Zealand schools, although they also have potential to provide more far-reaching benefits for all ākonga. In light of this potential, recent changes under a new Ministry of Education framework now see both structured literacy pedagogies (through the Better Start Literacy Approach) and Reading Recovery offered as part a comprehensive and inclusive three-tiered Early Literacy Approach (ELA) in junior primary schools (Education Gazette Editors, 2021; Ministry of Education, 2021a). Under the new ELA model, resources and strategies for the University of Canterbury's Better Start Literacy Approach (BSLA) and RR are available as part of whole-class, small-group, and individual teaching and learning. Here we provide brief overviews of the potential of structured approaches to literacy and Reading Recovery to accelerate learning, followed by current evidence relating to the effectiveness of each approach in the New Zealand context.

(a) Structured approaches to literacy

Structured approaches to literacy include pedagogies that employ the systematic and explicit teaching of reading and writing, underpinned by cognitive theories of learning. Evidence for structured approaches to literacy derives from a body of research called the "science of reading" (SOR), drawing on literature from the fields of psychology, neuroscience, and others to explain how the brain learns to process language and print (see, for example, Ordetx, 2021). Ākonga are guided to use the alphabetic principle, employing a systematic focus on teaching about how to orthographically map sounds to print. In structured approaches to literacy, word recognition (decoding) and language comprehension are regarded as critical and related aspects of reading (Gough & Tunmer, 1986), with word decoding emphasised as being essential to access meaning. Structured literacy pedagogies follow developmental sequences within component skills of reading and writing (e.g., National Reading Panel, 2000; Scarborough, 2001), including phonological awareness ("an individual's awareness of the sound structure, or phonological structure, of a spoken word") (Gillon, 2017, p. 2), phonemic awareness, phonics, fluency, vocabulary, and comprehension.

Structured Literacy™ instruction is a specific term used by the International Dyslexia Association (IDA) to describe evidence-based programmes that are effective for individual ākonga with dyslexia (see, for example, Ministry of Education, n.d.-c). Recent research in Aotearoa New Zealand, however, has also explored the structured, systematic teaching of literacy as part of a whole-class pedagogical approach (e.g., Gillon et al., 2019), and not solely as a one-to-one intervention for ākonga with identified speech, language, and literacy difficulties.

Evidence from recent studies in New Zealand primary schools has demonstrated the potential of systematic teaching of phonological awareness, phoneme awareness, and the alphabetic code to accelerate reading and writing skills of Years 0/1 ākonga (Chapman et al., 2018a; Gillon et al., 2019; McNaughton, 2020). In Massey University's longitudinal study (Chapman et al., 2018a), New Entrant and Year 1 ākonga whose teachers had implemented explicit and systematic word-decoding teaching strategies scored significantly higher on measures of spelling and reading than did learners in the control group, especially those from low decile schools.

Research from the University of Canterbury's Better Start Literacy Approach (BSLA) showed that the implementation of a systematic, whole-class teaching programme incorporating phonological awareness (including phoneme identity, segmentation, blending, and manipulation) and vocabulary elaboration during book reading, was effective in accelerating the early word reading and spelling skills of 5-year-olds (Gillon et al., 2019, 2020), with similar results for ākonga from Māori, Pacific, and New Zealand European backgrounds. A further study, using a randomised delayed treatment design, showed significant BSLA intervention effects for both Tier 1 (whole-class) and Tier 2 (small-group) levels (Gillon et al., 2022). Scott et al. (2022) also found that the BSLA intervention was equally effective for linguistically diverse ākonga who spoke languages other than English at home.

No further New Zealand studies exploring structured approaches to literacy were located for ākonga beyond Year 1, although longitudinal data indicate that oral narrative and decoding skills in Year 1 are positively related to subsequent reading outcomes in Year 3, including comprehension and retell fluency (Shaughency et al., 2017).

In home settings, randomised control trials have explored a structured parent–child book-reading intervention for children aged 3–5 years called *Tender Shoots,* where phonological awareness or "Stimlulating Sound Sensitivity" (SSS) is one aspect of the programme (Reese et al., 2022; Riordan et al., 2022). After 6 weeks, children showed gains in phonological awareness as a result of the intervention. In another study using a similar approach with eight 4-year-olds in Māori families (Derby et al., 2022), SSS was also an aspect of the parent–child book reading programme delivered in te reo Māori and/or English over 12 weeks. Post-intervention, the children showed gains in hearing sounds and syllables, rhyme, and initial phonemes.

(b) Reading Recovery

Reading Recovery (RR) is an early literacy intervention that was originally developed in New Zealand in the 1970s, arising from cognitive constructivist theories of how ākonga learn to read, and underscoring the importance of emergent literacy experiences at home, before formal schooling (Clay, 1979, 1991). As an intervention, RR was traditionally offered one-to-one for ākonga needing accelerated reading support after their first year at school. RR in New Zealand is now available to be embedded as part of small-group and whole-class teaching and learning, with trained RR kaiako working collaboratively with classroom kaiako to support all ākonga (Jesson, 2022; Ministry of Education, 2021a).

Jesson (under review) explains that RR is based on the Literacy Processing model (Clay, 2016; Doyle, 2018). In this model, reading and writing are viewed as developing, interdependent systems. The literacy processing model emphasises the active role of the ākonga in constructing meaning, and the changes in learning that occur in the ākonga (called intra-individual differences) as they learn to read. One view of the RR approach is that reading instruction is contingent on the prior knowledge and experience of the ākonga, and therefore teaching will depend on what individual ākonga bring to the task, as opposed to a universal, prescribed approach.

A recent critique of RR (Chapman & Tunmer, 2019) posited that the approach is effective for some of the ākonga that it aims to support, but is less effective for ākonga Māori, Pasifika learners, and those attending schools in lower socioeconomic areas who are more likely to be represented in RR's group of "unrecovered learners" (p. 237) who still need further support following the intervention. Central to Chapman and Tunmer's (2019) critique is that RR uses the multiple cues method of teaching reading, rather than a focus on the explicit, systematic teaching of phonemic and alphabetic awareness. The use of multiple cues in RR aligns with constructivist, whole-language approaches to literacy instruction used more widely in New Zealand classrooms, a point contested by scholars who have argued the need for explicit, systematic code-oriented literacy instruction for all ākonga (Chapman et al., 2018a, 2018b; Chapman & Tunmer, 2019).

Prior to the RR refresh in 2021, national monitoring data (Education Counts, 2019) and an independent evaluation for the Ministry of Education (Appleton-Dyer et al., 2019) identified that RR was effective in increasing the literacy development of most 6-year-olds who took part, especially those with the lowest literacy levels. The report by Appleton-Dyer et al. (2019), however, also recommended adjustments to the implementation of RR to benefit schools more widely, and over time. As a result, RR in New Zealand has recently undergone a change in delivery as part of the Ministry of Education's Early Literacy Approach (Ministry of Education, 2021a) and is now offered as part of a three-tier model called Reading Recovery and Early Literacy Support (RR & ELS). Under the refreshed approach, RR takes more of a sociocultural outlook, with resources embedded in individual, small-group, and whole-class or school-wide literacy supports, and with increased collaboration with between RR and classroom teachers (Jesson, 2022).

No empirical studies were located on outcomes from the refreshed RR & ELS model in New Zealand since these recent changes. Reports of preliminary data, however, suggest that the new RR & ELS approach has the potential to accelerate reading outcomes between four to five levels in 8 weeks, with improvements in word reading and letter knowledge evident for ākonga in the 40 schools that took part (Education Gazette Editors, 2022).

2.3.2 Receive PLD and support to provide inclusive literacy and communication instruction for all ākonga

Across all the literature, there are diverse implications for building teachers' professional knowledge. Our focus for this review is on pedagogy, but many of the papers imply the need for teachers to build stronger content knowledge to enhance their flexibility in using the respective pedagogies.

Studies have highlighted the need for kaiako to have access to PLD, resources, and support in order to make pedagogical decisions around embedding literacy approaches for all ākonga. One primary school survey on early language and literacy reported that kaiako expressed a specific need for PLD and access to New Zealand-based tools and resources for assessing and supporting specific oral language and early literacy competencies for Years 0/1 ākonga in English-medium schools (Cameron et al., 2019). In ECE settings, evaluation of the Oral Language and Literacy Initiative (OLLi) approach between 2018 and 2021 showed that the additional systemic support provided by speech-language therapists in the initiative resulted in increased kaiako confidence and use of early communication and literacy strategies with ākonga aged 3–4 years (Ministry of Education, 2021b).

Research has highlighted that, even with the relevant linguistic knowledge, kaiako may encounter challenges in systematically implementing new or different methods to their usual teaching strategies (Arrow et al., 2019; Chapman et al., 2018b). For example, in Arrow et al.'s (2019) study, survey and video observations of kaiako indicated that they held a high level of phonological knowledge and medium

levels of phonemic knowledge, but they still needed guidance on how to transfer this knowledge to apply explicit word-level instruction with beginning readers in the classroom. Research into the BSLA programme has also showed that kaiako workshops, online support, and in-class support are an integral part of ensuring successful outcomes (Gillon et al., 2019, 2020; Scott et al., 2022).

