Exploring teachers’ perceptions on the use of digital devices and the digital technologies curriculum content in diverse decile 1 schools

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Abstract

Digital devices are rapidly changing our world and consequently, our primary school classrooms. Learners in decile 1 schools deserve the best quality education possible; thus, this research has investigated teacher perceptions of digital devices. Strategies teachers use to manage the complexities of their use in the context of decile 1 schools were also identified. This study explores the advantages and challenges of the recently introduced digital technologies curriculum content (Ministry of Education, 2018b) and gives recommendations for schools utilising digital devices in their programmes.

Qualitative data from semi-structured interviews and online questionnaires have revealed that although today’s students are Digital Natives who have only lived in a digital world (Prensky, 2001, p. 2), learners in decile 1 primary schools do not necessarily have basic digital skills nor are they digitally literate. This is due to the unequal access to digital devices and/or the internet in students’ homes or the use of devices for entertainment. Thus, teachers employ deliberate, purposeful decisions when utilising digital devices. An absence of strategies that address the lack of access has been identified.

The findings address the digital technologies curriculum content (Ministry of Education, 2018d) and support schools to make informed decisions when designing their plans for implementing curriculum content. They revealed that teachers positively perceive the new curriculum content as relevant to students’ futures but currently lack knowledge of this content. They also hold misconceptions between this content and eLearning. Components of successful digital device programmes for use within The New Zealand Curriculum are also discussed (Ministry of Education, 2007a).

Recommendations for schools seeking to successfully implement the digital technologies curriculum content (Ministry of Education, 2018b) include professional development to build teachers’ content knowledge and address misconceptions. Involving teachers in this process will develop ownership, thus giving teachers a reason to change their practice, leading to the effective implementation of this curriculum content (Ministry of Education, 2018b). The findings encourage schools to develop a realistic understanding of the factors impacting on their students. Following this, schools should respond to these factors in ways that will make a difference for students.
Acknowledgements

The completion of this thesis has taken the support of many people who have encouraged me along the way. Without them, this journey would have taken far longer.

First and foremost, I must thank God who has guided me along my journey, given me peace when I needed it, and strength when I had none! Though there have been many trials, He has redirected my path and has remained with me always.

“The Lord directs the steps of the godly. He delights in every detail of their lives. Though they stumble, they will never fall, for the Lord holds them by the hand.”
Psalm 37:23-24 (New Living Translation)

Second I must acknowledge the participants and schools involved in this research project. Without your willingness to participate, there would not have been a research project to complete. I appreciate the time you have taken to share your perceptions with me; I have learned so much from you.

Thank you to Dr Jo Mane, my primary supervisor, and Dr Lisa Maurice-Takerei and Dr Hayo Reinders, my secondary supervisors. Your knowledge and expertise have been invaluable. Thank you for your support, feedback, and guidance over the last two years.

I would like to acknowledge the support of the staff at the Unitec Student Achievement and Learning Services, and in particular, Cat Mitchell. Your encouragement and advice have been vital to the completion of this thesis.

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## Glossary

<table>
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<th>Term</th>
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<tr>
<td>Digital citizenship</td>
<td>“Participation in civic, social, cultural, economic and environmental opportunities online” (Netsafe, 2018a, p. 11) through the combination of “attitudes and values” for online activity (Netsafe, 2018a, p. 11), “knowledge of digital environments[s]” (Netsafe, 2018a, p. 11) and “digital literacy skills” (Netsafe, 2018a, p. 11).</td>
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<tr>
<td>Digital devices</td>
<td>“A physical unit of equipment that contains a computer or microcontroller” (PC Mag, n.d., para. 1), for example an iPad, laptop, interactive whiteboard, mobile or smart phone.</td>
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<tr>
<td>Digital fluency</td>
<td>The ability to “decide when to use specific digital technologies to achieve … [a] desired outcome” (Ministry of Education, n.d.-c, para. 2).</td>
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<tr>
<td>Digital literacy</td>
<td>“Know[ing] how to use digital technologies and what to do with them” (Ministry of Education, n.d. para. 1).</td>
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<td>Digital pedagogy</td>
<td>Pedagogy is defined as “the &quot;how&quot; of teaching. Together with content knowledge, it forms the core of the body of professional practice” (Ministry of Education, 2018b). In this thesis, ‘digital pedagogy’ refers to how to teach using, about, and with digital devices and digital knowledge.</td>
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<td>Digital technologies</td>
<td>Refers to the digital technologies curriculum content, (Ministry of Education, 2018b) which includes Computational thinking for digital technologies (Ministry of Education, 2018b, p. 4) and Designing and developing digital outcomes (Ministry of Education, 2018b, p. 4).</td>
</tr>
<tr>
<td>Digitisation</td>
<td>“Creating a digital (bits and bytes) version of analog/physical things” (I-SCOOP, n.d., para. 17).</td>
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<tr>
<td>eLearning</td>
<td>Digital devices are used as tools for learning, and are used to support the work of The New Zealand Curriculum (Ministry of Education, 2007).</td>
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Progress outcome

“Describe the significant learning steps students take as they develop expertise in digital technologies learning” (Ministry of Education, n.d.-f, p. 4) within the technological areas of Computational thinking (Ministry of Education, n.d.-f, p. 4) for digital technologies and Designing and developing digital outcomes learning areas (Ministry of Education, n.d.-f) instead of the achievement objectives used in other curriculum areas (Ministry of Education, 2018b).
# Abbreviations

<table>
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<tr>
<td>CRT</td>
<td>Classroom Release Time</td>
</tr>
<tr>
<td>ESOL</td>
<td>English for Speakers of Other Languages</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technologies</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>MDTA</td>
<td>Manaiakalani Digital Teacher Academy (Hipkins, Whatman, &amp; MacDonald, 2015)</td>
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<td>PD</td>
<td>Professional Development</td>
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Chapter 1: Introduction

“I taught my kids binary code last year… My kids were like, “This is actually cool.” Then I tried to teach our release teacher. She was like, “I just don’t get it.”” (P-A-SH).

The world in which teachers have grown up in is vastly different from the rapidly evolving digital world in which our students currently live (Prensky, 2001). Their digital experiences are poles apart. From birth, children are immediately propelled into a digital world (UNICEF, 2017). Digital content is changing how children and young people communicate, behave, and spend their time. Primary school-aged children are gaming and instant messaging on their cell phones (The University of Auckland, 2017). As participants in this research project acknowledged, using social media, watching YouTube, and online gaming have become the norm. With the difference in experiences, teachers may not fully comprehend their students’ digital worlds. Digital concepts that are simple for children to understand are not necessarily as simple for teachers. In a 2017 New Zealand survey, 31% of primary schools stated that they use digital devices in all classes (Johnson, Maguire, & Wood, 2017) – a stark contrast to the education teachers received in their own primary school years. For many teachers this means learning to use new digital technologies (Prensky, 2001), perhaps uncomfortably and with much reservation; for others, this opens up an exciting world of possibilities with new content to be explored.

As Pajares (1992) points out, beliefs or perceptions can be indicative of teaching actions. Teachers are the key decision makers in classrooms, and while they are guided by The New Zealand Curriculum (Ministry of Education, 2007) and school policy, they choose their teaching content and their teaching tools. What teachers think, believe, and perceive about digital devices impacts on their use within classrooms. If we as educators are eager to ensure digital devices are used purposefully in our classrooms (Domingo & Garganté, 2016), to improve teaching practice, and to understand how to implement the recently introduced digital technologies’ curriculum content (Ministry of Education, 2018b) into classrooms effectively, it is worthy to investigate teachers’ perceptions about digital devices. This is due to the strong correlation between perceptions and actions (Pajares, 1992; Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013). The introduction of the digital devices

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1 Throughout this thesis, the term ‘digital devices’ refers to “a physical unit of equipment that contains a computer or microcontroller” (PC Mag, n.d., para. 1), for example, an iPad, laptop, interactive whiteboard, mobile or smart phone.
technologies curriculum content (Ministry of Education, 2018b) in 2018 presents new content and poses new challenges for teachers in diverse decile 1 schools. The teacher who exasperates, “I just don’t get it” (PA-SH) is likely to hold negative perceptions about digital devices, impacting on their willingness to engage in teaching with and about digital technologies, consequently impacting on the effectiveness of the digital technologies curriculum content (Ministry of Education, 2018b). The use of technology within classrooms is dependent on teachers’ perceptions (Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013), and whilst the curriculum does not solely rely on the use of digital devices for all of its content, teachers’ perceptions will undoubtedly have a large impact on the effectiveness of its implementation in schools.

**Digital technologies curriculum content**

The new digital technologies curriculum content sits under the technology learning area (see Figure 1) (Ministry of Education, 2018c). This digital content is sectioned into two technological areas, *Computational thinking for digital technologies* (Ministry of Education, 2018b, p. 4) and *Designing and developing digital outcomes* (Ministry of Education, 2018b, p. 4). These areas use “progress outcomes” rather than the “achievement objectives” (Ministry of Education, 2018b) used across other curriculum areas.

![Figure 1. Structure of the technology learning area (Ministry of Education, 2018d).](image)

In *Computational thinking for digital technologies*, students learn about how computers work, the thinking processes that sit behind them involving algorithms for programming (Ministry of
Designing and developing digital outcomes, is largely focused on using computers or digital devices as tools to create an outcome (Ministry of Education, 2018d).

**Research problems**

As a young teacher, I am aware of the opportunities that digital devices and the internet present for our students. This includes communication tools, the ability to have a voice and generate awareness of societal issues, opportunity to personally advance education, collaboration (UNICEF, 2017) and more. However, they also pose dangers. Bullying, exposure to violent or sexual material, privacy issues, and the impact on mental health (UNICEF, 2017) are all concerning threats for children. If we as teachers are not proactive about the problems these issues create by equipping students with the skills to navigate them and instead are reactive or ignorant, the risk presented for our students is far greater. *The New Zealand Curriculum* (Ministry of Education, 2007) states that children should “develop the values, knowledge, and competencies that will enable them to live full and satisfying lives” (p. 8). I believe that, as children’s lives presently include the frequent, ubiquitous use of digital devices, there is a pressing need to teach students about digital devices and how to use them effectively and safely.

Teachers’ perceptions have a large impact on digital device use in classrooms (Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013); what teachers perceive about the digital technologies curriculum content (Ministry of Education, 2018b) will dictate the effectiveness of its implementation into schools. As the use of digital devices in society increases and the digital technologies curriculum content (Ministry of Education, 2018b) is introduced, there is a need to explore teachers’ perceptions on the use of digital devices in order to understand how they can be used effectively in classrooms, reflecting their use in society. Consequently, teachers should develop students’ digital literacy and digital citizenship skills, supporting them to safely interact in the digital world. Uncovering teachers’ perceptions about digital devices will help to build effective classroom digital device programmes. It will also help to build an understanding of how teachers can be better supported to facilitate the successful implementation of the digital technologies curriculum content (Ministry of Education, 2018b) which presents new content and challenges for teachers. As an ICT (Information and Communication Technologies) leader in my own school, I have an interest in uncovering these perceptions to support teaching programmes and inform the implementation of the digital technologies curriculum content (Ministry of Education, 2018b) and teaching practice within my own decile 1 school.
Decile 1 schools are often negatively perceived as schools where students come ‘without’ rather than schools where students come ‘with’. Decile 1 schools “are the 10% of schools with the highest proportion of students from low socio-economic communities” in New Zealand (Ministry of Education, 2017g, para. 5). These schools are identified by a number of community factors including income, education, employment levels, financial support from the government, and housing situations (Ministry of Education, 2017g). In some case studies it was found that 33% of children in hardship in New Zealand were without adequate home internet and computer access (Duncanson et al., 2017), 20% of New Zealand children are without sufficient or nourishing food (Child Poverty Monitor, 2018), and 55.56% of children in a decile 1 classroom came to school without breakfast on a particular day (Barraclough, 2017). All of these statistics are more than numbers, they are realities for a large number of New Zealand children, many of whom are likely to be attending decile 1 schools. Consequently, it is easy to see how decile 1 schools may be negatively portrayed in the media when the ‘without’ is reported on, neglecting to acknowledge the ‘with’. However, it is important to understand that these factors while impacting on students, are not indicative of their ability to achieve and should not dictate their educational path.

Alton-Lee (2003) recognises that “diversity encompasses many characteristics including ethnicity, socio-economic background, home language, gender, special needs, disability, and giftedness” (p. v). Schools’ deciles are diversely indicated by a number of factors based on socio-economic status (Ministry of Education, 2017g), with high proportions of low socio-economic status students attending low decile schools (Ministry of Education, 2017g). However, socio-economic status does not take into account the ‘with’ that students bring with them. Darling-Hammond, Wise, and Klein (as quoted in Futrell, Gomex, & Bedden, 2003) comment on areas of diversity including the “experiences children bring with them to school — the wide range of languages, cultures, exceptionalities, learning styles, talents, and intelligences” (p. 382). Schools, regardless of the decile label they are categorised, or rather, funded by, are diverse environments, filled with diverse students.