Aside from studies focusing on early literacy in Years 0/1, other studies in New Zealand have also uncovered a general need for increased kaiako learning and support around ways to tailor teaching practices for ākonga with disabilities in both ECE and school settings (Education Review Office, 2022; Howell, 2022). This finding is echoed by case studies calling for more kaiako knowledge, confidence, and access to resources in supporting the literacy and communication of ākonga with a diverse range of needs, including those with autism spectrum disorder (ASD) (e.g., Clendon et al., 2021; Young et al., 2021), Down Syndrome (e.g., Van Bysterveldt et al., 2019), deaf ākonga who use New Zealand Sign Language (e.g., Powell et al., 2019), gifted and high-ability ākonga (Kronborg, 2018), and ākonga who stutter (e.g., Hearne et al., 2021). Howell (2022) emphasised the role of Learning Support Co-ordinators in helping to increase potential for kaiako to provide inclusive literacy instruction in primary and secondary schools.

2.3.3 Consider the specific needs of individual ākonga in order to flexibly support their literacy and communication abilities

Scholars have argued that it is important for kaiako to have a broad understanding of theories and patterns around literacy development, while also being flexible in applying and adapting this knowledge to respond to the individual learning capabilities and needs of all ākonga (Kuhn & Dougherty Stahl, 2022). This view aligns with the need for UDL strategies to flexibly support all ākonga via multiple means of engagement, representation, and expression as described at the start of this overview.

Studies have explored ways that approaches to assessing and teaching phonological awareness might be adapted by kaiako to support ākonga with complex communication and learning needs, including those who are unable to use speech or writing as primary modes of communication. In a review of literature, Gillon and Clendon (2017) highlighted considerations around adapting phonological awareness assessments and interventions for ākonga who use Augmentative and Alternative Communication (AAC) systems. Research indicates that, while direct and explicit instruction of phonological awareness is possible for many ākonga with complex communication needs, the range of phonological awareness capabilities varies greatly in this population and subsequently requires adaptations according to individual needs.

Morton et al. (2019, 2021) and McIlroy (2019) illustrated the benefits of narrative assessment as an approach to making quality teaching and learning visible for school-aged ākonga with communication and literacy needs, including nonverbal ākonga using AAC systems. Grounded in sociocultural perspectives of curriculum, pedagogy, and assessment, these studies give examples of ways that narrative assessment can demonstrate the capabilities of ākonga in ways that formal literacy assessments do not, using photos and storied language to reflect the voices of the ākonga, their family, kaiako, and others who know the child well.

Gillon and Macfarlane (2017) provide a framework for early literacy support, drawing on He Awa Whiria /The Braided Rivers approach (Macfarlane et al., 2015) to weave together Indigenous knowledges and Western cognitive frameworks to improve the reading and writing skills of ākonga with speech and language difficulties. The *cognitive* domain includes the skills required for word recognition

(print) and comprehension; the *psychological* domain focuses on aspects such as reading motivation, interest, self-perceptions, and expectations; and the *ecological* domain includes cultural and environmental influences in the home and educational environments. Successful achievement in reading occurs when ākonga strengths in all three domains are evident, and this will vary across ākonga and cultural contexts.

2.4 Pedagogies of talk around text

This section presents recent research findings on pedagogies of talk around text. Our focus here is dialogue-intensive pedagogies associated with positive literacy outcomes including literate thinking (Langer, 1987; Wells, 1989).

The research evidence suggests that kaiako need to:

1. provide opportunities for all ākonga to engage in talk around text
2. use approaches and tools shown to support talk around text
3. consider their dialogic stance and the cultural locatedness of their talk.

2.4.1 Provide opportunities for all ākonga to engage in talk around text

Research evidence suggests that ākonga in Aotearoa New Zealand may not often have opportunities to engage in purposeful talk around text. In the National Monitoring Study of Student Achievement (NMSSA) in English (Educational Assessment Research Unit & New Zealand Council for Educational Research, 2019), less than half of Year 4 ākonga and less than half of Year 8 ākonga reported that they "often" or "very often" had opportunities to talk about the characters in stories they read (Y4: 44%, Y8: 41%), talk about how the writer put the story together (Y4: 28%, Y8: 31%), or to make links between what they read and their own lives (Y4: 28%, Y8: 36%). Only about half of Year 4 ākonga (52%) and two-thirds of Year 8 ākonga (62%) reported they "often" or "very often" had opportunities to talk about the main ideas in the things they read. Less than half of the Year 4 (46%) and less than half of the Year 8 students (42%) reported "often" or "very often" having opportunities to talk about the texts they listened to. And less than half of the Year 4 (35%) and Year 8 ākonga (42%) reported "often" or "very often" had opportunities to talk about the things they watched, how they had been made, and how the ideas had been presented.

There is also evidence to suggest that opportunities for talk around text may be inequitable (McNaughton, 2020). Wilson and Oldehaver (2017) found that senior secondary school ākonga from low decile New Zealand schools, and Māori and Pacific ākonga, are less likely than their peers to have opportunities to experience dialogically organised instruction. This is a missed opportunity given research findings that associate opportunities for talk around text with positive literacy outcomes: across different populations; for English language learners; in different languages; and across home, centre, and school settings (Denston, 2021; McNaughton, 2020; Parr et al., 2021; Wilson et al., 2021).

In one New Zealand study, a parent questionnaire highlighted that an active home literacy environment predicted children's receptive vocabulary and phonological awareness at 5 years of age (Van Tonder et al., 2019). The research described such an environment as including talking together, telling and reading stories, singing songs, and playing alphabet and word games.

Neha et al. (2020) illustrated the importance of the home literacy environment for Māori children aged between 3 and 5 years. In their study, maternal book reading and reminiscing (talking about the past) were found to correlate with oral language and academic outcomes. Adult–child reminiscing was

identified as a source of resilience for Māori whānau, emphasising the importance of oral narratives as a less visible but vital aspect of Indigenous, intergenerational literacy practices.

Riordan et al. (2022) worked with parents and preschoolers to compare two book-reading and conversation approaches to an activity-based control group. The Rich Reading and Reminiscing (RRR) condition taught parents to converse with their children about the storyline and engage in meaning-related talk. The study found that RRR increased parents' and children's meaning-focused talk during book reading and elaborative talk during reminiscing. In a related study that followed 53 dyads (77%) of the children involved in RRR into primary school and formal literacy instruction, Timperley et al. (2022) found evidence of lasting impact, concluding that shared reading programmes as delivered in the study can have long-lasting effects on talk around text and may enhance aspects of parents' involvement with children's education.

As in Neha et al.'s (2020) study, Reese et al. (2022) found evidence in kindergarten settings that oral reminiscing and talk during book reading supported connections between oral language and literacy development in children aged 3–5 years. Using learning stories as the basis for teacher–child interactions (Carr & Lee, 2012), the study found that reminiscing interactions encouraged more child talk, complex language, and greater lexical diversity; while book-reading interactions allowed for more conversational turns and more complex language used by kaiako.

There is an association between focused discussion around text and gains in vocabulary, and narrative skills at Years 1–3. And there is an association with gains in comprehension and reasoning across learning areas in the middle to upper primary school years and for secondary school ākonga (McNaughton, 2020).

In the New Zealand secondary school context, Wilson and Oldehaver (2017) found that a professional development programme aimed at increasing the amount and quality of small-group, disciplinary-specific talk about text in 12 biology, English, and mathematics classrooms was associated with positive shifts in ākonga practices, attitudes, and achievement in the learning areas concerned.

Bayldon et al. (2021) explored dialogic shared reading which incorporated aided language modelling and increased communication partner responsiveness with two ākonga with complex physical, cognitive, and sensory needs (CPCSN). Ākonga used auditory plus visual partner assisted scanning (PAS) to access a Pragmatic Organised Dynamic Display (PODD) communication book. Bayldon et al. (2021) found positive shifts in the children's communication skills, both within the intervention sessions and the classroom. This included increases in turn taking, initiations, efficiency, and conveying meaning. Bayldon et al. (2021) conclude that shared storybook interventions that include aided language stimulation, responsiveness, and wait time can support the communication outcomes of ākonga with CPCSN who use PAS.

Fitton et al. (2018) conducted a meta-analysis examining the impact of shared book reading on the English language and literacy skills of young children learning English as a second language. Results revealed an overall significant, positive effect of shared reading on English learners' outcomes, supporting shared book reading as an early educational activity for young learners of English. The authors conclude that the widespread use of shared reading as an educational activity and as a vehicle for delivering intervention programmes appears to be warranted. However, the study did not identify the essential characteristics of shared reading programmes that influence the approach's effectiveness, so it is not possible to comment on the nature of the dialogue occurring or the relative impact this had.

2.4.2 Use approaches and tools shown to support talk around text

There is a range of approaches to text-based discussions with different instructional purposes. Wilkinson et al. (2019) identified nine major dialogue-intensive approaches to conducting classroom discussions about text for promoting literate thinking. Approaches were considered "major" if they were applied consistently in classrooms and had an established place in educational research or practice. The approaches identified included Literature Circles, Book Club, Grand Conversations, Questioning the Author, Instructional Conversations, Junior Great Books Shared Inquiry, Collaborative Reasoning, Paideia Seminars, and Philosophy for Children.

Wilkinson et al. (2019) then developed a conceptual framework to characterise the nine approaches on various parameters of discussion. The purpose of the framework was to enable teachers to make informed decisions about which approach best suited their instructional purpose. The parameters included: who had control of the topic of discussion; who had interpretive authority; who had control of turns for speaking; who chose the text; genre of text; whether the reading occurred before or during the discussion; group size; composition of group in terms of reading ability; group management; degree of focus on the intention of the author; and orientation towards the text. Orientation towards texts included three possible stances: expressive (reader-focused affective response); efferent (reading to acquire and retrieve information); and critical-analytic (interrogating the assumptions and worldviews underpinning the text).

All nine approaches used mixed-ability groups. All approaches used narrative fiction and two also used expository texts. The focus on author intention was low to medium in all but one approach. Seven approaches were teacher-led, and seven approaches involved reading the text before the discussion. Five approaches were carried out in small groups and four as a whole class. There was most variation across approaches in terms of the relative emphases across the three possible stances (see above) and the degree of control exercised by the teacher in terms of text choice, discussion topic, turn taking, and interpretive authority. The implication is that teachers need to be aware of what they are doing when they conduct a discussion, and why, because different ways of organising and facilitating a discussion promote different types of talk, different ways of thinking, and different orientations towards text.

Findings from the analysis of Wilkinson et al. (2019) are consistent with other research findings. For example, other recent reviews of the research literature also show that teachers need a deep knowledge of dialogic approaches to use them effectively (Denston, 2021; McNaughton, 2020; Wilson et al., 2021). And other international research shows an association between the use of mixed-ability grouping for talk around text and positive ākonga outcomes in literacy—especially for lower performing ākonga (see, for example, Kennedy, 2018; Murphy et al., 2017).

Digital technology is shown to support dialogic intensive talk for ākonga from different backgrounds if used alongside in-person interactions (Denston, 2021; Whyte et al., 2022). However, the use of technology for dialogic intensive interactions around text requires kaiako knowledge of digital tools, including their limitations as well as their affordances, so that they can be used purposefully and with intent (Denston, 2021). For example, a study involving a 1:1 digital initiative in New Zealand (McNaughton et al., 2019; Rosedale et al., 2019) explored the teaching of argumentation, ākonga use of an online discussion board, and evidence of perspective taking. They concluded that instruction and tools can be incorporated into classrooms in ways that support the development of advanced forms of argumentation.

2.4.3 Consider their dialogic stance and the cultural locatedness of their talk

There is a complex relationship between kaiako stance—or orientation towards text—and the dialogic practices or approaches kaiako, and their ākonga, use in the classroom. It is worth considering the findings of a small study from the United States to illustrate the complexities of this relationship. In a cross-case analysis of two second-grade bilingual classes with very different discourse practices—one predominantly dialogic and the other predominantly monologic—Aukerman et al. (2017) found that, even when not prompted by kaiako, individual ākonga moves tended to reflect the dominant discourse practices of the kaiako, thus reinforcing these dominant practices. And even when the kaiako made moves that could be considered contrary to their predominantly monologic or dialogic stance, ākonga responded in ways consistent with their teachers' dominant stance. Aukerman et al. also found that ākonga shape each other's discourse practices, especially in the more dialogic classroom and often in ways that reinforce the dominant discourse of their teacher. Aukerman et al. (2017) conclude that kaiako education needs to go beyond simply teaching certain discourse moves associated with dialogic instruction, such as authentic questions, to focus on how to identify overarching ākonga and kaiako discourse practices and the reciprocity between them.

Kaiako practices are culturally embedded. Denston (2021) highlights the importance of kaiako awareness of the cultural locatedness of their own speaking and listening to ensure that group or class dialogue does not silence the worldview of minority groups. Opportunities for kaiako and ākonga to talk together about their lived, everyday experiences form an important part of joint meaning-making as part of authentic opportunities for reading and writing in the classroom (Parr, 2022). Building on social practices that are already familiar to ākonga, such as tuakana–teina or peer conversations, is one approach found to be beneficial in lifting the self-regulation and writing achievement of priority learners (Māori, Pacific, and boys) in Years 5–8, and indeed, is an effective practice for *all* learners (Gadd & Parr, 2022).

The development of tools to support teachers to facilitate culturally sustaining talk around text is therefore important. In the New Zealand context, Oldehaver (2018) responded to the need to reconcile international views of dialogic teaching with a Pacific worldview by developing the Pacific Dialogic Indicator tool (PDIT). This tool—or framework—is informed by Pacific ways of knowing and language practices based on talanoa.

2.5 Critical literacy

Critical literacy pedagogies encourage ākonga to question the construction and effects of texts (Sandretto, 2012; Tilson & Sandretto, 2016). At a societal level, critical literacy pedagogies also seek to address issues of educational and social justice by promoting the multiple and diverse life-worlds of all ākonga, calling for pedagogies of access to multimodal literacies in multiple contexts (Lim et al., 2022). A "multiliteracies" approach (Cazden et al., 1996; Kalantzis et al., 2016) recognises both the diversity of situations and the multiplicity of text forms that ākonga work with as they seek to create and communicate meaning. In doing so, a multiliteracies approach challenges the traditional literacy pedagogies focused solely on language modes (talk, reading, and writing), and brings into question pedagogies of access. Critical literacy approaches call for kaiako and ākonga to think about how meaning is made and communicated using multimodal texts that are constructed using varying combinations of linguistic, visual, gestural, spatial, and audio modes. Critical literacy helps ākonga become aware that texts are social constructions that impact on how we see ourselves and others in the world.

Research suggests that learning is likely to be effective when kaiako are enabled to:

1. teach critical literacy to all ākonga at all levels of school
2. provide opportunities to critically analyse multimodal texts
3. use critical literacy approaches developed for the local context.

2.5.1 Teach critical literacy to all ākonga at all levels of school

Findings from the NMSSA in English 2019 (Educational Assessment Research Unit & New Zealand Council for Educational Research, 2020) suggest that primary and intermediate kaiako may see critical literacy as less important than other purposes for teaching English and that they do not often teach critical literacy. Only 43% of Year 4 kaiako and 37% of Year 8 kaiako rated learning how to deconstruct and critically analyse texts as having "great importance". And less than one-third of Year 4 kaiako (32%) and only one-quarter of Year 8 kaiako (25%) indicated that they "very often" provided their ākonga with opportunities to think critically about the texts they read rather than take them at face value. The conclusion drawn by Wilson et al (2021) that ākonga in Aotearoa New Zealand have few opportunities to develop critical literacy is consistent with these NMSSA findings.

Opportunities to learn and practise critical literacy in Aotearoa New Zealand may also be inequitable— at least in secondary schools. In a study of literacy teaching in English, mathematics, and biology from 22 Auckland low-to-mid socioeconomic status (SES) secondary schools, Wilson and Oldehaver (2017) found little evidence of critical literacy teaching and learning, which they describe as concerning given that ākonga in low SES schools are more likely to experience social marginalisation and injustice.

Opportunities to develop critical literacy across all levels of schooling are shown to be important. Wilson et al. (2021) recommend beginning teaching towards critical literacy at the early levels of the curriculum; for example, by considering gender stereotypes in fairy tales. Their view that even very young children can begin to develop critical literacy is consistent with other New Zealand-based research outside of the time parameters of this review (see, for example, Kahuroa (2013) who explored the analysis of stickers as gendered texts with children in an ECE setting).

Wilson et al. (2021) argue that the critical skills of "argumentation" should be taught as a part of critical literacy, a conclusion also drawn by McNaughton (2020). This is because opportunities to learn and engage in argumentation and collaborative reasoning focused on critical literacy across content areas is shown to promote advanced and increasingly discipline-specific oral and written literacy skills across a range of learning areas, and in both digital and print contexts (McNaughton, 2020). In their study on how the digital learning environment might be used to support increased achievement in writing, Jesson et al. (2018) found that the kaiako focus on criticality raised academic expectations in relation to exploring argumentation, reasoning in texts, and the need for critical awareness about the ways texts can position readers.

The dearth of critical literacy teaching and learning in Aotearoa New Zealand suggests the need for kaiako support in this area. In a study on critical thinking, which included critical literacy concepts, Shafer (2022) concludes that providing secondary school kaiako with opportunities to explore their pedagogical theories and practices with others may help them to shift how they value and use critical thinking in their respective learning areas (in this case—English, social studies, and science). He concluded that showing ākonga how critical thinking can be applied across different learning areas may support and enhance ākonga learning—both in terms of critical thinking and in terms of learning area content.

There is some evidence to suggest that, even when kaiako education has been effective in supporting kaiako to build critical literacy capabilities, the policy environment and school context may dissuade them—especially beginning kaiako—from applying these capabilities in the classroom. Carss' (2019) research illustrated that, despite focusing on critical literacy and multiliteracies in their initial teacher education, the nine beginning primary kaiako she followed during their first year of teaching focused predominantly on reading and writing and did not explicitly support their ākonga to develop critical literacy. She found strong indications that this was in part due to assessment policy mandated at the time of the study. She recommends that pre-service educators and schools place more emphasis on literacy across the curriculum, working with a diverse range of text forms and critical literacy approaches.

2.5.2 Provide opportunities to critically analyse multimodal texts

Recent New Zealand research suggests that kaiako provide students with even fewer opportunities to critically analyse multimodal texts than print texts. In the most recent NMSSA in English (Educational Assessment Research Unit & New Zealand Council for Educational Research, 2020) an extremely small proportion of Year 4 kaiako (2%) and Year 8 kaiako (8%) indicated that they "very often" provided their ākonga with opportunities to "critically analyse multimodal texts like movies, presentations, and posters". This matters because most of the texts ākonga encounter in today's world are multimodal. Ākonga need to be able to recognise the ways in which such texts perpetuate social injustice through linguistic, visual, audio, gestural, and spatial modes of meaning-making and how these language modes work together. Ākonga also need to learn how to resist, "talk back" to, or challenge the dominant discourses in these texts through the reading practices they adopt and the new readings they construct. And they need to learn how to do this across different learning areas. In other words, they need to develop what Sandretto and Tilson (2013) describe as critical multiliteracies.