Anti-deficit thinking challenges the idea that low achievement is the result of these kinds (Valencia, as cited in Thrupp, 2014) of ‘without’ factors and instead considers the impact of the teacher and the school (Thrupp, 2014). As previously mentioned, there are a number of factors that impact on students and teachers in decile 1 schools (Biddulph, Biddulph, & Biddulph, 2003; Franken & McComish, 2003; Ministry of Education, 2017a; Ministry of Education, 2017f). Thrupp (2014)
recognises the need to acknowledge and address these factors while also considering the teacher and school as well. This research project attempts to challenge the ‘without’ thinking by investigating the impact that teachers and the school can have while also addressing these factors. Within this project the successful strategies that teachers use at a school level to mitigate the impact of such factors, including teaching actions, are explored.

As a teacher in a decile 1 school, I am passionate about the lively, caring, intelligent, thoughtful, and energetic students that fill my classroom. I am interested in challenging deficit thinking, as well as ensuring my students receive a quality education. This includes an education that provides them with the digital tools they need for now and the future, thus my interest in researching within the context of decile 1 schools and digital devices.

**Literature**

**Teachers’ perceptions**

Educational literature into teachers’ perceptions highlights the importance of digital devices for students (Ertmer, Addison, Lane, Ross, & Woods, 1999; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010), and other recent literature draws attention to the high use of digital devices and the internet (Netsafe, 2018b), which is increasing (UNICEF, 2017). Further to this, studies into teachers’ perceptions found that teachers believe digital devices are motivating or engaging for students (Akkoyunlu & Erkan, 2013; Ifenthaler & Schweinbenz, 2013; Ottenbreit-Leftwich et al., 2010). Ertmer (1999) categorises barriers for digital technology use into first-order barriers that include external or physical issues and second-order barriers that include personal beliefs.

This research investigates perceptions which reveal second-order barriers (Ertmer, 1999) to digital device use. These barriers are important to understand due to the strong correlation between perceptions and teachers’ actions. There is presently a lack of research with a focus on teachers’ perceptions within decile 1 schools in New Zealand. This research adds to the field of present educational literature and supports schools to address barriers specific to the decile 1 school environment for digital device use relating to teachers’ perceptions.

**Strategies for using digital devices in classrooms**

Within the field of educational research on the use of digital devices, there is some research on the use of digital devices within the New Zealand context, however there is less based in low decile primary schools. Literature that reports on the ways that digital devices are used within schools in
mid-low socio-economic areas includes a number from New Zealand, which are discussed in academic and non-academic literature (Bishop & Lepou, 2018; Fletcher & Brooks, 2006; Kemker, Barron, & Harms, 2007; Manaikalani Film Festival, n.d.; Fletcher, Parkhill, & Fa’ofoi, 2005; Hawke’s Bay Today, 2017). Such literature commonly identifies creative uses of digital devices where students create content rather than where students respond to content. Despite the number of available studies, there are few studies specifically investigating the strategies for using digital devices that target the complex needs of the learners in decile 1 schools (Fletcher & Brooks, 2006; Jesson, Annan, McNaughton, & Sneddon, 2014).

A commonly identified problem throughout literature includes the lack of student access to the internet outside of school hours, affecting low-decile schools as well as low socio-economic areas (Jesson et al., 2014; Nicholas & Fletcher, 2017; C Wylie & Bonne, 2016; Statistics New Zealand, n.d.). Although a clear problem has emerged from the literature, there are only a limited number of studies reporting on strategies low decile schools are using to combat the lack of internet and digital devices in students’ homes (Jesson, Meredith, & Rosedale, 2015; Jesson et al., 2014; Fletcher & Brooks, 2006).

One such pedagogy that fits the specific context of low decile schools and the use of digital devices is ‘Learn, Create, Share’ (Hipkins et al., 2015). In the field of educational research digitally responding to the needs of decile 1 schools, this pedagogy appears to stand alone.

The strategies teachers use to target the needs that are specific to the learners in decile 1 schools are investigated in this research project, shedding new light on a relatively unexplored topic. This investigation into these strategies is able to inform present educational practice for teachers in classrooms.

The digital technologies curriculum content and its implementation

Due to the recent release of the digital technologies curriculum content (Ministry of Education, 2018b), there appears to very little academic literature with a focus on the curriculum content. Just one such article discussing the digital technologies curriculum content and its content was available (Parsons, Thomas, Lynch, & MacCallum, 2018). In addition to this, there are a small number of publications from the Ministry of Education available to support schools to develop teachers’ understanding of the curriculum (Ministry of Education, n.d.-a, n.d.-b, n.d.-c).
The implementation of the digital technologies curriculum content (Ministry of Education, 2018b) will require change for schools. Throughout educational change management literature, the importance of professional development emerged and, in particular, one briefing paper commented on the importance of using professional development to support the implementation process of the digital technologies curriculum content (Ministry of Education, 2017c; New Zealand Technology Industry Association, 2016). Different focuses for professional development and ways to deliver it were also presented in the change management literature (Davis, Mackey, & Stuart, 2015; Glazer, Hannafin, Polly, & Rich, 2009; Mirriahi, Alonzo, McIntyre, Kilgyte, & Fox, 2015; Seong & Ho, 2012; Sheffield, Blackley, & Moro, 2018; Shening, 2013; Yuen, Law, & Wong, 2003).

Further to professional development, the theme of creating a school culture where teachers are valued through a range of actions (Davis et al., 2015; Mackey et al., 2015; Overbay, Mollette, & Vasu, 2011; Yuen et al., 2003), including having a culture of trust for teachers emerged (Mackey et al., 2015; McLeod, 2015; Seong & Ho, 2012; Shening, 2013; Yuen et al., 2003). There was a lot of discussion on school vision for the use of digital devices, including its importance, allowing input from a number of stakeholders, and enabling teachers to take ownership of the vision itself (Davis et al., 2015; Flanagan & Jacobsen, 2003; Larson, Miller, & Ribble, 2009; McLeod, 2015; New Zealand Technology Industry Association, 2016; Osborne, 2014; Shening, 2013; Wang, 2010). The importance of principal leadership, specifically in regards to making technological change within schools, was also highlighted (Flanagan & Jacobsen, 2003; Osborne, 2014; Wang, 2010). However, Fletcher and Brooks (2006) also point out that it is important to have programmes that support those in ICT leadership positions due to the influence they have. Despite this, there appears to be a lack of teacher education and graduate teacher programmes that support teachers to develop the necessary skills for teaching in low-decile schools and, in particular, digitally rich environments regardless of the increasing use of digital technology.

Due to the recent introduction of the digital technologies curriculum content (Ministry of Education, 2018b), the investigation into teachers’ knowledge of digital technologies and the curriculum will support teachers and leaders to implement its content within New Zealand schools. Thus this research project begins to explore this area informing present and future practice.
Findings

The findings of this research project identified that teachers in decile 1 schools perceive the use of digital devices as important. This confirms the findings from another study (Liu et al., 2016), and adds to the educational literature due to its specificity within the decile 1 context. This perception is significant in light of the learning needs presented in decile 1 schools, as demonstrated by National Standard data (Ministry of Education, 2017f, 2017i, 2017d). One participants’ comments led to discussion around anti-deficit thinking and a holistic approach to education, which has strong relevance to decile 1 school communities. The findings of this research revealed two contrasting perceptions on the complexities of this environment; first the apparent lack of digital devices and the internet in students’ homes, which is in agreement with literature (Nicholas & Fletcher, 2017). Then in contradiction, the that digital devices (assuming they are present in homes) are largely used for entertainment purposes. This perception is also supported by a study from The University of Auckland (2017) although this research does not specifically reference decile 1 schools. Both of these perceptions lead to a need to teach students basic digital skills (Parsons & Adhikari, 2016). This study found that teachers use deliberate, purposeful decisions when using digital devices in their teaching programmes (Alton-Lee, 2003; Sheninger, 2013) and that the ways devices are used can support different levels of learning (Beschorner & Hutchison, 2013; Couse & Chen, 2010; Schacter & Jo, 2016; Sheninger, 2013). This research project also exposes a need for more programmes within schools that mitigate the complexities of the decile 1 environment.

The findings continued to reveal a teacher perception that the digital technologies curriculum content (Ministry of Education, 2018b) is relevant for students’ futures but did not recognise the importance of this content for students’ present lies. This perception of future importance in regards to digital devices is similarly found in other studies (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010). However, this research project has shown teachers do not see the importance of the digital technologies curriculum content (Ministry of Education, 2018b), for students’ present lives, contributing to the current educational field of literature. Consequently, these findings uncover a need to develop teacher knowledge and understanding of the digital technologies curriculum content (Ministry of Education, 2018b), as well as reiterating the important role of professional development and support in accordance with literature (Adhikari, Parsons, & Mathrani, 2012; Flanagan & Jacobsen, 2003). Developing a school culture that is conducive to change includes valuing teachers (Overbay et al., 2011) and having respectful
relationships (Mackey et al., 2015), encouragement to take risks (Seong & Ho, 2012) and giving teachers a sense of ownership (Davis et al., 2015).

**Personal reflection of findings**
Through this research project, I have continued to develop my own thinking and understanding of the ‘with’ that students gift to our decile 1 schools: their rich culture, values, unique ways of looking at the world, and vibrant love of life. These students enrich our classrooms for the better. I have been challenged to evaluate how we constantly ask our students to ‘colour between the lines’, to fit into a space that is designed by a western way of thinking rather than redesigning schools so they reflect students’ own ways of thinking (Milne, 2014).

**Significance**
This research project is significant for a number of different audiences who stand to benefit from the knowledge gained, the teaching community, policy and decision makers, and researchers.

**Teaching community**
The findings of this research project will be of significance for school leaders who require teachers to utilise digital devices in their classrooms and are beginning to implement the digital technologies curriculum content (Ministry of Education, 2018b) in their schools. This project will support them to understand teachers’ decisions or behaviour as a result of their perceptions of digital devices (Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013). This understanding will support leaders to target their professional development and school focuses to meet the needs of teachers in regards to classroom digital devices use and the digital technologies curriculum content (Ministry of Education, 2018b). This project will also equip teachers with strategies they can use within their classrooms to manage digital device use, improving outcomes for students, and teachers.

**Policy and decision makers**
The findings of this research project hold significance for policy and decision makers as there is limited New Zealand research specific to decile 1 schools, with a focus on digital devices. Due to the recent release of the digital technologies curriculum content (Ministry of Education, 2018b), there is also very little research on it. The findings of this research project will inform policy and decision makers about the current understandings primary school teachers hold of the digital technologies curriculum content (Ministry of Education, 2018b) and their readiness to implement it within their classrooms, enabling better targeting of resourcing for the primary school sector.
and, in particular, decile 1 schools. Findings from this project will also highlight teachers’ perceptions of the issues impacting on the students in decile 1 schools, again informing decision makers about resourcing and the current needs of students. Valuing the perceptions of teachers, the vehicles who carry out the requests of decision makers, communicates respect and enables cohesion across the different sectors of the education system.

Researchers
As previously discussed there is an undersupply of New Zealand research and academic literature that is set in decile 1 or low decile schools and focuses on digital devices. Some researchers have investigated successful strategies in one low decile school (Fletcher & Brooks, 2006); however, some of the more recent literature that reports on a digital initiative (Hipkins et al., 2015) does not provide a realistic picture of digital device use in decile 1 classrooms due to the amount of costs involved in this initiative. Evidently, there is academically more to explore. This research project begins to paint a picture of the strategies teachers use when teaching with digital devices, as well as teachers’ perceptions on the digital technologies curriculum content (Ministry of Education, 2018b) and its implementation, through a small sample of teachers in diverse decile 1 schools, in South Auckland, and Auckland, ultimately contributing to the body of current educational research. The findings of this project will highlight further potential avenues for academic research.

Rationale
This research project intends to address the current gaps in educational literature pertaining to teacher perceptions and the impact of digital devices and the digital technologies curriculum content (Ministry of Education, 2018b), all within the context of decile 1 schools.

It explores the nature of teachers’ perceptions as a result of changes to The New Zealand Curriculum (Ministry of Education, 2007), due to the inclusion of the digital technologies curriculum content in the technology learning area (Ministry of Education, n.d.-f). In particular, the research will focus on decile 1 schools and teachers’ perceptions and practices as they relate to the two new digital technological areas in the technology learning area (Ministry of Education, 2018b). There are a number of rationales for this research project including the introduction this content in 2018 (Education Gazette Editors, 2016) and the needs of the learners in diverse decile 1 schools (Ministry of Education, 2017f, 2017i, 2017d). There are also a number of barriers for digital device use (Ertmer, 1999), increasing need to have digital world knowledge (UNICEF, 2017), and
hesitancy of some teachers to develop their digital skills and implement them in classrooms. Finally, the perceived benefits of sharing pedagogical knowledge between colleagues. These reasons all provide a range of rationales for this research project.