There are a very small number of recent studies on the use of critical multiliteracies in Aotearoa New Zealand over the past 5 years. For this reason, we have expanded the parameters of the research for this section by 1 year to include studies published in 2016. The studies we present here take a broad view of what constitutes text, including advertisements, video games, and even the physical environment. One example is research on puberty education in the primary school context, in which Agnew and Sandretto (2016) report on how critical analysis of menstrual product advertisements can support ākonga to deconstruct and possibly reconstruct negative discourses of menstruation. Another is the use of practitioner enquiry to explore critical literacy as a pedagogy to enhance citizenship education in social studies (Abbiss, 2016).

McNaughton and Gluckman (2018) draw attention to the value of critical literacy for ākonga when engaging in activities online. As part of the study *Games, Gamification, and Game Design for Learning*, McDowall (2017) and Bolstad and McDowall (2019) highlight the need for critical literacy when playing games, especially video games, due to their immersive nature. The authors explore how we might better support ākonga to develop critical games literacy through opportunities to play, question, review, modify, and make games.

In a study on the use of eco-critical literacy in secondary school English classrooms, Matthewman et al. (2017) consider the environment as a text that can be read in conjunction with the texts produced about it. They conclude that, to be effective, eco-critical literacy approaches need to "pay precise attention to authors and texts as located in places and environments as well as in culture", to "make connections between real places and students' literacy practices", and to support "critical and nuanced understanding of how texts shape environmental attitudes, values and identities" (p. 56).

2.5.3 Use critical literacy approaches developed for the local context

There are existing frameworks and models that have been developed internationally to teach critical literacy. Well-known examples include *The Four Resources Model* (Freebody & Luke, 1990; Luke & Freebody, 1999) and *A Pedagogy of Multiliteracies* (Cazden et al., 1996). There are also research findings on the application of these models in the New Zealand context (Sandretto et al., 2006; Sandretto & Critical Literacy Research Team, 2008; Sandretto & Tilson, 2013; Sandretto & Klenner, 2011) and tools for kaiako to use in their classrooms (Tilson & Sandretto, 2016).

In their recent survey of critical literacy praxis in Aotearoa New Zealand, Sandretto et al. (2021) highlight the importance of balancing critical literacy approaches developed for the New Zealand context with those developed internationally so that ākonga are equipped with the skills needed to identify and talk back to the power relationships in this country. Wilson et al. (2021) concur, recommending the inclusion of critical literacy concepts across the refreshed New Zealand curriculum. The authors cite, as an example, the inclusion of critical literacy concepts in the draft histories curriculum document to support ākonga exploration of power relationships in the history of Aotearoa New Zealand. Research into critical literacy needs to be responsive to changing times, as well as to place. Sandretto et al. (2021) also identify the need for further critical literacy research involving a wider range of text types, different learning areas, environmental (as well as social and cultural) contexts, online spaces, notions of sexuality and gender, and English as an additional language (EAL) learners.

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3. Maths overview

"Maths" is used as an all-encompassing term to refer to the grouping of subject matter, skills, competencies, and understandings that encompass all aspects of numeracy, mathematics, and statistics. The learning area of Mathematics and Statistics interweaves the "effort and creativity of many cultures that over time have used mathematical and statistical ideas to understand their world" (Ministry of Education, 2022b, p.23). Being numerate in Aotearoa New Zealand today includes understanding diverse cultural perspectives and privileging te ao Māori and Pacific worldviews in the classroom (Ministry of Education, 2022a, 2022b).

The Best Evidence Synthesis (BES) for Effective Pedagogy in Pāngarau/Mathematics (Anthony & Walshaw, 2007) synthesised national and international evidence about the nature of quality mathematics teaching and has informed the teaching and learning of mathematics in Aotearoa New Zealand since its publication. The intention of this literature review is not to replicate the BES, but to share fresh insights from the most recent mathematics education research in Aotearoa New Zealand.

In parallel with international literature (e.g., Celedòn-Pattichis et al., 2018; Civil et al., 2019; Rubel, 2017; Thomas & Berry, 2019), recent research in Aotearoa New Zealand highlights strengths-based, inclusive, culturally sustaining approaches that enable equitable access to learning for all. Effective kaiako are transforming teaching and learning mathematics from traditional transmission models to pedagogies that position ākonga as culturally located, collaborative, agentic learners.

In this literature overview, we aim to highlight evidence about the pedagogies and principles that have been shown to be effective for diverse ākonga in the unique context of Aotearoa New Zealand. There is no one way to effectively teach mathematics and statistics, so this literature overview aims to provide a range of evidence to underpin the Common Practice Model.

3.1 Culturally sustaining pedagogies

All kaiako in Aotearoa New Zealand are required to develop cultural competencies in order to successfully teach ākonga Māori, and Pacific learners (Ministry of Education, 2011, 2018). Enacting cultural competencies means kaiako must give effect to Te Tiriti o Waitangi and understand what is important when taking a Māori worldview in relation to teaching and learning. Doing this might entail incorporating te reo Māori, tikanga Māori, and values into the classroom (Ministry of Education, 2011, 2022a).

Culturally sustaining pedagogies aim to foster and strengthen cultural ways of being, knowing, and doing. Such pedagogies firmly ground mathematics and statistics teaching and learning in the heritage cultures of ākonga (Averill, 2018a, 2018b; Civil, 2018). Culturally sustaining pedagogies: help ākonga appreciate why mathematics is important in their lives; positively impact on the ways that they identify as learners and doers of mathematics; and allow them to engage with mathematical and statistical ideas in ways that enhance learning, engagement, achievement, and wellbeing (e.g., Ladson-Billings, 2021; Nicol et al., 2020). Three key themes are evident across the research exploring

culturally sustaining pedagogies in mathematics and statistics classrooms. The literature shows that kaiako who effectively enact culturally sustaining pedagogies:

1. draw on ākonga cultures, languages, and identities to strengthen both cultural and mathematical identities
2. incorporate cultural values, such as collaboration and respectful relationships, into mathematics teaching to guide participation and communication
3. embed mathematical problems in authentic contexts, to connect to the cultural and mathematical contexts in the lives of ākonga.

3.1.1 Draw on ākonga cultures, languages, and identities to strengthen both cultural and mathematical identities

A common thread across the research is that mathematics and statistics are not neutral or culture free. Rather, every culture has mathematics and the mathematics that ākonga know, understand, and come to school with is linked to the cultural practices and identities of ākonga (e.g., Hill et al., 2019; Hunter & Hunter, 2017; Meaney et al., 2021; Wilson et al., 2017). When kaiako enact culturally sustaining pedagogies they acknowledge, value, and build on the funds of knowledge all ākonga and their whānau hold, and that every ākonga brings to early childhood settings and schools (Averill, 2018b).

Culturally responsive kaiako build relationships with ākonga and their whānau, find out about their out-of-school mathematical experiences, and use this knowledge to embed everyday mathematics related to the cultures and lives of ākonga in to learning at school (Hunter, 2022). Implementing culturally sustaining pedagogies requires kaiako to develop deep cultural understandings, which takes time, commitment, and consultation with whānau (Averill, 2018a; Hunter, R. et al., 2020). For instance, Hunter, R. et al. (2020) describe instances of kaiako meeting with whānau to ask about where they see mathematics within their home contexts. In these examples, community-held mathematical knowledge shared with kaiako included traditional recipes, drum lessons, making clothes, and planting taro shoots. These contexts were then incorporated into mathematical learning experiences for ākonga, which: (a) provided ākonga with opportunities to see rich mathematics in their lives; and (b) affirmed their cultural identities by reflecting their cultural capital in maths problems at school.

Cunningham (2019) and Hunter (2022) examined how photo elicitation interviews with young Pacific learners could be used to inquire into out-of-school mathematical experiences, and as a basis for developing tasks that align with Pacific learners' cultural identities and backgrounds. Both studies showed that utilising Pacific learners' cultures, interests, and experiences for task design enabled learners to link mathematics learnt in school to real-world experiences outside of school, and links between home, school, and community mathematics were strengthened.

Within culturally sustaining pedagogies, ākonga home languages are highlighted as assets that are important for understanding mathematical concepts and promoting mathematical learning (Averill, 2018b; Hunter et al., 2022; Sharma, 2018). In a small-scale study, Sharma (2018) focused on the use of home languages as a resource for Pacific secondary school learners who were learning about statistical methods. Ākonga were supported by kaiako and peers to use their home language, together with English and mathematical/statistical English, to develop their understanding. All kaiako identified that the first languages of ākonga served as a resource for thinking and communication. Likewise, Hunter & Hunter (2017) and Hunter, R. et al. (2020) found that the ability to code-switch from one language to another supported ākonga to discuss, explain, and justify their mathematical thinking and to develop deeper levels of mathematical understanding.