The introduction of the digital technologies curriculum content into the technology learning area of *The New Zealand Curriculum* (Ministry of Education, 2007) from 2018 (Education Gazette Editors, 2016) impacts on teachers and their learning programmes, increasing the use of digital devices and learning about digital technologies as it becomes a requirement. There are a number of complexities associated with this change in curriculum, such as the wide-ranging content, already full curriculum and classroom programmes, students’ learning needs, current teacher understandings, and resourcing. Such issues will dictate how the digital technologies curriculum content (Ministry of Education, 2018b) will be enacted in classrooms and schools. This research will identify how teachers are responding to this curriculum change, current understandings, and support required for implementation. Recommendations and conclusions drawn will give diverse decile 1 schools guidance on how they can successfully implement the digital technologies curriculum content (Ministry of Education, 2018b).

Decile 1 schools are very diverse communities that are situated in the lowest 10% of socio-economic areas in New Zealand (Ministry of Education, 2017g). Their students commonly face barriers to achievement, such as having parents with low income, low education, low skill level jobs, and housing issues (Ministry of Education, 2017g). They are more likely to experience low attendance at school (Ministry of Education, 2017a), health issues, low family income, a lack of home resources to support learning (Biddulph et al., 2003), transience (Ministry of Education, 2017h), and have non-English speaking backgrounds (excluding international students who pay fees) (Franken & McComish, 2003). However, these issues are not indicative of a students’ educational path, neither are they a given for all students in decile 1 schools, or unheard of in decile 10 schools. Instead, they more commonly appear in decile 1 schools and have an impact on a child and their learning. Consequently, these factors need to be addressed to allow all children to have the best possible learning experience.

For some students in decile 1 schools, these barriers make ‘Bring Your Own Device (BYOD)’ programmes unlikely to be possible, online learning platforms often too costly, and no devices available for home use. This is in contrast to many high decile schools where these programmes have been implemented (Cathy Wylie & Bonne, 2016), further facilitating home-school
partnerships and achievement. There is little New Zealand research on how digital devices are used in low decile schools where such issues impact on learning despite decile 1 schools representing a high number of students in our education system. This research will uncover teachers’ perceptions of the complexities of decile 1 contexts and how they impact on their teaching with digital devices, facilitating recommendations going forward for these schools.

Dedicating classroom time to integrate digital devices within literacy and numeracy can be a complex risk for teachers. Across decile 1 schools in 2016, many students were below the National Standard – that is, 38.3% in reading (Ministry of Education, 2017f), 45.1% in writing (Ministry of Education, 2017i), and 41.1% in mathematics (Ministry of Education, 2017d). As a result, there is pressure to raise achievement. Low achievement impacts on the decisions that teachers make when designing their classroom programmes. If teachers perceive the use of digital devices as a risk to achievement or a less-accelerated path to achievement, they are less likely to utilise them in classrooms where there is low achievement as students cannot risk spending precious learning time on unbenevolent activities. Teachers choose to invest valuable classroom time into activities that make the biggest impact on improving learning outcomes for students and to rely upon evidence based pedagogy relevant to their situations, maximising learning time in classrooms. Hence this research will identify successful strategies decile 1 schools use to manage these complexities when using digital devices.

Teachers can be reluctant to integrate devices into their teaching programmes due to technological issues. For example, the rate of technological change (Phelps & Graham, 2008), issues arising during lessons (Romrell, Kidder, & Wood, 2014) and device and software problems (Aldern, as cited in Romrell, Kidder, & Wood, 2014). The possible mismatch between learning and an app’s content (Gedik, Hanci-Karademirci, Kursun, & Cagiltay, 2012), and device management (Romrell et al., 2014) impact on teachers. These issues all influence teachers’ attitudes towards digital device integration. Sharing teacher perceptions on attitudes and reluctance, as well as successful strategies for counteracting this, facilitates the successful use of digital devices in diverse decile 1 schools in the future, ultimately supporting the work of many learning areas in The New Zealand Curriculum (Ministry of Education, 2007a) and, in particular, the digital technologies curriculum content (Ministry of Education, 2018b).

The opportunity to explore perceptions and share pedagogical knowledge of successful digital device use in diverse decile 1 schools will benefit teachers who face similar complexities and
challenges in their own low decile classrooms. This research will be shared with the schools whose teachers participated and will be available to other schools that are interested in the findings, equipping teachers in decile 1 schools with strategies relevant to diverse teaching environments. The phrase, “kia kotahi te hoe o te waka kia whaia te matauranga - Towards knowledge and excellence we paddle as one” (Makiha, n.d., para. 1) encompasses the essence of this research. As teachers, we are responsible for contributing to the learning journeys of the students in our classrooms, as well as others who are not, through the sharing of pedagogical knowledge as a commitment to our profession (Education Council, 2017).

The intention of this research project was to explore teachers’ perceptions and to identify the impact of digital devices, hence a qualitative approach was selected. Semi-structured interviews and online questionnaires were carried out, with similar questions allowing the data to crossover. The aims of this research project and questions that guided it are as follows:

**Research aims:**
1. To explore teachers’ perceptions on teaching with digital devices in a diverse decile 1 environment.
2. To identify the impact of the digital technologies curriculum content and the use of digital devices in *The New Zealand Curriculum* within diverse decile 1 schools.

**Research questions:**
1. How do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?
2. What are the current strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?
3. What do teachers in diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating the new digital technologies curriculum content in the technology learning area of *The New Zealand Curriculum* into their practice?
4. What are some recommendations for schools in diverse decile 1 communities when supporting *The New Zealand Curriculum* with digital devices and implementing the digital technologies curriculum content?
Thesis organisation
The thesis includes six chapters, organised as follows:

Chapter 1: Introduction
The first chapter describes the decile 1 context and the place of digital devices in primary education. It justifies the importance of investigating teacher perceptions and explains the situation created by the recent introduction of the digital technologies curriculum content (Ministry of Education, 2018b) into schools, continuing to provide a rationale for this research project. It then offers a brief overview of the main themes drawn from relevant educational literature. Finally, it lays out the research aims and questions.

Chapter 2: Literature Review
This chapter explores the educational literature about digital devices organised in relation to teachers' perceptions, teachers' strategies, the digital technologies curriculum content (Ministry of Education, 2018b) and change management for the curriculum's integration into schools. Analysis of the existing literature on teachers' perceptions reveals a number of themes including the use of digital devices for communication with parents, student engagement and motivation, and barriers for use. Literature exploring teachers' strategies for digital devices identifies the range of uses in classrooms, internet access, home-school partnerships, pedagogy, and teacher education. Other relevant literature addresses the role that school culture, teacher ownership, vision, professional development and leadership play in implementing change. Overall, the review of current research and literature in this area reveals a number of gaps. This includes the need for more research into the perceptions of New Zealand teachers, particularly within the specific decile 1 school context, and the lack of research on teachers' strategies for using digital devices. Furthermore, due to the recent release of the digital technologies curriculum content (Ministry of Education, 2018b), there is little literature discussing the curriculum itself.

Chapter 3: Methodology and Methods
The third chapter in this thesis describes the purpose of this research project and discusses how the research aims and questions are addressed through a qualitative methodology using semi-structured interviews and an online questionnaire. It identifies thematic analysis as the method for analysing the qualitative data gathered from the interviews and questionnaires. Another method of analysis described includes simple descriptive statistical analysis due to the small amount of
quantitative data gathered from some of the questions in the questionnaires and interviews. Ethical issues are identified and culturally responsive practice is also discussed.

Chapter 4: Findings
This chapter reports on the findings of this research project and provides brief analysis of the key ideas that emerged across the two sets of data gathered. It is organised into five sections; first the participants, then the remaining four sections report on the key findings in relation to and in order of the research questions. Each of the sections reports on the results from the online questionnaire and the semi-structured interviews together, under the key findings. The key findings that are briefly analysed in this chapter are expanded on in the following chapter.

Chapter 5: Discussion
The fifth chapter discusses the key findings identified in the previous chapter with reference to relevant educational literature. Significant ideas in support of other literature are identified and significant findings where current literature offers little exploration are highlighted. These findings are discussed in order of the research questions, including teacher perceptions on the importance of digital devices, unequal access, and life outside the computer. Following this, teachers’ strategies discussed include anti-deficit thinking, basic digital skills, and decision making. The advantages and challenges of the digital technologies curriculum content (Ministry of Education, 2018b) discussion include a future-focus, students’ home lives, teachers’ lack of content knowledge, and misconceptions. Finally, the discussion of the last research question identifies recommendations for the implementation of the digital technologies curriculum content (Ministry of Education, 2018b) in regards to changing understandings, and the range of support available for teachers and schools.

Chapter 6: Conclusion and Recommendations
The final chapter provides statements on the conclusions drawn from this research project and identifies its strengths and limitations. The identified strengths include the focus on teachers’ perceptions which impact on teaching practice, the specificity of the decile 1 context, and the exploration of the new digital technologies curriculum content (Ministry of Education, 2018b). The limitations include the relatively small sample size and participants’ knowledge of the digital technologies curriculum content (Ministry of Education, 2018b). This chapter then continues to comment on recommendations for schools, teachers’ practice, and possible avenues for future
research exposed by this project. The concluding statements reflect on the purpose of this research project.
Chapter 2: Literature Review

Introduction
The ubiquitous use of digital devices within our society means that students are currently living in a world that requires many digital skills. Currently, children in our primary schools have never lived in a world without digital devices and are classed as Digital Natives (Prensky, 2001, p. 2). These students require high levels of digital literacy, which is “know[ing] how to use digital technologies and what to do with them” (Ministry of Education, n.d. para. 1). Students also require digital citizenship, which is the “participation in civic, social, cultural, economic and environmental opportunities online” (Netsafe, 2018a, p. 11). This is developed through “digital literacy skills” (Netsafe, 2018a, p. 11), “knowledge of digital environment[s]” (Netsafe, 2018a, p. 11) and, the combination of “attitudes and values” for online activity (Netsafe, 2018a, p. 11). These skills enable students to safely and beneficly interact in the world they presently live in and in the future world to come. This review explores the educational literature on digital devices and aims, in particular, to examine the current research about teacher perceptions of digital devices and their use. This includes strategies for the integration of digital devices in schools within low socio-economic areas, and change management for the implementation of the new digital technologies curriculum content (Ministry of Education, 2018b) addition to the revised technology learning area of The New Zealand Curriculum (Ministry of Education, 2007).

Diverse decile 1 schools
Decile 1 schools “are the 10% of schools with the highest proportion of students from low socio-economic communities” (Ministry of Education, 2017g, para. 5) in New Zealand. This is diversely indicated by a community’s income, education, employment levels, financial support from the government, and housing situations (Ministry of Education, 2017g). Students from diverse low socio-economic areas are more likely to experience low attendance at school (Ministry of Education, 2017a), short and long term health issues, low family income, a lack of home resources to support learning (Biddulph et al., 2003), transience (Ministry of Education, 2017h), and frequently have non-English speaking backgrounds (Franken & McComish, 2003). These factors indicate typical facets of diversity between the students that attend low decile and high decile schools, however, feed into a deficit idea of what students come to school ‘without’. Alton-Lee (2003) asserts that diversity includes “ethnicity, socio-economic background, home language, gender, special needs, disability, and giftedness” (p. v), recognising some of the ‘with’ students bring to their education, regardless of which decile school they attend. No student, classroom, or
school, is the same. Despite the ‘decile’ label attached to each school, each one is diverse. To positively impact the students in these schools, teachers must recognise this diversity and use this to guide their teaching practice (Alton-Lee, 2003).

**Teachers’ perceptions**

‘Perceptions’ can be defined as “the way in which something is regarded, understood, or interpreted” (Oxford Dictionaries, 2018, para. 2). In a study on teachers’ perceptions, the term ‘perceptions’ was defined as the “interpretation of events among ... teachers due to past experiences, current understanding, present situation and information” (Nikian, Nor, & Aziz, 2013, p.621). There are a number of terms that researchers use when discussing perceptions (Nikian et al., 2013; O’Bannon & Thomas, 2014; Parsons & Adhikari, 2016). This includes attitudes (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2013; Sánchez, Marcos, González, & GuanLin, 2012), beliefs (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010) and views (Akkoyunlu & Erkan, 2013).

Throughout this literature review on digital devices, the term ‘perceptions’ has been used to describe ‘what teachers think’ about digital devices, which recognises the experiences that have shaped their understandings. Yan and Zhao (as cited in Nikian, Nor, & Aziz, 2013) state that the use of technology\(^3\) in a classroom depends on the teachers’ perception of a device and their goals for its use. Therefore the exploration of teachers’ perceptions about digital device use is of major importance as it influences teaching practice. This was highlighted in one study that investigated mobile technology, where it was noted that the exploration of perspectives “provides a means for promoting a more meaningful use of [this] technology in the classroom setting” (Domingo & Garganté, 2016, p. 22). Thus, through educational research, understanding teachers’ perceptions can identify key issues that can increase practitioner knowledge leading to enhanced teacher practice.

**Digital devices and family engagement**

In a study carried out by Ottenbreit-Leftwich et al. (2010), it was identified that teachers perceived that the use of technology would increase family engagement in a child’s education. In the study, this perception of technology was connected with teachers’ use of digital devices as a means of communicating with families. This use of digital devices has also been found in New Zealand, in

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\(^3\) When appropriate, the term ‘technology’ has been interchanged with the phrase ‘digital devices’. This has often occurred when discussing literature in order to maintain consistency of language across this thesis.
a survey carried out by Johnson, Maguire, and Wood (2017). While not investigating teachers’ perceptions specifically, this study found that of the 339 primary schools surveyed, a high percentage were using digital technology to communicate with families and the school community. Schools identified emailing parents (91%), updating their website (90%), and emailing newsletters (87%) as some of the ways they engaged with families (Johnson, Maguire, & Wood 2017). For both of these studies, digital devices were used as a means of communication with the school community (Johnson et al., 2017; Ottenbreit-Leftwich et al., 2010). In the first study, the investigation into the beliefs of teachers highlighted a connection between ‘what teachers think’ about technology and how it is used. Ottenbreit-Leftwich et al.’s (2010) findings support Yan & Zhao’s (as cited in Nikian, Nor, & Aziz, 2013) conclusion that technology use in the classroom is dependent on the teachers’ perceptions of it.

**Digitalisation**

Ottenbreit-Leftwich et al. (2010) found that teachers commonly perceived digital devices and their integration in the classroom as an important part of education. They also commonly perceived it as a necessary skill for the present world that students live in and of high significance for the future. This is evident in the way that “‘digitalization’ has already changed the world. The rapid proliferation of information and communications technology (ICT) is an unstoppable force, touching virtually every sphere of modern life [...] shaping everyday life” (UNICEF, 2017, p. 8). The digitalisation of the world that students live in has required action from teachers and schools to include a digital literacy component in their teaching and learning programmes (Erttmier et al., 1999; UNICEF, 2017). Digital literacy “represents a person’s ability to perform tasks effectively in a digital environment” (Jones-Kavalier & Fannigan, 2008, p.14). In one study carried out by Sadaf and Johnson (2017), teachers held the perception that digital literacy is able to facilitate students’ creativity and critical thinking about the output of content to other people and the input of content for themselves as consumers. In this technology saturated world, digital literacy skills are perceived to give students the ability to interact in the future (Ottenbreit-Leftwich et al., 2010). In a New Zealand study of teenagers’ use of the internet and digital devices, it was found that 33% of teenagers spent four or more hours online each day, and another 38% identified their use at between 2-4 hours per day (Netsafe, 2018b). In addition to this, the use of digital devices and the internet is increasing (UNICEF, 2017); for example, use of wireless devices for the internet has increased from 8% to 87% between 2007 to 2015 (Smith, Bell, Miller, & Crothers, 2016). These

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4 Throughout this thesis, the term ‘digitalisation’ refers to “the ongoing adoption of digital technologies across all possible societal and human activities” (I-SKOOP, n.d., para. 35).
statistics illustrate the realities of students’ home lives and the necessity to teach digital literacy in schools. Teachers perceive digital literacy as an important component of a teaching and learning programmes as it bridges the gap between curriculum and home lives, making learning more relevant and increasing motivation for learning (Sadaf & Johnson, 2017).

Motivation and engagement
Ertmer et al. (1999) found that some teachers perceive the use of technology as motivating for students. This perception is similar to the perception that digital devices are able to increase student engagement in learning. The connection between engagement and motivation for learning with digital devices was a theme that appeared throughout studies, including Akkoyunlu and Erkan, (2013) and Ifenthaler and Schweinbenz (2013). In Wall, Higgins, and Smith's (2005) research, students identified that the use of interactive whiteboards was a motivator for them to participate in the learning and helped them to stay focused. Motivation and engagement are powerful concepts for teachers as they impact on learning, as illustrated by one participant in Ottenbreit-Leftwich's et al., (2010) study who commented that “raising the level of interest of my students through the use of technology leads them to learn more about a topic, without even realizing they are doing so” (p. 1328). If teachers hold the perception that digital devices can increase students’ motivation (Sánchez et al., 2012), it is likely to prompt them to integrate digital devices into their classrooms, based on Yan and Zhao’s (as cited in Nikian, Nor, & Aziz, 2013) statement that technology use is dependent on teachers’ beliefs.

Barriers to digital device use in classrooms
There are a number of perceptions that teachers hold on the barriers that impact on the use of digital device integration in their classrooms. Ertmer (1999) categorises these as first-order barriers, which are external or physical issues such as device availability, and second-order barriers, which are internal issues such as perceptions and beliefs. Internal perceptions about the external issues of digital devices can be classed as both first-order and second-order issues. Ifenthaler and Schweinbenz (2013) identified that technical issues, including device charging and software problems, negatively influenced teachers’ attitudes or perceptions, with one participant stating, “that’s too time consuming... that is not realistic for a school” (Ifenthaler & Schweinbenz, 2013, p. 529). The perception of a first-order issue is a barrier to digital device integration in classrooms, which also identified the reliability of devices as an important factor. Another study identified similar first-order barriers such as the number of devices in a classroom or the amount of time teachers needed to invest to create lessons (Nikian et al., 2013) as having a strong negative impact
on the use of technology in classrooms. In theory these external first-order barriers can be easily solved with practical solutions (Fisher, et. al., as cited in Ertmer, 1999), perhaps through the purchasing of time-efficient charging stations or purchasing of more digital devices; however, these solutions rely on appropriate resourcing. These types of first-order barriers are perceived by teachers as being the biggest challenges for integrating digital devices into their classroom programmes as evident in Nikian et al.'s (2013) study despite having straightforward solutions in comparison to second-order barriers (Ertmer, 1999) such as deeply held perceptions about the place of teachers and students in classrooms (Ertmer, 1999).

Teachers hold a number of perceptions about digital devices which impacts on their use in schools (Yan and Zhao, as cited in Nikian, Nor, & Aziz, 2013), hence this topic is of high importance due to its influence on teaching practice. Teachers’ perceptions on digital devices relating to communication with parents, engagement and motivation for students, and first and second-order barriers for use have been identified as themes throughout current educational literature. The perceptions held by teachers in low-decile schools have not been explicitly explored in digital device literature; consequently, researchers have much to understand about how teachers’ perceptions of the realities of teaching and learning in low-decile schools and digital devices interrelate, and the implications for their use in classrooms.

**Strategies for digital device use in schools in low socio-economic areas**

There is much research on the ways digital devices are used and the strategies for their use in schools. However, there is a limited amount of research within the New Zealand context, and less based in low-decile primary schools or schools in low socio-economic areas. Despite there being some research on how digital devices are used within this particular bracket – low-decile primary schools in New Zealand – there is little research into the strategies for using digital devices that specifically targets the complex needs of the learners within decile 1 schools. Due to the limited amount of literature fitting into all of these categories, literature that fits some of this criteria has been explored in this literature review.

**Early childhood education and early primary school education use of digital devices**

In 2016, across decile 1 schools, many students were below the National Standards in reading, writing, and mathematics – that is, 38.3% in reading (Ministry of Education, 2017f), 45.1% in writing (Ministry of Education, 2017i), and 41.1% in mathematics (Ministry of Education, 2017d). Despite these lower levels of achievement, digital devices are able to be used in effective ways
regardless of a students’ learning levels. This has been documented in a number of case studies of digital device use in early childhood education (Beschorner & Hutchison, 2013; Couse & Chen, 2010; Schacter & Jo, 2016). Studies showed that digital devices were able to be used to support students in early childhood education and early primary school education within literacy (Beschorner & Hutchison, 2013; Couse & Chen, 2010) and numeracy (Schacter & Jo, 2016). This demonstrates the ability of digital devices to be utilised in education across different levels of learning, thus indicating their ability to be used in decile 1 schools regardless of students’ achievement levels.

Using digital devices to create content

Research identifies that within low-decile schools or schools in low socio-economic areas, teachers are using a wide variety of apps and programmes on digital devices to support their teaching and learning programmes. The majority of the literature discusses creative uses where the user is creating content rather than responding to prompts such as games. These creative apps are transforming the way that students’ learning is being carried out and are facilitating learning activities that were not achievable in the past (Puenteutra, 2013). The creative apps and programmes discussed in academic research and non-academic literature range from the use of video editing software (Bishop & Lepou, 2018; Fletcher & Brooks, 2006; Kemker et al., 2007; Manaiakalani Film Festival, n.d.), podcasting work (Burt, 2007), multimedia presentations (Fletcher & Brooks, 2006; Fletcher, Parkhill, & Fa’ofoi, 2005; Kemker et al., 2007), robotics (Hawke’s Bay Today, 2017), animation (Fletcher & Brooks, 2006), coding (Fletcher & Brooks, 2006), design software (Bishop & Lepou, 2018), and a number of other apps or programmes, highlighting the wide use of digital devices in this setting.

Two of the most prevalent creative uses of digital devices in literature based in low-decile schools or schools in low socio-economic areas was the use of video making software (Bishop & Lepou, 2018; Fletcher & Brooks, 2006; Kemker et al., 2007; Manaiakalani Film Festival, n.d.) and multimedia presentations such as PowerPoint (Fletcher & Brooks, 2006; Fletcher et al., 2005; Kemker et al., 2007). These creative uses of digital devices bring with them opportunities that do not exist without the technology, described by Puenteutra (2013) as ‘transformation’. For example, within one cluster of mostly low-decile schools in Auckland, a yearly film festival screens videos created by students (Manaiakalani Film Festival, n.d.). This use of digital devices raises students’ confidence (Dorothy [screen name], 2014). The use of video editing and multimedia
tools can be applied to teaching and learning programmes across any area of learning and is a good example of digital device use within low-decile schools or schools in low socio-economic areas.

**Access to digital devices and the internet**

Access to the internet outside of the school environment is a common issue in areas in Auckland (Stats NZ, n.d.-b, n.d.-e, n.d.-c), impacting on low decile school communities (Nicholas & Fletcher, 2017). Further to this, access to digital devices and all they encompass can be difficult in high poverty areas (Jesson et al., 2014). Both of these issues require schools to put strategies in place to address the impact these have on education. In a survey of New Zealand secondary schools, it was reported that in 88% of decile 1-2 schools there was an “inability or unwillingness of parents and whānau to buy a device for their child” (Wylie & Bonne, 2016, p. 32); however, this statistic does not comment on household access to devices. New Zealand statistics highlight the divide in access to the internet between households in particular areas. In the 2013 New Zealand Census, the percentage of households without access to the internet included Epsom Central at 11.8%, Ponsonby East at 9.5%, and Remuera South at 10.1% (Stats NZ, n.d.-a, n.d.-g, n.d.-h). Schools in Epsom, Ponsonby, and Remuera are for the majority, high decile schools, with a few exceptions (Ministry of Education, 2019b). In comparison, other areas had higher percentages of households without access to the internet including Otahuhu North at 45%, Otara East at 56%, Mangere Central at 41.7% (Stats NZ, n.d.-b, n.d.-e, n.d.-c). The majority of schools in Otahuhu, Otara, and Mangere are decile 1 schools, with a small number between decile 2-3, and one which is decile 10 (Ministry of Education, 2019b). The identified comparison of data highlights the digital divide that exists in New Zealand homes impacting on “access to the world of information and communication” (Venezky, 2000, p. 64). This lack of internet access found in these areas where the majority of schools are low decile schools causes a digital divide in comparison with those who have higher access to the internet. The students living in these areas are likely to be attending local low decile schools and are impacted by the lack of digital devices. Thus this issue of inequality needs to be addressed.

In order to combat and reduce the impact of the digital divide in New Zealand homes, low-decile schools are using a range of strategies. For example, the continuation of paper newsletters alongside internet-accessible information for schools (Fletcher & Brooks, 2006) and the provision of digital devices for use at school (Wylie & Bonne, 2016). Other strategies include free access to community internet (Jesson, Meredith, et al., 2015) and the availability of digital devices for lease and eventual purchase (Wylie & Bonne, 2016). These strategies enable students to use digital
devices at school and at home (Jesson, McNaughton, & Wilson, 2015). Another strategy used outside of schools but connect to them is an initiative that provides families with children at low decile schools with digital training, digital devices, and access to the internet at affordable rates (20/20 Trust, 2017b). The lack of digital devices able to be supplied by parents in decile 1-2 schools (Wylie & Bonne, 2016) may put pressure on schools to provide devices for the learning opportunities required by the digital technologies curriculum content (Ministry of Education, 2018b). One strategy used by a low decile school to address the lack of digital devices was the reliance on charities to support their funding for school use digital devices (Fletcher & Brooks, 2006). These strategies employed by schools begin to combat or reduce the impact of the issues brought up by a lack of access to digital devices and the internet within students’ home contexts. However, other problems that arise from unqual access to digital devices and internet are not necessarily addressed by these strategies. For example, an inability to facilitate home-school partnerships through digital devices.