3.1.2 Incorporate cultural values into mathematics teaching to guide participation and communication

Culturally sustaining pedagogical approaches incorporate Māori and Pacific peoples' values in the mathematics classroom. While Māori and Pacific peoples are dynamic, diverse, heterogeneous groups, there is a common set of values that Māori and Pacific peoples share. For example, family and collective responsibility are an integral part of life for both ākonga Māori and Pacific learners (Hunter et al., 2019; Rimoni et al., 2022). Other core cultural values include respect, caring relationships, family, and community (Ministry of Education, 2011, 2018; Rimoni et al., 2022).

Hill et al. (2019) explored what intermediate school-aged Pacific learners valued for their mathematics learning. Two values that were important to this group were peer collaboration and family support. The research highlighted the need for educators to recognise what ākonga Māori and Pacific learners value for learning mathematics and adopt pedagogical approaches that align with these values. For example, in a study focused on culturally responsive pedagogy through ako in an English-medium secondary school mathematics classroom, the values of collaboration, reciprocity, and respect were enacted (Saunders et al., 2018). Kaiako and ākonga of diverse ethnicities were encouraged to learn from each other, and results indicated that discussing and embedding reciprocity in the mathematics classroom increased enjoyment, motivation, and achievement in mathematics learning.

Research (e.g., Hunter & Hunter, 2017; Hunter et al., 2018; Hunter, R. et al., 2020; Saunders et al., 2018) also explores ways kaiako can build on values that support ākonga Māori and Pacific learners to participate and communicate mathematically in culturally respectful ways. For example, Hunter, R. et al. (2020) showed how kaiako who used whānau as a metaphor for ways of working together allowed ākonga Māori and Pacific learners to draw on the concept of family to support their mathematics learning, and the value of respect for whānau members to support effective collaboration. Additionally, drawing on their home values supported ākonga to take risks with mathematical reasoning and engage in a range of mathematical practices within a culturally safe environment.

An emphasis on collective values is at odds with the use of ability groups or streaming, which have been commonplace in New Zealand mathematics classrooms (Anthony & Hunter, 2017). The use of heterogeneous grouping aligns with the cultural values of ākonga Māori and Pacific learners that support collectivism rather than individualism (Hunter & Hunter, 2017; Hunter, R. et al., 2020). Tokona te Raki, the Māori Futures Collective (2021), presented four case studies of de-streaming in secondary mathematics classes where care for ākonga and culturally sustaining teaching were prioritised. All classes reported positive shifts in ākonga attendance, engagement, wellbeing, and achievement.

3.1.3 Embed mathematical problems in authentic contexts, to connect to the cultural and mathematical contexts in the lives of ākonga

Kaiako who engage in culturally sustaining pedagogies utilise contextual tasks that support ākonga Māori and Pacific learners to engage with big mathematical and statistical ideas in meaningful and relevant ways (Cunningham, 2019; Hunter & Miller, 2022; Hunter & Hunter, 2019; Hunter, R. et al., 2020; Saunders et al., 2018). For example, Hunter and Miller's (2022) research explored the use of culturally located patterns, such as tivaevae, tapa cloth, and tukutuku panels, to develop young culturally diverse ākonga understanding of growing patterns. Their evidence showed that ākonga were able to access early algebraic reasoning through familiar patterns from their home and community contexts. In a secondary school setting, Taeao and Averill (2019) describe using sāsā as a context for learning mathematical concepts such as geometry, symmetry, shapes, angles, fractions, and number patterns.

Findings showed that dance had the potential to provide Pacific learners with positive mathematical experiences that enhanced their learning and achievement. Furthermore, using singing, storytelling, metaphor, and dance to teach mathematics helped strengthen ākonga cultural identities and holistic wellbeing (Averill, 2018a; Ingram & Curtis, 2022; Taeao & Averill, 2021).

When ākonga learn within cultural contexts that already have meaning for them, these familiar contexts allow a focus on the mathematics, and kaiako are able to increase levels of challenge in the problems ākonga work with (Hunter, R. et al., 2020; Hunter et al., 2022). Hunter et al. (2022) showed how an effective kaiako explicitly positioned ākonga as cultural experts, who were mathematically competent, as she launched a cognitively challenging task. Results showed that there were rich opportunities for ākonga to develop new mathematical knowledge and construct progressively more abstract understandings as they generated formal mathematics from cultural ideas. Additionally, the use of a culturally located context was central to the sustained engagement of ākonga in rich and challenging mathematical activity, which led to views of themselves as competent, confident, culturally strong learners and doers of mathematics.

Researchers in the Māori-medium space (e.g., Meaney et al., 2021; Trinick & Meaney, 2017; Trinick et al., 2017) emphasise the importance of kaiako having strategies to combine cultural knowledge and mathematical knowledge, in ways that give value to both. Trinick and Meaney's (2017) project merged Western mathematical ideas from statistical investigation with questions about the early Māori migratory voyages. Results indicated tensions in trying to honour the learning of both cultural and statistical understandings. Similarly, Trinick and colleagues (2017), using the highly valued artefact of a wharenui, showed that there is a need to put cultural knowledge at the forefront of any learning to maintain the integrity of the cultural context. To address challenges incorporating cultural practices into mathematics lessons, Meaney et al. (2021) provide a cultural symmetry model for designing and implementing mathematical activities in schools. For these researchers, learning mathematics is not just about mathematical content, but the opportunities to support holistic educational outcomes, such as the revival and maintenance of te reo Māori and cultural knowledge.

3.2 Play-based pedagogies

Play-based learning (sometimes called "learning through play") is a pedagogical approach centred around play as the valued mode of learning. Definitions of play-based pedagogies vary in the literature, although many agree that there is a continuum ranging from open-ended, ākonga-led play through to more purposefully framed and kaiako-guided play (Aiono et al., 2019; Björklund et al., 2020; McCluskey et al., 2018; Pyle et al., 2017). Multiple approaches are often combined.

Research on play-based learning tends to be framed within a social-constructivist theory of learning, because the purposeful expansion of children's knowledge as they play is "socially negotiated" with meaning "sought and expressed through language" (Cheeseman, 2019, p. 12). Cheeseman notes that young children have "a spontaneous and sometimes explicit interest in mathematical ideas" (p. 12) as they play. Adults playing alongside them can create space for children to extend these ideas and give shape to their existing working theories (Cheeseman, 2019; Thomas et al., 2022).

Play is important, particularly in early childhood. Play-based pedagogies are at the heart of *Te Whāriki*, the early childhood curriculum (Ministry of Education, 2017). More recently, play-based pedagogies have also become a focus in some school classrooms. Play-based pedagogy can serve as a bridge between ECE and school entry settings (Milne & McLaughlin, 2018). The mathematics curriculum is expressed differently in *Te Whāriki* and in *Te Mātaiaho*, the refreshed New Zealand

Curriculum, but kaiako collaboration allows insights about ākonga working theories, expressed as they play, to be shared across the transition. Collaboration can also support continuity of some materials provided for play in both settings (e.g., counting resources) even if these are used somewhat differently in each setting (Thomas et al., 2022).

Play-based pedagogies appear to be used less often once ākonga move beyond the early years of schooling. Older ākonga might encounter playful mathematics learning in the form of games, but there are caveats around their use if the aim is to bring the benefits of play per se into mathematics learning contexts (Darragh, 2021a). Playful encounters with mathematics might also be built into highly structured pedagogies such as Mantle of the Expert, which also aims to integrate learning across the curriculum (Coleman & Lind, 2020). In the secondary school, some recent small-scale initiatives have used play/sports as *contexts* for mathematics learning. Such studies report increased engagement and positive attitudes towards learning mathematics (Sanchal & Sharma, 2017).

Play provides opportunities for cognitive, emotional, social, and physical development, but the literature is clear that these benefits will not be realised simply by allowing ākonga to play. The conditions in which this pedagogy is supportive of mathematics learning fall into three main themes. Evidence suggests that kaiako need to:

1. notice and respond flexibly to ākonga playful explorations
2. select and use intentional play-based approaches to support and develop ākonga mathematical ideas, experiences, working theories, and identities
3. develop strong partnerships to promote playful mathematics learning experiences that build on ākonga funds of knowledge.

3.2.1 Notice and respond flexibly to ākonga playful explorations

Child-led play provides opportunities for ākonga to explore mathematical relationships and patterns in ways that satisfy their own curiosity. Fostering creativity and curiosity has been identified as important to children's development as mathematicians. Indeed, this sense of playfulness is similar to that demonstrated by professional mathematicians (Mackay et al., 2022). Both mathematicians and children can engage in "pattern making moments of playfulness, amusement, connection and delight" (Thomas et al., 2022, p. 18). In such conditions, play supports the development of positive ākonga identities as mathematicians (Darragh, 2021a).

Children's talk during play provides cues about their working theories. The words they choose to use can be picked up as opportunities for linking current ideas and experiences to new contexts, expanding working theories through challenge and further exploration, and building bridges between different formal learning contexts (e.g., ECE to school). One research team invented the phrase "drops of language" to support opportunities to develop nascent ideas such as a sense of the "bigness" of things (Thomas et al., 2022).

Children can spontaneously engage in different aspects of mathematics as they play. For example, they might develop concepts of: measuring volume through emptying and filling containers; direction and orientation by moving through the playground; length and distance by piecing together train tracks; or even a big mathematical idea such as equivalence when given the opportunity to playfully figure out how a balance beam works (Cheeseman et al., 2017).