Digital home-school partnerships
The Ministry of Education encourages home-school partnerships and communication in schools, noting that “technologies facilitate on-going reciprocal two-way communication between students and parents, giving parents anywhere, anytime access to their child's learning” (Ministry of Education, n.d., para. 1). However, for low-decile schools, this technological form of communication is impeded by a lack of home access to the internet and digital devices. Despite these issues, there are some cases in low-decile schools where it was identified that digital devices were a tool that could facilitate and improve home-school communication, and/or increase the fluidity of learning between home and school (Fletcher & Nicholas, 2018; Jesson et al., 2014; Nicholas & Fletcher, 2017; Pohio & Falloon, 2010). Strategies used to increase home-school communication resulted in students being motivated in their learning, strengthened relationships, as well as a reduction of reluctant parent involvement (Pohio & Falloon, 2010), an increase in the fluidity of learning between school and home, and engagement (Fletcher & Nicholas, 2018). One strategy used by a school was the provision of mobile phones for teachers, allowing students to call and text their parents to share achievements or positive news about their learning (Pohio & Falloon, 2010). This strategy led to an increase in two-way communication with information being shared about students’ school and home lives (Pohio & Falloon, 2010). Other studies identified the use of blogging as a strategy, increasing home connections (Fletcher & Nicholas, 2018; Nicholas & Fletcher, 2017) as well as connections with other students outside of the school (Fletcher & Nicholas, 2018). In both of these studies, the fluidity of learning between home and
school was facilitated by the use of blogging (Fletcher & Nicholas, 2018; Nicholas & Fletcher, 2017). For one school, the use of Quad Blogging with other schools provided an audience for students, making the sharing of learning a purposeful and engaging task (Fletcher & Nicholas, 2018). Across these studies, the use of digital devices in low-decile schools were able to provide another way to engage with parents and other audiences, involving them in students’ learning journeys despite the lack of home access to digital devices found in many low-decile areas.

**Digital pedagogy**

Another strategy for the use of digital devices within low-decile schools is the appropriate selection of pedagogy that is responsive to the needs of students. Within *The New Zealand Curriculum* (Ministry of Education, 2007), a document applicable across deciles, eLearning is briefly discussed alongside pedagogy and is encouraged as a tool that supports and works alongside other curriculum areas to facilitate learning (Ministry of Education, 2007). In a case study Fletcher and Nicholas (2018) describe the use of digital devices within a low decile school as part of the hidden curriculum, explaining that the device use was not separate, instead was integrated, reflecting the discussion on eLearning in *The New Zealand Curriculum* (Ministry of Education, 2007). In addition to integration within the curriculum, Callow and Orlando (2015) identify that good practice involves pedagogies that are modified to fit within the context of the classrooms they are applied to. Unwin (2009), in reference to literacy, states that “critical to literacy learning and the success of using technology in schools in low SES [Socio-Economic Status] location[s] is that pedagogy is developed that addresses the literacy and technology needs of the learners in that community” (as cited in Callow & Orlando, 2015, p. 353).

One pedagogical framework encompassing the elements of Unwin’s (as cited in Callow & Orlando, 2015) position is the “Learn/Create/Share” cycle of learning employed by a group of low decile schools in Tamaki, Auckland (Jesson et al., 2014). This pedagogy was developed within a cluster of schools and, therefore, reflects the needs of the learners in its community, their learning content, and the technology promoted by Unwin (as cited in Callow & Orlando, 2015). “Learn/Create/Share’ aims for “visible and ubiquitous learning, strong learner agency and connectedness to grow knowledge” (Manaiakalani, n.d., para. 1). This is evident through the cluster’s annual film festivals (Manaiakalani Film Festival, n.d.), community access to the internet, and the provision of digital training enabling parents to participate in students’ online learning (Jesson et al., 2014). This pedagogy, coupled with digital devices, was identified as a tool that could be used “to promote student achievement, increasing student engagement and digital citizenship”
While applicable to different schools, different communities (Burt, 2015) and non-digital contexts, the pedagogy has been developed and implemented by this particular cluster of low-decile schools (Dorothy [screen name], 2015) with a 1:1 learner to device ratio (Hipkins et al., 2015). Hence the digital technology, and the “Learn/Create/Share” pedagogy that guides it, is used to meet the needs of these learners, making the pedagogy responsive to the low-decile school community it is working within, as described by Callow and Orlando (2015).

**Teacher education programmes**

One strategy for supporting the use of digital devices in low-decile schools is teacher education and professional development. Literature highlights the use of both internal (Davis et al., 2015; Overbay et al., 2011; Sheninger, 2013) and external (Sheninger, 2013; Wright, 2017) professional development or support for schools. Wright (2017) comments on the ability of external practitioners to provide insight sometimes not offered by internal practitioners. Two specific programmes that support the professional development of newly graduated teachers in their first two years of service at low-decile schools are Teach First NZ and the Manaiakalani Digital Teacher Academy (MDTA) (Education Gazette editors, 2017; Hipkins et al., 2015). Of these two programmes the MDTA places a high focus on the inclusion of digital devices and digital pedagogy within low-decile primary and secondary schools (Hipkins et al., 2015), whereas the Teach First NZ scheme focuses on tackling the inequality in New Zealand low-decile secondary schools without specific reference to digital devices (Education Gazette editors, 2017). Both of these programmes provided first year teaching experiences that were different from the experiences of teachers at other schools not enrolled in the programmes. These experiences included sharing a class with a mentor, one day a week professional digital learning support (Hipkins et al., 2015), a nine week intensive pre-service programme, reduced teaching time (12 hours a week), and mentoring (Education Gazette editors, 2017). While these two particular programmes were used as strategies to support the development of teachers in low decile schools, only the MDTA targets both low decile schools and digital pedagogy; however, neither of them have supported high numbers of candidates. Another programme supporting in-service teachers from all sectors and deciles is a postgraduate qualification provided through The Mind Lab by Unitec, focusing on equipping teachers to educate students for the current digital world and develop leadership and research within their field (The Mind Lab, 2019). In 2014, MDTA supported ten teachers through its programme (Hipkins et al., 2015), in 2017, the Teach First NZ scheme supported forty-five teachers across secondary schools (Education Gazette editors, 2018), and in 2015, 800 scholarships were awarded to teachers wanting to complete The Mind Lab qualification (Lin, 2016). While
these programmes explore a number of different avenues, there remains a gap in supporting in-service teachers in low-decile schools to develop digital pedagogy and strategies, specially targeted to meet the complex needs of the students in their schools. Within initial teacher education and graduate teacher programmes, there is also a lack of programmes that specifically supporting teachers to develop the necessary skills for teaching in low-decile schools as well as digitally rich environments.

The learners in low socioeconomic areas have a number of complex needs that can be targeted through various strategies. Available literature identified some school level strategies (Fletcher & Nicholas, 2018; Nicholas & Fletcher, 2017; Pohio & Falloon, 2010), cluster wide strategies (Hipkins et al., 2015; Jesson et al., 2014), and teacher education strategies (Hipkins et al., 2015) that utilise digital devices in such schools. Some literature was available on the use of digital devices in these low socioeconomic schools, allowing the commonly used apps and programmes to be identified as creative uses software software (Bishop & Lepou, 2018; Fletcher & Brooks, 2006; Fletcher et al., 2005; Hawke's Bay Today, 2017; Kemker et al., 2007; Manaia Film Festival, n.d.). However, the literature did not discuss the strategies that individual teachers employ in their own classrooms to address or mitigate the issues that students in low socio-economic areas face. Significantly, low-decile (1-3) schools represent 180,119 students in the New Zealand education system (Education Counts, 2019). That is 22.5% of all students (Education Counts, 2019). With 30% of schools falling into the low-decile band (Ministry of Education, 2017g), it is important that research addresses the needs of these learners with reference to digital devices, due to their high use and the introduction of the digital technologies curriculum content (Ministry of Education, 2018b).

**The digital technologies curriculum content**

The digital technologies curriculum content (Ministry of Education, 2018b) is a recent document which began to be implemented in New Zealand schools in early 2018 (Ministry of Education, n.d.-e). Previously *The New Zealand Curriculum* (Ministry of Education, 2007) encouraged the use of eLearning but did not require its inclusion in New Zealand schools (Ministry of Education, 2007), hence this curriculum content is the first curriculum document to require the implementation of digital technologies learning in schools. The new digital technologies curriculum content sits under the technology learning area and is included in two of the five technological areas (see Figure 1) (Ministry of Education, 2018c). The two digital technologies technological areas include *Computational thinking for digital technologies* (Ministry of Education, 2018b,
p. 4) and *Designing and developing digital outcomes* (Ministry of Education, 2018b, p. 4). Both area use “progress outcomes” instead of the “achievement objectives” used in the other three technological areas (Ministry of Education, 2018b).

In Computational thinking for digital technologies, students learn about how computers work, the thinking processes that sit behind them involving algorithms for programming (Ministry of Education, 2018d) and how data or information is represented (Ministry of Education, 2018b). Computational thinking could be described as the ‘inner goings on’ of a computer. At various levels this includes simple directional language (Ministry of Education, 2017b) and the evaluation of complex ideas such as “network communication protocols, artificial intelligence, graphics and visual computing, big data, social algorithms” (Ministry of Education, 2017d, p. 12). When aligned with the levels of *The New Zealand Curriculum* (Ministry of Education, 2007), the first progress outcome in this technological area sits towards the end of level 1 (see Figure 2). This positioning is earlier than the Designing and developing digital outcomes progress outcome which sits further on in the curriculum levels (Ministry of Education, n.d.-b, n.d.-a).

![Figure 2. Structure of the technology learning area (Ministry of Education, 2018d).](image)
Designing and developing digital outcomes is largely focused on using computers or digital devices as tools to create an outcome (Ministry of Education, 2018d). At various levels, students are required to “develop, manipulate, store, retrieve and share digital content” (Ministry of Education, 2017d, p. 13). As they progress, students develop their understandings and abilities for scrutinising their choice of tools, discerning the most suitable tool for their task and the risk and responsibilities of being creators of digital content (Ministry of Education, 2018d). The first progress outcome is aligned in the middle of level 2 of *The New Zealand Curriculum* (see Figure 3) (Ministry of Education, n.d.-b, 2007a), thus this content is taught once students have already established an understanding of Computational thinking for digital technologies (see Figure 2) (Ministry of Education, n.d.-a).

With the submissions on the draft digital technologies curriculum content open from mid 2017 (Education.govt.nz, 2017), the confirmed curriculum content released in December 2017 (Ministry of Education, n.d.-f), and beginning to be implemented from 2018 (Ministry of Education, n.d.-f), there is minimal academic literature focusing on the curriculum content. Only one scholarly
article that specifically explores the digital technologies curriculum content (Parsons et al., 2018) was locatable. In this article, Parsons et al., (2018) examine the content of the entitlement and specialist sections of the digital technologies curriculum content (Ministry of Education, 2018b) and largely discuss digital fluency within it (Parsons et al., 2018), up to year 13. In particular, it discusses the curriculum’s content (Parsons et al., 2018) and does not address teachers’ perceptions or current knowledge.

While there is only one locatable scholarly article on the digital technologies curriculum content (Ministry of Education, 2018d), there is a considerable body of literature that focuses on change management, leadership in education or the implementation of digital technologies (Davis et al., 2015; Flanagan & Jacobsen, 2003; Glazer et al., 2009; Larson et al., 2009; Mackey et al., 2015; McLeod, 2015; Overbay et al., 2011; Seong & Ho, 2012; Sheninger, 2013; Yuen et al., 2003). This provides an informative overview of the elements required to successfully integrate the digital technologies curriculum content (Ministry of Education, 2018b) into a school. These elements include the valuing of teachers and respectful relationships, school culture, vision for technology use, professional development and leadership.

**Valuing teachers**

In order to achieve change in terms of implementing the digital technologies curriculum content in a school (Ministry of Education, 2018b), it is important to develop a culture that values teachers. In technology implementation, there is a temptation to focus only on the technology; however, “technology initiatives are about people—the people who plan with, teach with, and learn with the technology” (Overbay, Mollette, & Vasu, 2011, p.56). According to Sheninger (2013), technology is only a tool. Its “true value... rests on how it is used to support learning and to create experiences that students find meaningful and relevant” (Sheninger, 2013, p.62). Therefore, as part of a school’s culture, teachers must be valued and viewed as more important than the technology, and in this case, teachers must be valued and viewed as more important than the concepts of the digital technologies curriculum content (Ministry of Education, 2018b). This is because it is their responsibility to implement the curriculum content within their classrooms (Overbay et al., 2011). Literature highlights that valuing teachers and viewing them as leaders could include consulting with teachers to ensure that their voices are heard (Overbay et al., 2011), involving them in decision making processes (Ely, 1990), and establishing trusting, respectful relationships between teachers, principals, leaders, and the Boards of Trustees in schools (Davis et al., 2015; Mackey et al., 2015; Yuen et al., 2003). The valuing of teachers as people is arguably a crucial concept that resonates
well with Māori and New Zealand culture, as illustrated in the well known Māori whakataukī which asks, ‘he aha te mea nui o te ao? He tāngata, he tāngata, he tāngata.’ ‘What is the most important thing in the world? It is people, it is people, it is people’ (Te Aupouri whakatauki). The importance of valuing people illustrated in this whakataukī and highlighted in the literature can be applied to teachers and management in schools. The valuing of staff signals the trust and respect leadership teams have for teachers’ knowledge and expertise, aiding leaders to manage change for the digital technologies curriculum content (Ministry of Education, 2018b).

**Trust leading to risk-taking**

Throughout literature, a culture of risk-taking, supported by trust in various ways, emerged as an important theme across educational change management and technology integration studies (Mackey et al., 2015; McLeod, 2015; Seong & Ho, 2012; Yuen et al., 2003). Relationships built on trust lead to a capacity for teachers to try out new ideas (Mackey et al., 2015) and take risks. In one case study, different levels of leadership worked together to encourage innovation (Seong & Ho, 2012). In this school, the senior leadership team fostered a risk-taking culture which partnered with skills development provided by the middle leadership team (Seong & Ho, 2012). These two ideas of risk-taking and professional learning are also linked by Mackey et al. (2015) stating that, in their study, “teachers’ willingness to learn and explore new technologies and associated pedagogies was intertwined with the characteristics of trust, mutual respect, and an understanding that risk taking was encouraged and supported” (p.21). The development of a risk-taking culture removes fear, freeing teachers to innovate as described by Sheninger (2013). The theme of creating a risk-taking culture is woven throughout literature where technology has been successfully integrated into classrooms, affirming it as “perhaps [the] most important” (McLeod, 2015, p.52) and necessary component of the implementation of the digital technologies curriculum content (Ministry of Education, 2018b). Thus it is imperative that leadership teams consider how to develop this culture that is conducive to change within their schools, throughout the implementation process.

**A vision for digital device use**

Another important component of technology integration identified in the research was a vision and teachers’ ownership of it. It is necessary to have a vision for the use of digital technology (McLeod, 2015) that is consistent across curriculum areas as noted by Larson, Miller, and Ribble (2009) in a practitioner journal. Researchers agree that the co-creation of a vision where stakeholders such as teachers, the community, principal, and Board of Trustees have input is
necessary (Flanagan & Jacobsen, 2003; Larson et al., 2009; McLeod, 2015; Sheninger, 2013). McLeod (2015) identifies co-created visions as evident in schools where technology has been successfully implemented. In Davis et al. (2015), teachers’ invitation to have their voice heard and input into creating a vision gave ownership, which is required to maintain momentum (Larson et al., 2009). In the Davis et al. (2015) case study, staff were trusted to innovate, provided these innovations aligned with the vision of eLearning, which is possible when staff are familiar with the vision, ensuring that the school’s goals are being worked towards. Other studies have identified that without this shared understanding through the school’s vision, there is a lack of direction. As a result, teachers have to navigate the technological landscape themselves (Larson et al., 2009) and similarly, without a vision from the principal there is a negative impact on the integration of technology (Wang, 2010).

At a New Zealand summit of educational leaders, the recent changes to The New Zealand Curriculum (Ministry of Education, 2007a) and important considerations for the inclusion of computational thinking in schools were discussed (New Zealand Technology Industry Association, 2016). The leaders identified a need for a vision that is shared across all levels of the education sector in order to convey a message of importance (New Zealand Technology Industry Association, 2016). In addition to this, they identified that it is important that schools develop their own unique visions relevant to their school’s needs (New Zealand Technology Industry Association, 2016). This includes all stakeholders, in particular teachers, in the co-creation of a school’s technology vision, giving ownership and momentum to the implementation (New Zealand Technology Industry Association, 2016).

A number of aspects necessary to include in a school’s vision of digital technology were identified by researchers such as the inclusion of “what transformative uses of technology might look like ... [and] a shared understanding of and commitment to what it will take to get to such a place” (McLeod, 2015, p.52). Also identified was a space for critical discussions about freedoms and restrictions (Larson et al., 2009), the addressing of issues before they arise (Larson et al., 2009), analysis of the school’s current state and responses to this (Larson et al., 2009), and integration into other curriculum areas (Larson et al., 2009). Osborne (2014) comments on the need for “a purpose to believe in” (p. 6) found throughout the school’s vision which was able to support staff to invest in technological change. Sheninger (2013) also identifies the importance of a vision leading to the creation of a plan. This allows stakeholders to understand how the vision will be carried out within the school. The importance of an implementation plan that is unique to the
school and its needs (Overbay et al., 2011) can also be applied to the vision throughout its co-creation.

**Professional development**

The need for professional development to support digital change and implementation was a key theme that emerged within research. According to Larson et al. (2009), professional development should match and support the vision created by the school. New Zealand educational leaders also identify that the pedagogical implications of the digital technologies curriculum content (Ministry of Education, 2018b) need to be explored as part of professional development, including the literature, knowledge, and skills based aspects of technology integration (New Zealand Technology Industry Association, 2016). In one research project, eleven out of eighteen schools in the study focused on issues such as “technological infrastructure, organisational structure and teachers’ technical skills” (Yuen et al., 2003, p.164), which Ertmer (1999) identifies as first-order barriers. Within these schools, the most important aspect of the technology integration model identified was the focus on the development of teachers’ digital skills (Yuen et al., 2003). In contrast, New Zealand educational leaders have noted that while digital skills are necessary, a “deeper knowledge of how to introduce technology from a pedagogical perspective; that is, the theory and practice of how best to teach” is also required (New Zealand Technology Industry Association, 2016, p.4). The deepening of knowledge and pedagogy can be accomplished through “opportunities to study, observe, reflect, and discuss their practice” (Flanagan & Jacobsen, 2003, p.128). This understanding that professional development needs to engage teachers in more than just the development of digital skills can be accomplished through a range of different actions.

Throughout case studies, there were a number of variations in the ways that professional development successfully supported teachers to integrate digital technologies or digital initiatives into their classrooms. In some case studies, professional development was provided by both school staff and outside agencies (Sheninger, 2013) and middle management leaders (Seong & Ho, 2012). In some studies the platforms used for professional learning were supported through online avenues (Mirriahi et al., 2015), face to face workshops (Sheffield et al., 2018) or scheduled meetings for the purpose of planning (Glazer et al., 2009). At one university, staff were given the opportunity to choose one of three different professional development courses that would best suit their needs (Mirriahi et al., 2015). This university also included a number of supporting elements or resources throughout its professional development such as videos, discussions, examples, critiques, reflections, and relevant materials (Mirriahi et al., 2015). In another case study
teachers engaged in using the very tools they were learning to implement in meaningful and authentic ways (Davis et al., 2015). Support for teachers in one research project found that the different types of assistance changed throughout the year (Glazer et al., 2009), with support moving from a large amount of modelling which decreased and eventually moved into assessing teacher’s practice where curriculum, standards, and the effect of the teacher (Glazer et al., 2009). In this particular study, it was noted that the interactions during planning meetings included “posing and responding to task-based questions, giving and seeking advice, and sharing ideas” (Glazer et al., 2009, p.31). In summary, as identified in research, there are a number of ways that professional development can be provided for teachers when managing technological change within a school. As previously discussed, it is important that these actions focus on pedagogical learning as well as digital skills (New Zealand Technology Industry Association, 2016) for successful implementation.

**Leadership**

Within the educational research on digital change management, the importance of leadership frequently appears. In an article based on one participant’s experiences, through narrative analysis the researcher identified that “technology-integration cannot succeed in the absence of effective technology leadership by the principal” (Wang, 2010, p.53). This view is supported by Flanagan and Jacobsen (2003) who explain that principals who do not have experience with digital technology in classrooms are not equipped to effectively lead their schools through technological change. As a result of ill-equipped principals, these schools have struggled with their “human and technical resources” (Flanagan & Jacobsen, 2003, p.127) during this shift in practice. This finding is also supported by educational leaders in New Zealand (New Zealand Technology Industry Association, 2016). The importance of “role models at every level [that] must “walk the talk” ” are highlighted by Osborne (2014, p.7), who goes on to suggest that “change is far more likely to be successful if people throughout the school see the principal ... operating in a manner consistent with the values of the change” (p.7). Evidently, leadership has a large role in digital change.

In one case study a school had success throughout technology integration by distributing leadership across different levels of management and, as a result, the principal and senior leadership team were able to work alongside the middle management team to support teachers in a number of ways (Seong & Ho, 2012). This was evident in senior management’s role of influencing school culture as well as empowering and motivating teachers to innovate, and middle management’s role in providing instruction for teachers to develop their pedagogy and skills
(Seong & Ho, 2012). This use of leadership distributed across different levels of school management is also identified as necessary by Ely (1990). The theme of leadership reoccurs throughout change management literature highlighting its influence on the implementation of technology. As McLeod (2015) states, “in the end ... it’s about robust, visionary instructional leadership” (p.56) in order for technological change to happen.

There are a number of elements that impact on the success of digital device integration and digital change management in schools, as shown in the discussed literature. However, the need to implement the digital technologies curriculum content (Ministry of Education, 2018b) from 2018 (Ministry of Education, n.d.-f) has highlighted a gap in the research that focuses on the integration of this particular content in schools. While international research provides insight into the successful strategies for educational change management and technology integration within schools, there is little research specific to the New Zealand context. As a result, researchers are unable to draw conclusions about the current trends in professional development needs for teachers and schools when specifically supporting the implementation of the digital technologies curriculum content (Ministry of Education, 2018b).

**Conclusion**

This literature review has explored the educational literature on digital devices, with specific reference to teachers’ perceptions, strategies for their use within schools in low socio-economic areas; and change management or digital implementation within schools. Emergent themes in the academic and non-academic literature include the relationship between teachers’ perceptions and how devices are used within classrooms, home, school, and community initiatives, and the role of valuing teachers, leadership, and professional development within educational change management.

There remains a gap in the literature that explores teachers’ perceptions of digital devices with a focus on the issues commonly found in diverse decile 1 schools impacting on students’ use of digital devices. In addition to this, the strategies these teachers employ to address or mitigate the issues that arise within this context are not well researched. The recent introduction of the digital technologies curriculum content (Ministry of Education, 2018b) will require recommendations formed through research that are specific to the current needs of New Zealand teachers to support its implementation.
The need for research based in low-decile primary schools in New Zealand which explores teachers’ perceptions of digital devices, strategies for their use, and change management for the implementation of the digital technologies curriculum content (Ministry of Education, 2018b) has been highlighted and justified throughout this review of the current available educational literature.
Chapter 3: Methodology and Methods

Introduction
This qualitative research project aims to describe the “lived realit[ies]” (Mutch, 2014, p. 62) of teachers in diverse decile 1 communities and draws on the perspectives gained in regards to the new digital technologies curriculum content (Ministry of Education, 2018b). This was achieved through the collection of data using interviews and questionnaires and in utilising thematic analysis and some descriptive statistical analysis. This chapter identifies, discusses, and justifies the research approach, design, and methods used in this project.

Research aims:
1. To explore teachers’ perceptions on teaching with digital devices in a diverse decile 1 environment.

2. To identify the impact of the digital technologies curriculum content and the use of digital devices in The New Zealand Curriculum within diverse decile 1 schools.

Research questions:
1. How do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?

2. What are the current strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?

3. What do teachers in diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating the new digital technologies curriculum content in the technology learning area of The New Zealand Curriculum into their practice?

4. What are some recommendations for schools in diverse decile 1 communities when supporting The New Zealand Curriculum with digital devices and implementing the digital technologies curriculum content?

Purpose of research
The research aims and questions of this project address two purposes; descriptive and interpretive forms of research. According to Gray (2014) "descriptive studies seek to 'draw a picture' of a situation, persona or event" (p. 36), that is, to “describe a phenomenon in detail” (Mutch, 2014, p.
This research project aims to discover what the use of digital devices looks like in diverse decile 1 schools, to “draw a picture” (Gray, 2014, p. 36) of the day to day happenings, considerations, and strategies that teachers use throughout their practice. The descriptive purpose of this research study is blended with an interpretive purpose whereby the researcher aims to “explore peoples’ [teachers’] experiences” (Gray, 2014, p. 37) in regards to ‘what works’ and ‘what does not’ when teaching and utilising digital devices, in diverse decile 1 communities, as well as integrating the new digital technologies curriculum content (Ministry of Education, 2018b) into schools. The descriptive and interpretive purposes of this research are fulfilled using an inductive approach that has gathered data using interviews and questionnaires.

**Inductive approach**

An inductive approach begins with the data and the identification of patterns that emerge across the dataset (Gray, 2014). This approach complements a qualitative methodology as the analysis begins with the data, letting it ‘speak for itself’, revealing its key messages (Creswell, 2014). This is in contrast to a deductive approach which identifies whether the data has proven or disproven a hypothesis (Gray, 2014). In an inductive approach to research, researchers discover unprecedented themes due to the collection methods, such as interviews or focus groups. This approach suits the aims of this research project as it is concerned with perceptions of impact, strategies, and advantages, which would be limited by a deductive approach.