The importance of kaiako noticing and responding to ākonga-led play is emphasised in all the papers cited here. Kaiako have a "vital role in stretching children's mathematical working theories by listening, actively observing children's interactions in both structured and play activities, extending

conversations, and planning further learning opportunities" (Thomas et al., 2022, p. 18). Cognitively Guided Instruction (CGI) is a child-centred approach to teaching and learning mathematics that easily fits into, but is not exclusive to, play-based learning. CGI offers kaiako a valuable framework for understanding the mathematical strategies that children construct themselves, so that kaiako are able to "identify and highlight the mathematics that children are engaging in and to create opportunities for them to notice and explore mathematics" (Shumway & Pace, 2017, p. 103).

3.2.2 Select and use intentional play-based approaches to support and develop ākonga mathematical ideas, experiences, working theories, and identities

Selecting and using intentional play-based approaches has the potential to support and develop ākonga mathematical ideas, experiences, working theories, and identities.

In a small case study, Willacy and Calder (2017) explored the use of mobile apps to make mathematics learning more engaging for ākonga located in Regional Health Schools. Kaiako selected apps for each ākonga based on their interests, as well as their target areas of need. Results indicated that using apps had a positive influence on ākonga engagement; with benefits such as mobility, fun, and colourful visualisations, they encouraged risk-taking and opportunities for collaboration and competition with peers and whānau members.

There is a small body of research exploring how kaiako and ākonga can best use digital technologies to enhance mathematical engagement, thinking, and understanding (e.g., Darragh, 2021b; Hāwera et al., 2017; Jackson; 2017; Nicholas & Fletcher, 2017). The research indicates that using digital technologies to improve student outcomes in mathematics classrooms is complex. Which digital technologies to use, and how, requires careful consideration, as well as technological, pedagogical, and content knowledge expertise.

In a discussion of the selection of mathematical games Darragh (2021a) illuminates the complexity of the intentional choices that confront kaiako. If the intention is to build engagement, enjoyment, and positive identities as mathematicians, kaiako will need to consider:

- whether the game portrays mathematics as having one right answer, or alternatively, allows multiple solution pathways
- whether surface skills (e.g., speed and recall) or deep mathematical skills (e.g., slow problem solving) are promoted during the game
- whether individual/competitive or collaborative mathematical engagement is promoted
- whether the game allows multiple ākonga to be positioned as "good at mathematics" (can there be multiple "winners" or only one?)
- how well the game fits with ākonga identities (e.g., is it set in a relevant and meaningful context?).

All these choices arguably extend well beyond the initial choice of the game. They have implications for the learning conditions the kaiako fosters and sustains throughout the whole learning experience. There are strong overlaps between these considerations and both culturally sustaining and problem-solving pedagogies.

One small-scale study recently reported that "a key takeaway message for kaiako interested in play-based learning and intentional teaching is the importance of developing a strong knowledge of the curriculum" (Milne & McLaughlin, 2018, p. 47). The Education Review Office (ERO) has also emphasised the importance of strong mathematical knowledge for intentional teaching using pedagogies such as play-based learning (Education Review Office, 2016).

3.2.3 Develop strong partnerships to promote playful mathematics learning experiences that build on ākonga funds of knowledge

Playful mathematics learning experiences provide rich opportunities to build on ākonga funds of knowledge, especially when strong partnerships are forged between ECE/school and home, or other contexts that are important in ākonga lives beyond ECE/school (Thomas et al., 2022).

One interesting possibility was not explicitly developed in any of the papers we read. The ECE literature discusses the use of narrative assessment (learning stories) to capture the complexity and holistic nature of ākonga emergent mathematical thinking (Mackay et al., 2022; Thomas et al., 2022). We did not find equivalent discussions set in the school sector, but the use of narrative assessment has evident potential to act as a "boundary object" that contributes to building a learning partnership between home and school.

3.3 Structured pedagogies

Structured pedagogies use systematic and explicit teaching approaches, including direct instruction of fundamental concepts in mathematics (Leong et al., 2019). Structured pedagogies involve practices such as: kaiako organising content into structured lessons based on ākonga cognitive abilities; providing explanations and modelling content for ākonga; and giving ākonga opportunities for guided practice of demonstrated procedures (Leong et al., 2019).

It is difficult to find any recent New Zealand research exploring structured pedagogies and principles for effective teaching and learning in mathematics education. Rather than advocating solely kaiako-directed pedagogies, the research points to the importance of kaiako engaging ākonga with a range of pedagogies and practices. For example, the Royal Society Te Apārangi (2021) recommend utilising a variety of approaches to critically engage ākonga, including learning to reason and justify, problem solving, challenging tasks, as well as some structured practice, and memorisation.

At first glance, structured pedagogies appear to be very different from approaches such as play-based learning or inquiry pedagogies, which promote conceptual understanding and ākonga actively constructing their knowledge. However, the kaiako role of making the intended learning explicit is crucial to both of these types of pedagogies (e.g., Fry & Hillman, 2018; Mathews & Cohen, 2022). For example, the kaiako role is equally important whether noticing and responding to teachable moments in play or building on ākonga explanations to make mathematical concepts and mathematical language explicit in an inquiry lesson.

3.4 Critical pedagogies

Critical pedagogies in mathematics and statistics encompass both critical thinking about mathematics and statistics, and critical awareness of wider social issues (Bills, 2020; Furness et al., 2017; Greenstein & Russo, 2019; Gutstein, 2018). Critical pedagogies recognise the importance of mathematics and statistics as tools for understanding, interpreting, and addressing issues of power and inequity, both in the classroom and in the wider world (Furness et al., 2017). Within critical pedagogies, teaching and learning expands beyond the acquisition of mathematical skills and knowledge, to developing ākonga as critically aware and agentic mathematical and statistical thinkers (Furness et al., 2017).

Current New Zealand literature focuses on social justice as fundamental to critical pedagogies in mathematics and statistics education. The literature shows that critical pedagogical approaches to teaching mathematics and statistics through a social justice framework can be enacted in the following three ways:

1. teaching mathematics and statistics in ways that are socially just
2. learning about social justice issues through mathematics and statistics
3. using mathematics and statistics to challenge social injustices.

3.4.1 Teaching mathematics and statistics in ways that are socially just

In these times of significant global change, researchers (e.g., Bills et al, 2021; Furness et al., 2017) advocate for ākonga developing skills and knowledge to think critically, consciously, and curiously about mathematics and statistics. For ākonga to develop critical thinking skills and processes, kaiako need to utilise pedagogies and classroom practices that build ākonga competencies not just as mathematical doers, but as critical mathematical thinkers (Furness et al., 2017).

One aspect of critical pedagogy is teaching mathematics and statistics in ways that are socially just. At the beginning of his study, Bills (2020) found that many of the kaiako participants had a narrow view of teaching mathematics for social justice. They did not consider the pedagogies and practices they engaged in as acts of social justice. Over the course of the study, the kaiako came to realise that the pedagogical practices they used that encouraged culturally responsive opportunities for equitable participation were teaching mathematics for social justice. In other words, teaching mathematics for social justice is not solely teaching ākonga mathematics set in the context of social justice issues.

Differentiated instruction, which is commonly used in New Zealand mathematics classrooms, has critical social justice implications. Differentiated instruction employs modified learning intentions or instructional strategies, and groups ākonga with similar learning needs (Anthony et al., 2019). Research suggests that kaiako create different levels of expectations for different groups of ākonga. Ākonga who are labelled as having less mathematical ability are often given direct instruction and routine practice, while those labelled as having higher ability are given more challenging, creative, problem-solving tasks (Anthony & Hunter, 2017). Anthony et al. (2019) argue that differentiation needs to be reframed in terms of a social justice perspective, which focuses on respecting ākonga differences and understanding the potential of every ākonga to learn and grow through the exploration of these differences; for example, using flexible and collaborative grouping which allows ākonga to engage with a range of peers to build collective meaning in mathematics. There are overlaps here with culturally sustaining and inquiry pedagogies for teaching and learning mathematics.

3.4.2 Learning about social justice issues through mathematics and statistics

Statistics is frequently used when teaching mathematics for social justice, by showing societal inequities through data (Bills, 2020). Bills (2020) utilised contextual statistical tasks, including a graph showing average hourly pay rates by ethnic group. The task required the Years 7 and 8, predominantly ākonga Māori and Pacific learners, to read, interpret, notice, and wonder about the data and evidence. Ākonga were able to access the mathematics, make comparisons between the pay of different groups, and articulate inequities within the data. Similarly, in their 2021 study, Bills and colleagues utilised statistical tasks that detailed national unemployment rates and average hourly pay rates by ethnicity. Ākonga demonstrated the ability to read and interpret trends over time, notice key data points and make comparisons, and critique disparities between ethnic groups in relation to income. Both research projects captured a shift in the ākonga from noticing mathematics to noticing and engaging in discussion about inequities in the data.

Alternatively, Hunter and Sawatzki (2019) used a funds of knowledge approach to examine how Pacific learners solved financial problems, including one about sharing the cost of fish and chips. Results showed that mathematics has a significant role to play in guiding and informing financial decision making, which is particularly important for marginalised groups in New Zealand.