**Qualitative methodology**

Qualitative research aims to develop a deep understanding of a topic through people, their experiences, opinions and views (Merriam & Tisdell, 2015). This results in data that displays trends that inform the researcher’s understandings (Creswell, 2014). The data gathered in qualitative research is usually recorded through language, as opposed to numbers, in quantitative studies (Braun & Clarke, 2013). Through the sharing of people’s experiences, opinions, and views, the qualitative data ‘speaks’, ‘painting a picture’ of the topic and revealing new understandings for the researcher (Mutch, 2014). Methods of data collection, such as observations, interviews, documents, and audio-visual resources (Creswell, 2014), are used in qualitative research. After analysis, this data reveals a number of themes across the sets of data. A qualitative methodology suits research where the research is concerned with understanding the area of focus (Braun & Clarke, 2013).
A qualitative methodology was selected for this research project as it aimed to explore the perceptions held by teachers on the use of digital devices in classrooms and *The New Zealand Curriculum* (Ministry of Education, 2007), as well as the digital technologies curriculum content (Ministry of Education, 2018b). It also aimed to identify the impact that these perceptions have on their practice. Perceptions are to do with understandings, and therefore a qualitative methodology is appropriate (Creswell, 2014). Interviews and questionnaires were selected as qualitative methods of data collection which were used to ‘paint a picture’ of teachers’ experiences and perceptions. These methods facilitated drawing conclusions of teachers’ perceptions held around the use of digital devices in diverse, decile 1 environments, the strategies they use, and the advantages and challenges the digital technologies curriculum content (Ministry of Education, 2018d) brings to classrooms, addressing the aims of the research project (Mutch, 2014). This led to the development of recommendations for a number of audiences.

**Culturally responsive practice**

Mutch (2014) describes the need for researchers to identify their own backgrounds due to the influence their backgrounds have on their understanding of the world. This is especially important as researchers’ backgrounds are likely to be different from the participants and subjects of their research.

I am a European-Chinese woman in my twenties, who has taught at decile 1-2 school for the past seven years. The education I experienced was in high decile schools, in a different area from where I now teach. My own experiences of education are rooted in a different time when digitalisation was not as prevalent as it is in the lives of today’s students.

After describing her own background, Mutch states “this is the only position I can speak from” (2014, p. 67). As a researcher, I recognise that my own experiences and world view have been shaped by my own cultural, economic, and educational backgrounds, and this impacts on my interpretation and view of situations.

It was not possible to predict the cultural and ethnic backgrounds of the participants that would participate in the research project. However, using knowledge gained from the 2013 Census, it was possible to ascertain the major groups of people the research would impact on. From this, the implications of culturally responsive practice with people who represent the major cultural and ethnic groups in the research area could be further explored. In 2013, in South Auckland, there were large numbers of Pacific, Māori, Asian, and European ethnicities (Stats NZ, n.d.-f, n.d.-b, n.d.-d, 2013a, 2013b). As a result of the cultural and ethnic diversity in the research area, it was appropriate to seek out consultation on culturally responsive research practices. Thus
representatives from the Māori, Tongan, Samoan, and Indian communities were met with. Each of these representatives were teachers at the researcher’s school. All representatives met at the same time and discussed their views, using their cultural knowledge to guide them.

At the initial meeting, the cultural representatives discussed the recruitment email for participants, the Participant Information Sheets for the interviews and questionnaires (see Appendix C and G), and the Participant Consent Forms for the interviews and questionnaires (see Appendix D and H). The researcher also asked the cultural representatives about the setting of the interviews, dress code for the interviewer, and the use of language and its comprehensibility for the participants.

The cultural representatives suggested that the participant recruitment emails start with a greeting that reflected a range of languages and consequently ‘Kia ora, Malō e lelei, Talofa lava, and Namaste’ were added to the emails. They also suggested that the closing of the emails also include ‘Mauri ora, Faka’apa’apa atu, Faafetai lava, and Dhanyawaad’.

Due to the historical implications of research, there is tension between Māori, research, and researchers (Tuhiwai Smith, 1999). Māori knowledge is highly valued by Māori and, thus, must be recognised by researchers as “legitimate knowledge” (Tuhiwai Smith, 1999, p. 285) regardless of researchers’ cultural backgrounds. Tuhiwai Smith (1999) discusses research as “defining legitimate knowledge” (p. 285), which can result in the “stripping away of mana… and undermining of rangatiratanga.” Consequently, knowledge provided by Māori, about Māori, must be valued and viewed as legitimate knowledge by researchers. Historical delegitimising of Māori knowledge may contribute to feelings within this research project that the researcher is superior to the participants when instead it is the participants who hold the knowledge. Actions to address similar feelings or situations were suggested by a cultural representative.

One of the representatives suggested that the researcher use language that places her on the ‘same level’ as the participants. The term “my fellow colleagues” instead of just “teachers” was recommended which reflected the desired mutually beneficial relationship between participants and researchers. The cultural representatives suggested that the researcher continue to dress the same way as a teacher when meeting with the teacher participants to encourage the notion that the researcher is a colleague, not just a researcher. The cultural representatives agreed with the researcher that meeting at the participants’ worksites was appropriate as it encouraged the
participants to feel comfortable during the interview. They also noted that it conveyed the formal nature of the research.

The cultural representatives agreed that the participant information sheets and consent forms were easily comprehensible and that, in the case of the interviews, the participants had the opportunity to ask the researcher questions during the interview so that they were of an accessible nature.

At the completion of this research project, the conclusions, recommendations, and implications for future research as a result of the findings of this project were presented to the cultural representatives, who gave feedback on their cultural appropriacy. The cultural representatives agreed they were culturally appropriate and were especially positive about particular findings that were acknowledged.

**Methods of data collection**

The qualitative nature of this research project leans itself towards methods of data collection that encourages participants to share their perspectives, opinions and experiences. It was thought that the method of interviews would provide the best opportunity for the researcher to gain an in-depth understanding of the participants’ “lived realities” (Mutch, 2014, p. 62). Semi-structured interviews were selected so the researcher was able to respond to the answers provided by the participants, prompting them for more detail when required. This data was analysed through thematic analysis. The use of questionnaires was selected as a data collection method to expand the reach of the research project and strengthen the data and its reliability. Questionnaires, while usually used in quantitative studies, were designed in this case to be of a qualitative nature where the participants’ perspectives and experiences were drawn out through carefully designed questions similar to the questions used in the interviews (Creswell, 2014). In some questions, a Likert scale was used as a measure of how important an idea was to the participants, contributing to the qualitative database. This particular data was quantitatively analysed using descriptive statistical analysis and presented using graphs and tables but, overall, contributed to the qualitative nature of the research project.

**Questionnaires**

Gray (2014) describes questionnaires as “research tools through which people are asked to respond to the same set of questions in a pre-determined order” (p. 252). Questionnaires are useful tools for surveying large numbers of people across a large geographical area, due to their dissemination
possibilities through post or online services (Bourque & Fielder, 2011). The information gathered in questionnaires can include qualitative data such as perspectives and beliefs (Hesse, Hesse, & Hesse, 2017), or quantitative data involving numbers (Mutch, 2014) depending on the types of questions that are asked. Throughout literature, there appears to be some variance in how the terms ‘questionnaire’ and ‘survey’ are used. In this research project, the term questionnaire refers to the paper or online copy of a set of questions that a participant responds to using writing in order for a researcher to collect data (Hesse et al., 2017). The term survey refers to the type of research that gathers data from a group of people that represents a population (Creswell, 2014). From this definition, it can be determined that questionnaires gather data for research that surveys a group of people.

Questionnaires can be administered in a number of ways, supervised, semi-supervised, and unsupervised. Unsupervised questionnaires are emailed to participants or posted in the mail and are completed without supervision from the researcher and, are instead, self-administered by the participant (Bourque & Fielder, 2011). This quality allows the researcher to survey a range of participants from a wide area who, due to financial barriers, may not otherwise have been possible if the data collection method had required face-to-face meetings (Bourque & Fielder, 2011). The unsupervised nature of online questionnaires requires the content to be easily understood by the participants (Hinds, as cited in Mutch, 2014) and the researcher must rely on the participants to make contact to clarify any questions they may have (Bourque & Fielder, 2011). This may become a barrier to participation and, consequently, the questionnaire must be carefully designed (Bourque & Fielder, 2011). For the purposes of this research project, unsupervised questionnaires were selected as a low cost research method with the potential to reach a wider group of participants, strengthening the overall data collected by the researcher.

The questionnaires were created online using Qualtrics, a secure survey website. Invitations to participate in the questionnaires were emailed to all principals of decile 1 schools in Auckland, who were then asked to forward the email onto their staff. The number of possible participants had the potential to be very high. To manage this, a maximum of 50 questionnaires were randomly selected to be included in the research project. Of all the submitted questionnaire responses, the researcher intended to use up to 50 that were randomly selected using an online random number generator to be included in the research project. However, there were less than 50 responses and a random number generator was not required. This number was chosen as a big enough sample size to represent a number of views but is also a manageable size for a Master’s thesis.
Questionnaire recruitment process

All decile 1 schools in Auckland were approached to participate in the questionnaire. At the beginning of March 2018, the researcher emailed the principals of all decile 1 schools in Auckland, requesting that they forward an email onto their staff (see Appendix F). This email was used to recruit participants. It contained a description of the research, the Participant Information Sheet (see Appendix G), and a link to the online questionnaire. Participant Consent Forms were not included in this email as they were built into the questions of the online questionnaire (see Appendix H). Participants who were interested in participating in the questionnaire were asked to follow the link which enabled them to continue onto complete the questionnaire unsupervised. The first section of the questionnaire was the inclusion criteria for participants, any participants whose answers did not fit the criteria were excluded from the research by being automatically prompted to submit their questionnaire after this point. Participants who met the inclusion criteria advanced to the second section, which included the Participant Information Sheet and Participant Consent Form (see Appendix G and Appendix H). If they indicated their consent to participate, continued onto the third data gathering section of the questionnaire.

Questionnaire participant selection

The researcher attempted to approach all full and contributing decile 1 primary school principals in Auckland, with the exception of one school due to human error. Separate intermediate schools were not included approached for participation, however full primary schools were included. Principals were approached through email for teacher participation in the online questionnaire (see Appendix F), although some principals were uncontactable. Only the researcher’s school was excluded from participating for ethical reasons. While the researcher attempted to contact all principals, some principals’ email addresses were unattainable. In the researcher’s recruitment email, principals were asked to forward the email including the Participant Information Sheet (see Appendix G) and a link to the online questionnaire to their teaching staff. In the email, it was made clear that teachers could make their own decisions about participation. As not all principals
replied to the researcher's request, it is unknown how many principals forwarded the email onto their teaching staff.

The recruitment email was also sent to schools where the interview participants were teaching. Due to the anonymity of the questionnaires, it is unknown whether any interview participants also participated in the questionnaire.

The questionnaire was designed to exclude participants who did not fit the inclusion criteria through their answers to the initial questions. There were a total of twenty participants who began the online questionnaire; however, a number of participants were not eligible to participate in the research due to various reasons, such as not fitting the inclusion criteria. A total of nine participants were disqualified from the dataset, leaving a total of eleven completed questionnaires included in the dataset that were analysed as part of this research project (n=11).

**Questionnaire structure**

The questionnaires were divided into five sections as described in the questionnaire schedule (see Appendix J). This schedule is different from the layout of the online questionnaires due to the online website used, although, the content remains the same. These sections included inclusion criteria, Participant Information Sheet and Participant Consent Form (see Appendix G and Appendix H), contextual questions, questions relating to the research questions, and conclusion. The inclusion criteria section asked three closed ‘yes’ or ‘no’ response questions. The inclusion criteria ensured that participants were currently teaching as a classroom teacher in a decile 1 school in Auckland and that they used digital devices in their classrooms as part of students’ learning. If the participants clicked ‘yes’ to all three questions, they proceeded to the next part of the questionnaire. If they answered ‘no’, they were automatically prompted to submit their responses and end their participation in the questionnaire. Any ‘no’ answers indicated the participants’ unsuitability for participation in the research project as they did not fit the inclusion criteria. If participants proceeded, they moved on to the Participant Information Sheet (see Appendix G) and Consent Forms (see Appendix H) section. In this section, the participants were able to read the Participant Information Sheet (see Appendix G) and then move on to six statements that they were asked to respond with ‘yes’ or ‘no’ for. These questions acted as the Participant Consent Form (see Appendix H). Participants were unable to sign the form due to the anonymity of the questionnaire and its online nature, so an indication of ‘yes’ for each of the statements was used as a confirmation of consent. If participants indicated ‘yes’ for each of the statements they moved
on to the contextual questions section where the participants were asked four questions to build an understanding of the environment they taught in. The fourth section included fourteen questions that were specifically based on the research questions. Of these fourteen questions, seven were ordinal scale questions where participants were asked to rank a statement on a Likert scale. One was a ranking question, which asked participants to sequence a number of suggestions in order of importance. The remaining six questions required participants to answer using a written response. This included three open-ended questions, two ‘list’ questions, and one question that asked the participants to make any final comments they wished to include in their questionnaire. At the end of the data collection period, the responses were thematically analysed and, in the case of the seven ordinal scale questions and one ranking question, descriptive statistical analysis was applied, as detailed in the analysis section of this chapter.

**Interviews**

(Gray, 2014) describes interviews as “a verbal exchange in which one person, the interviewer, attempts to acquire information from and gain an understanding of another person, the interviewee” (p. 382). These exchanges provide the interviewer with information that relates to ideas, experiences, and perspectives on a particular topic that the interviewer has selected and are used to steer the conversation (Braun & Clarke, 2013; Gray, 2014). Interviews are a commonly used method of data collection for quantitative and qualitative methodologies as the flexibility in the style of questioning allows for different outcomes to be achieved (Mutch, 2014). Cohn and Manion (as cited in Mutch, 2014) identify three uses of interviews: the gathering of information, testing of hypotheses, and to strengthen the purpose of other methods.