3.4.3 Use mathematics and statistics to challenge social injustices

The opportunity for ākonga to become more informed and active citizens is a further potential outcome of critical pedagogies (Bills, 2020; Bills et al., 2021; Hunter & Sawatzki, 2019). Bills (2020) highlighted the powerful shifts kaiako noticed in how ākonga could interpret data and use mathematics to look for solutions to inequities. Similarly, Bills et al. (2021) argue that using mathematics lessons to bring social justice issues to the attention of ākonga led them to consider the reasons that inequities exist and developed the potential for those issues to be addressed by collective action. For example, ākonga realised the importance of knowing political party policies and the power of voting for a government.

3.5 Dialogic pedagogies

Learning mathematics involves a lot of talking (Attard et al., 2018; Planas & Chromaki, 2021). Many New Zealand classrooms have shifted from traditional ways of teaching mathematics, where kaiako do the majority of the talking and ākonga listen and follow, to utilising tasks and activities that require ākonga to talk, question, and actively make sense of mathematical ideas (Averill, 2018b; Hunter & Hunter, 2018; Rodley & Bailey, 2021). *Te Mātaiaho*, the refreshed New Zealand Curriculum (Ministry of Education, 2022b) holds expectations for ākonga to engage in mathematical practices at all levels of schooling, including justifying processes and solutions, asking questions, and building explanations by sharing, comparing, and contrasting ideas. Collaborative discourse provides a tool for ākonga to engage in these mathematical practices and learn the language of the discipline of mathematics. However, powerful and equitable mathematical discourse can be challenging for kaiako to develop in classrooms (Gibbs & Hunter, 2018; Hunter, R. et al., 2020; Rodley & Bailey, 2021).

Three broad themes were evident across the research exploring dialogic pedagogies in mathematics and statistics classrooms. The research shows that effective kaiako utilise dialogic pedagogies to:

1. make classroom discourse an integral part of teaching and learning
2. utilise frameworks and tools to support ākonga to participate in meaningful mathematical discourse actively and equitably
3. recognise that multiple forms of discourse and language can be used as resources for facilitating mathematical communication.

3.5.1 Make classroom discourse an integral part of teaching and learning

The literature shows that dialogic pedagogies are complex, and many kaiako are challenged when they are required to adopt more facilitative roles and enact lessons where mathematical practices are at the centre of ākonga discourse (Averill, 2018b; Hunter & Hunter, 2018; Hunter, R. et al., 2020; Rodley & Bailey, 2021).

One of the challenges of implementing dialogic pedagogies stems from conflicting beliefs about the nature of mathematics and mathematics teaching. Many kaiako have experienced traditional methods of transmission-based teaching in their own learning (Hunter & Hunter, 2018). Consequently, they may

consider that good mathematics teaching involves memorisation of facts and procedures. Similarly, ākonga who have experienced traditional mathematics instruction have learnt that their role is to listen rather than talk or question (Rodley & Bailey, 2021).

Equity-related issues are also at play when ākonga collectively discuss mathematical ideas. For example, status and power structures in the classroom have an impact on which ākonga are privileged and which ākonga are side-lined in mathematical discourse (Averill, 2018b; Gibbs & Hunter, 2018; Hunter & Hunter, 2018). Additionally, disagreeing with others holds the possibility of being considered culturally impolite or disrespectful. Hunter and Hunter (2018) illustrated the dissonance Pacific learners experienced when they were required to explain, justify, or inquire into the reasoning of others, because these practices were not common in their home environment or community.

The research (e.g., Hunter & Hunter, 2018; Hunter et al., 2018; Pearce & Hunter, 2022; Thomas et al., 2022) shows that when kaiako develop a supportive learning environment and provide opportunities for ākonga to participate in collaborative discourse, there is potential to transform mathematics teaching and learning for ākonga from a young age. For example, Thomas et al. (2022) investigated mathematics teaching and learning for ākonga during their last year of kindergarten and their first year of primary school. They found that language played a critical role for ākonga to communicate their actions, mathematical thinking, and working theories in the context of mathematical activities. When kaiako became more attuned to the mathematical language of ākonga, they included more provocations such as listening, questioning, and prompting, which resulted in extended mathematical conversations and more connected learning.

Pearce and Hunter (2022) explored the importance of mathematical talk in two new entrant classrooms. They found that mathematical talk provided opportunities for young ākonga to justify and explain their ideas and make sense of their own and others' mathematical reasoning. Their research showed that ākonga were provided with opportunities to develop rich mathematical reasoning when kaiako used actions such as: (i) scaffolding ākonga by explicitly praising their engagement in mathematical practices; and (ii) creating rich mathematical discourse environments—also known as "talk-rooms". Additionally, kaiako questioning had a key role in establishing a discourse rich mathematical environment. Kaiako in the study did not just accept yes or no answers but expected ākonga to agree or disagree in a mathematical manner using the word "because".

Hunter and Hunter (2017) showed how, with PLD support, kaiako repositioned themselves as facilitators and members of a learning community, increased ākonga voice and autonomy to question and challenge in culturally appropriate ways, and provided equitable access for all ākonga to participate in mathematical discourse. When kaiako attended to classroom social and discourse norms, building on Pacific learners' values, more ākonga were able to engage in mathematical practices and contribute to the discourse at higher cognitive levels (Hunter & Hunter, 2017, 2018).

3.5.2 Utilise frameworks and tools to support ākonga to participate in meaningful mathematical discourse actively and equitably

Research has identified some key discourse tools that can be used by kaiako to enhance ākonga communication, participation, and engagement with mathematical practices. Kaiako tools such as talk moves (Education Review Office, 2018; Gasson & Anthony, 2018; Hunter et al., 2018; Pearce & Hunter, 2022; Rodley & Bailey, 2021) and a Communication and Participation Framework (Hunter & Hunter, 2018; Hunter et al., 2018) are shown to support ākonga to participate in rich mathematical discourse and engage more critically with each other's mathematical thinking.

The Education Review Office (2018) presented a number of teaching strategies and approaches used successfully by schools with above average achievement at the upper primary level. Two of the schools used "talk moves" to deliberately teach ākonga how to engage in mathematical discussions with their peers. Kaiako used moves such as revoicing (where the kaiako repeats some of what the ākonga is saying and then asks the ākonga to respond and verify whether it is correct) and repeating (where ākonga were asked to restate someone else's reasoning) to orchestrate talk. Through using talk moves, kaiako were able to provide more equitable opportunities for all ākonga to participate in mathematical discourse, and ākonga "sharpened their ability to think mathematically, explain their mathematical ideas and seek clarification of others' ideas" (Education Review Office, 2018, p. 56).

Hunter and Hunter (2018) and Hunter et al. (2018) describe their "Communication and Participation Framework" (CPF), which provides kaiako with practical, sequenced ways to scaffold ākonga to access the mathematical talk used in mathematical practices. The CPF details actions that kaiako can use adaptively and flexibly to support ākonga to engage in discipline-specific mathematical discourse and develop productive talk involving justification and mathematical argumentation in culturally sustaining ways. Evidence from their research (Hunter & Hunter, 2018; Hunter et al., 2018) showed that the CPF supported ākonga Māori, Pacific, and other diverse learners to develop increasingly complex participation and discourse patterns, which in turn supported them to engage in increasingly proficient mathematical practices.

3.5.3 Recognise that multiple forms of discourse and language can be used as resources for facilitating mathematical communication

The literature shows that dialogic pedagogies recognise multiple forms of discourse as resources for facilitating mathematical communication. For example, in a Māori-medium context, Allen and Taplin (2017) explored the use of "show and tell" digital technology to develop both mathematical understanding and mathematical language in te reo Māori. Gasson and Anthony (2018) explored how New Zealand Sign Language could be used by kaiako and ākonga as part of communication in a mainstream mathematics classroom. There were many positive outcomes, including increased access to communication by previously hesitant ākonga, increased kaiako awareness of ākonga thinking, and a more productive and collaborative community of inquiry experience within the classroom.

Other research explored how ākonga Māori and Pacific learners drew on multimodal forms of communication such as gesture, drawings, language, and symbols to develop algebraic reasoning (Hunter et al., 2022). Drawing on multimodal means of communication, particularly body language and gesture, supported ākonga Māori and Pacific learners to engage in challenging tasks, and to access increasingly sophisticated forms of algebraic understandings.

3.6 Inquiry-based pedagogies

Inquiry-based pedagogies in mathematics utilise ambitious, problem-solving approaches (e.g., Dorier & Maass, 2020; Hunter et al., 2018; Hunter et al., 2020; Makar & Fielding-Wells, 2018; Sullivan et al., 2021). A genuine problem, suitable for using in inquiry approaches, will not have a pre-given or readily apparent solution method (Livy et al., 2018). Ākonga need to actively work together to find a way of tackling the problem, and they need to be supported to work through uncertainties and frustrations as the inquiry unfolds. They are, in fact, working in similar ways to mathematicians using disciplinary mathematical practices. For example, they look for patterns and relationships, make conjectures, justify their reasoning, and use mathematical language (Hunter et al., 2018). This emphasis on

developing an identity as a mathematician is also a theme in the literature on play-based pedagogies (Darragh, 2021a). There are a number of overlaps between the research of these pedagogies. For example, one paper focused on the opportunities that play provides for young ākonga to pose and solve problems of their own devising (Cheeseman, 2019). More typically, problems are devised by kaiako, with ākonga cultural assets, likely interests, and next mathematical challenges in mind.

In some classrooms, problem solving is seen as an extension activity to be used with higher achieving ākonga. This is likely to be linked to a strongly held belief that ākonga who have difficulties with traditional mathematics learning activities will have even greater difficulties with problem solving (Anthony, 2016; Rodley & Bailey, 2021). Such practice is inequitable because all ākonga need to experience the open-ended nature of mathematical inquiry. They need to understand that struggle and not knowing are normal parts of the discipline of mathematics (Rodley & Bailey, 2021). Open-ended learning challenges help build an identity as someone who can do mathematics. When the focus is on matters of equity, there is a strong overlap between literature on culturally sustaining pedagogies and inquiry-based approaches.

Evidence suggests that kaiako need to:

1. design or locate appropriate problems and become familiar with potential solution strategies before they introduce them to ākonga
2. sequence the learning in ways that respond to ākonga progress in working through the problem
3. foster an equitable classroom culture in which all ākonga are given opportunities to contribute their ideas and work together to solve the problem at hand.

3.6.1 Design or locate appropriate problems and become familiar with potential solution strategies before they introduce them to ākonga

Alongside contexts that reflect the languages, cultures, and identities of ākonga, selecting suitably open-ended problems that build conceptual understanding with high levels of cognitive demand is important (Anthony, 2016). Anthony characterises such "rich" tasks as those that "afford opportunities for students to interpret and develop multiple representations, to evaluate mathematical statements, to make conjectures, justifications and explanations, and encourage reasoning of solutions and the making of mathematical generalisations" (p. 4).

Ākonga prior knowledge must be considered and will influence the strategies the kaiako uses to launch the problem (see below). Ākonga literacy skills also need to be considered—a visual component can often help make a problem accessible to more of the ākonga in the class (Rodley & Bailey, 2021).

It is advisable for kaiako to work through a mathematical problem before they introduce it to their ākonga. Doing this helps to internalise both the problem itself, the processes that might be used to solve it, and possible ākonga misconceptions (Eden, 2020; Ingram et al., 2019; Rodley & Bailey, 2021). These researchers say that, when a group of kaiako work together on a new problem, they collaboratively build their own mathematical understandings and strengthen their problem-solving dispositions. Working through problems before they use them is particularly valuable for kaiako who may hold strong beliefs around the value of traditional mathematics teaching, because of the way they were taught mathematics themselves (Rodley & Bailey, 2021).

3.6.2 Sequence the learning in ways that respond to ākonga progress in working through the problem

Problem solving is typically positioned as a large-group or whole-class activity, and the need for carefully structured sequencing of a problem-solving lesson is another clear theme in the literature (Hunter et al., 2018; Ingram et al., 2019). While ākonga can work through open-ended problems individually, most research focuses on the highly collaborative social construction of responses via small-group activity. Group task discussions allow ākonga to engage with others' ideas, and to experience a variety of ways of conceptualising the problem and its solution (Anthony, 2016).

It is important that the problem is introduced or "launched" in a way that maintains the intended cognitive demand without giving too much away while ākonga begin to wrestle with the challenge (Hunter et al., 2018; Ingram et al., 2019; Rodley & Bailey, 2021). The kaiako also needs to establish a "common language" so that ākonga can connect to the context of the problem, and the problem is interpreted and understood appropriately by all ākonga (Bailey, 2018, p. 140). The focus is not on how to solve the problem, but on the overall objective of the task; that is, what do we have to work out, rather than how do we work it out (Hunter et al., 2018).

Kaiako need to be careful not to jump in too soon once the "exploring" phase gets underway (Ingram et al., 2019). Their role is to provide enabling prompts and cues if ākonga get too stuck, but not to rescue them by providing too clear a pathway to the solution. Enabling prompts might: reduce the number of steps; simplify the complexity of the numbers; or introduce new ways of representing the problem (Bailey, 2018). If kaiako have worked through and discussed the problem in a supportive community of practice, they are better placed to anticipate difficulties and be responsive to these as ākonga explore the task (Bailey, 2018; Rodley & Bailey, 2021). Additionally, kaiako should monitor the participation of ākonga, and intervene if they need to address status issues and reposition ākonga for equitable participation (Gibbs & Hunter, 2018; Hunter & Hunter, 2018).

Researchers (Bailey, 2018; Hunter et al., 2018; Ingram et al., 2019) also note that the "summary" phase, where ākonga review the solutions and strategies they have devised, needs to be carefully managed. Explicit teaching of how to make explanatory justifications is likely to be needed (Anthony, 2016; Hunter & Hunter, 2018). The "talk moves" that kaiako use at this stage of problem solving (Anthony, 2016; Rodley & Bailey, 2021) overlap strongly with dialogic pedagogies.

Kaiako knowledge of the intended mathematical outcomes is critical, so that they can purposefully select which solutions are shared back to the larger group (Ingram et al., 2019). As the kaiako helps ākonga to make connections between each other's ideas, they need to be mindful of sequencing so that the reporting becomes cumulative. They also need to make deliberate connections to the big ideas of mathematics and statistics and highlight the mathematical goals of the lesson (Bailey, 2018; Hunter et al., 2018; Ingram et al., 2019). In the final "consolidating" phase, problems with similar numbers or concepts may be posed, which have been designed to consolidate or extend the new mathematical learning (Ingram et al., 2019).

3.6.3 Foster an equitable classroom culture in which all ākonga are given opportunities to contribute their ideas and work together to solve the problem at hand

Closely aligned with culturally sustaining, critical, and dialogic pedagogies, inquiry pedagogies seek to develop inclusive, respectful, and caring learning relationships in mathematics classrooms (Hunter & Hunter, 2017, 2018). For example, flexible, strength-based grouping is used to give all

ākonga opportunities to work with a range of peers to focus on developing new mathematical understandings. Hunter and Hunter (2017) argue that every ākonga is entitled to and capable of engaging in mathematical thinking, reasoning, communication, and collaborative problem solving. High kaiako expectations and valuing ākonga strengths in inquiry classrooms provides all ākonga with equitable learning and growth opportunities and leads to a range of outcomes including greater ākonga voice and agency, pro-social skills, and productive mathematical dispositions for diverse ākonga (Anthony et al., 2019).

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4. Common themes

This literature review has identified a number of key principles and pedagogies that underpin effective teaching in literacy & communication and maths, from early childhood through to the end of secondary schooling. After exploring a wide range of evidence from Aotearoa New Zealand, we have identified five common themes that are interwoven across all of the effective pedagogies. We believe these themes are at the heart of supporting positive educational and wellbeing outcomes for every ākonga in literacy & communication and maths.

Culturally sustaining

There is strong consensus that culturally sustaining practices are critical across the learning pathway. Ākonga are culturally located, and their diverse languages, cultures, and identities are assets that can supercharge their learning. Whakawhanāungatanga and manaakitanga are at the heart of culturally sustaining pedagogies.

Relationships between kaiako, ākonga, and their whānau are foundational to educational success. Finding out about, recognising, and drawing on ākonga funds of knowledge enhances learning relationships and provides opportunities for ākonga to access more abstract curriculum- and discipline-related concepts through familiar contexts. Culturally sustaining practices not only empower ākonga to develop positive learning dispositions, but also affirm them as cultural experts, and their cultural identities as strengths.

Inclusive and equitable

Powerful learning experiences are inclusive and equitable. Aligning with the principles of UDL, all ākonga can thrive when kaiako design multiple opportunities for them to participate, make meaning, and express themselves in diverse ways that build on their strengths and capabilities. When there are multiple ways for ākonga to be recognised as successful, many more ākonga can be successful. Streaming or grouping ākonga according to perceived ability is the antithesis of inclusive and equitable approaches. Holistic outcomes that extend well beyond the purely academic are valued in inclusive, equitable classrooms. Learning is effective when ākonga also develop social and emotional wellbeing, positive learning dispositions, and strong cultural identities.

Collaborative

Collaboration is an essential part of effective practice across all learning domains and in early childhood and school settings. Knowledge building is recognised as being a collective process of co-constructing meaning, and multiple facets of collaboration are required for learning. Collaborative, reciprocal, and responsive relationships between kaiako and ākonga, kaiako and whānau, and ākonga and their peers are critical. Effective ECE settings and classroom environments support opportunities for kaiako and ākonga to learn together and from one another as whānau, building on existing knowledges and strengths, and drawing on cultural competencies such as ako and manaakitanga.

Agentic

In contemporary educational settings it is vital that kaiako create environments that extend well beyond themselves as the sole source of knowledge and provide opportunities for ākonga to exercise agency in their learning. Ākonga need opportunities to problem solve, engage in dialogue, think critically, talk specifically about how meaning is made, and build knowledge. These competencies are critical for this generation who will have to solve global challenges, adapt to a changing climate, and build an equitable, sustainable future. Kaiako need to be enabled to utilise their professional expertise and have the support, resourcing, and time required to establish their classrooms and schools as learning communities.

Strategic

Kaiako content knowledge and the confidence to choose from a range of pedagogies and practices underpins effective teaching and learning. Kaiako are able to make a difference for ākonga when they have relevant pedagogical knowledge, underpinned by ongoing professional learning and support to make decisions around which pedagogies are effective, for whom, and in what contexts. These decisions require curriculum knowledge and adaptive expertise, drawing on bigger picture understandings of theory as well as specific knowledge of ākonga. "Students are best served when they are able to explore … ideas in many diverse individual, pair-based and collective ways. They are underserved in learning situations in which only a limited range of pedagogies are present" (Averill et al., 2021, p. 51).

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