There are three styles of questioning used in interviews: structured, semi-structured, and unstructured (Mutch, 2014). In a structured interview, the same predetermined questions are asked to all the participants (Gray, 2014). For a semi-structured interview there are predetermined questions and topics for discussion, however, there is flexibility in which questions and topics are used or omitted, as well as the addition of new questions that are responsive to the topics that have arisen (Gray, 2014). An unstructured interview has one discussion topic or question to commence the interview and, as a result, the participant is able to shape the interview themselves (Mutch, 2014).

Interviewing is a complex task that requires a number of skills that are employed throughout the interview, often at the same time. These skills include encouraging participants to talk freely.
(Braun & Clarke, 2013), maintaining composure throughout disagreement with ideas or offensive comments, controlling the conversation (dependent on the type of interview), note taking, observation of body language, responsiveness to answers, and active listening (Braun & Clarke, 2013; Gray, 2014). The use of these skills helps the researcher to obtain quality data from the participant. Due to their ability to explore perceptions and beliefs and provide the flexibility necessary to delve deeper into unforeseen topics that may emerge through discussion, qualitative semi-structured interviews were selected as the main method of data collection for this research project.

**Semi-structured interviews**

In a semi-structured interview, the interviewer has predetermined the questions and discussion topic, however, responds to the participants’ dialogue by modifying, deleting and adding questions in order to suit the direction of the interview (Gray, 2014). This approach facilitates the collection of rich data through the “probing of views and opinions where it is desirable for respondents to expand on their answers” (Gray, 2014, p. 366). Semi-structured interviews elicit a wide range of answers to questions due to the open style of questioning (Ayres, 2012), contributing to the in-depth understanding that the researcher is aiming to gain through this qualitative method of data collection. Open questions do not elicit a one-word response but, instead, invite the participant to give a detailed answer and to explain their thinking. This is achieved through the keywords ‘who’, ‘what’, ‘where’, ‘when’, ‘why’, and ‘how’ rather than, ‘can’ or ‘does’, which tend to produce one-word responses such as ‘yes’ or ‘no’. Consequently, open questions were used in the semi-structured interviews due to their ability to produce abundant information. For these reasons, the use of semi-structured interviews was employed as the style of interview as they fit the aim of the research project and provided the best opportunity to gather in depth and wide-ranging data on teacher perceptions.

**Talanoa**

“Talanoa’ is the Pasifika process, described as ‘‘‘tala’ which means to tell or to talk, and ‘noa’ which means anything or nothing in particular’” (Otunuku, as quoted in Faavae, Jones, & Manu’atu, 2016, p. 140). Talanoa is practised in a number of Pacific nations, including Samoa and Tonga (Prescott, 2008), two of the major cultural and ethnic groups affected by this research project. Consequently, talanoa was taken into consideration when designing the research process. The process of talanoa can take many hours and requires a strong relationship between the researcher and the participant.
(Faavae et al., 2016). It also requires an open ended and unstructured conversation that has little direction by the researcher (Faavae et al., 2016).

One value associated with talanoa discussed by Prescott (2008), is an “underlying trust relationship” (p.130). This value influenced this project throughout different stages of the research process. The researcher began to build trust during the semi-structured interviews by introducing herself first and then asking the participant about themselves. A focus on building trust was continued over time through the reassurance of the confidential nature of the participants’ responses and the transcription process, the opportunity for the participant to approve the transcription, and the transparency and willingness of the researcher to answer questions about the research through the Participant Information Sheets (see Appendix C) and at the beginning of the interview. While this trusting relationship associated with talanoa cannot be ‘achieved’ as such, but rather developed and built upon, the researcher attempted to build their relationship with the participants throughout the research process. This building of trust indicated the researcher’s commitment to maintaining a collegial relationship with the participants as appropriate within the bounds of the research project and the teaching profession.

As previously discussed, the process of talanoa can take many hours and requires a lot of time for an open ended, unstructured conversation with little direction from the researcher (Faavae et al., 2016). Due to the number of interview participants involved in this research project and the time available for the part time researcher-full time teacher to complete the data collection, talanoa was not able to be selected as a method of data collection. However, the significant aspect of building a trust relationship as highlighted in a ‘talanoa’ approach was drawn upon throughout the research process.

**Interview recruitment process: Schools**
The researcher aimed to recruit five decile 1 (full or contributing) primary schools in South Auckland for participation in the semi-structured interviews. Twelve schools were approached for permission to conduct research with their staff on site. These schools were contacted using an email to the school’s principal (see Appendix A). This email (see Appendix A) briefly explained
the focus of the research project, the commitment required for participation, and an invitation to contact the researcher with any questions.

For some of these schools, the researcher called their school offices to find out the best way to contact the principals; however, in all of these cases, email was suggested. Originally, schools were approached between October and December 2017 however, only three schools consented to their involvement. Later the search for schools was expanded, and other schools were approached for recruitment in February 2018. Of the twelve approached schools, six agreed to participate in the research. Five did not reply to the researcher’s request, and one indicated that they were unable to participate. One school, the researcher’s own school was removed from the project due to ethical issues including the bias created by using participants who knew the researcher. Principals of the five schools in South Auckland who indicated that their school would participate in the research completed the organisation consent forms, agreeing that the interviews could be conducted on-site at their schools. These forms were then returned to the researcher.

**Interview recruitment process: Participants**

On the 4th of April 2018, the researcher emailed the principals of the schools that had agreed to participate in the research requesting that they forward a participant recruitment email onto their teaching staff (see Appendix B). From these schools, the researcher attempted to recruit two participants each, totalling ten participants across the five schools (n=10). This email contained a brief introduction about the researcher, a description of the research, an outline the commitment required for participation, the Participant Information Sheet (see Appendix C) and Consent Form (see Appendix D). Teachers who were interested in participating in the research were asked to register their interest by clicking on a Survey Monkey link. This Survey Monkey form requested participants’ contact details and school name. It also asked questions relating to the inclusion criteria, and a statement acknowledging their understanding that they may be selected to participate in the research project. The inclusion criteria ensured that participants were currently teaching as a classroom teacher in one of the selected decile 1 schools in South Auckland and that they used digital devices in their classrooms as part of students’ learning.

**Interview participant selection**

Potential participants who registered their interest to participate in the research went through a selection process that the researcher managed using the information they had provided and a
random selection process. All participants who registered their interest in participating fit the inclusion criteria.

One school had two participants register their interest; therefore, both participants were automatically selected to participate. At some schools, there were fewer than two participants who registered their interest in participation and consequently, the researcher asked the principals to resend the recruitment email to their staff. For some schools there remained fewer than two participants after this action. Three schools had only one participant register their interest, and as a result, all three participants were automatically selected to take part in the semi-structured interviews. One school exceeded the number of participants required, with three participants registering their interest. Each of these participants was assigned a number and an online random number generator was used to select the participants for participation in the research. A total of eight interview participants were recruited to participate in the semi-structured interviews, despite the researcher aiming for a total of ten interview participants (n=8/10).

After this, participants were informed of their selection, and non-participants were also informed that they had not been selected. Interviews were set-up with participants at their work sites between March and May 2018.

**Interview structure**

The interviews were divided into four sections, as described in the interview schedule (see Appendix I); the introduction, contextual questions, questions relating to the research questions, and conclusion. The introduction section was used to establish a relationship with the participant. Up until this point communication had been via email or over the phone. The interviewer introduced herself, and briefly talked about the research aims, confidentiality, her approach and gave the participant opportunity to ask questions, building trust between the interviewer and interviewee in accordance with the trust value underpinning talanoa (Prescott, 2008). In the contextual questions section, the researcher asked four questions that helped build an understanding of the environment that the participant teaches in. The majority of the interview was focused on the questions section, in which the interviewer had predetermined eleven open ended questions that specifically targeted the information required to answer the research questions relating to the research aims. Due to the semi-structured nature of the interview, the researcher was able to prompt the participants to explain their ideas in detail where their meaning was unclear, or to provide more information when a concept was not common (Gray, 2014).
the conclusion section, the interviewer thanked the participant, reminded them of the transcription process going forward, and ended the interview.

The semi-structured interviews were held on-site at participants’ places of work in order to make participants feel comfortable throughout their interviews. They were conducted for 45-60 minutes and were recorded using a voice recorder. Once the audio files were transferred to a computer and eventually two password protected external hard drives, they were relabeled in order to maintain confidentiality. A representative from Auckland Transcription Services signed a confidentiality agreement (see Appendix E) and were then given a copy of the audio files to transcribe. Once the transcripts were returned to the researcher, they were given to the participants for review. The participants were given the opportunity to retract information, clarify the meaning and then approve their transcript. Participants had two weeks to remove their data from the project. They were also able to remove themselves from participating in the research project at any time. After approval, the transcripts were read and thematically analysed by the researcher.

Analysis
Thematic analysis
Thematic analysis is a method of analysis that identifies the main themes or trends relevant to the research project which reoccur throughout a particular piece of data, as well as across a dataset (Braun & Clarke, 2013). This includes, but is not limited to, “repeated words, strong emotions, metaphors, images, emphasised items, key phrases, or significant concepts” (Mutch, 2014, p. 164). The trends that emerge either come straight from the data or from theory and literature that are used as a lens to understand the information (Braun & Clarke, 2013).

In this qualitative research project, thematic analysis was chosen as the method of analysis. This approach allowed the data to “speak for itself” (Mutch, 2014, p. 122). This was a good fit for the study as it facilitated the effective exploration of perceptions to meet the aims of the research project.
The following steps were taken to carry out thematic analysis on the interview and questionnaire data, adapted from Mutch (2014), and Braun & Clarke (2013).

1. Up to ten interviews were transcribed and up to 50 questionnaire responses were selected.

2. The researcher skim read and became familiar with each transcript and questionnaire.

3. The researcher recognised information that was repeated, ‘jumped out’, or was of interest to the research project, thus identifying themes.

4. Once all the transcripts and questionnaires had individually gone through this process, the researcher identified the themes from each transcript in light of the whole dataset. The researcher looked for themes that went across the transcripts and questionnaires by grouping ideas together, cutting and pasting sections, and labelling them.

5. The researcher looked for consistency across the dataset and validity of related ideas using literature.

6. Throughout the research process, the researcher revisited the individual transcripts and questionnaires to identify quotes and examples that could be drawn out.

7. The researcher also created a thematic map in the final stages of the research process when identifying conclusions. This developed an understanding of the overarching themes and the relationships between the ideas.

8. The researcher wrote a summary of findings and themes, including quotes and examples. The summary was linked to literature and identified problems with the patterns that had emerged.

Thematic analysis was applied to each interview and questionnaire that was selected to be part of the research project, and across the datasets as a whole.

**Descriptive statistical analysis**

Descriptive statistical analysis seeks to “describe the basic features of a study, often through the use of graphical analysis” (Gray, 2014, p. 562). Through this method of analysis, the information is presented visually using a graph or numerically using a chart (Gray, 2014). This method of analysis is typically used with quantitative methods of data collection.
The questions that were used in the questionnaire were designed to give an in depth understanding of the number, or percentage, of participants that perceived an idea in a particular way. This meant that while numerical data was gathered, the data still represented qualitative ideas. The nominal (contextual) questions, ordinal (data gathering, Likert scale), and ranking (data gathering) questions in the questionnaire were able to be analysed and presented using bar graphs. The ranking questions were presented using percentage statements. This data was used to support the qualitative understandings that this research project aimed to gain by describing the contexts and perceptions of the participants.

After separate thematic analysis of the interview and questionnaire datasets and descriptive statistical analysis of the questionnaire dataset, the datasets were also viewed together. Together, these datasets produced an in depth understanding of teachers’ perceptions across Auckland and South Auckland in diverse decile 1 schools.

**Ethical issues**

The researcher experienced some difficulty recruiting schools to participate in the research project. Originally, the researcher only approached local schools close to their worksite as they were the most relevant for the research project. However, of the four school principals that were emailed, only one principal replied. As the researcher was also a full-time teacher it was not possible to visit the schools to meet with the principals and discuss the possibility of research in order to gain organisational consent. Instead, only phone calls and emails were able to be used, unless meetings were requested outside of school hours.

Throughout the participant recruitment process, the potential participants for the interviews and questionnaires were provided with Participant Information Sheets (see appendix C and G), as well as the Participant Consent Forms (see Appendix D and H) for the potential interview participants (the consent form for the questionnaire was built into the questions). These documents provided the necessary information about the research project, including contact details for the researcher and researcher’s supervisor, should they have any questions. These steps were taken to allow the potential participants to make an informed decision about nominating themselves to participate in the research.

Steps were taken to ensure the reduction of harm and maintain confidentiality. However, confidentiality was unable to been guaranteed due to the possibility that participants’ quotes used
may be identifiable by their colleagues due to their own personal knowledge. The researcher reduced this risk by ensuring no identifying information was collected about the questionnaire participants, and that both the questionnaire and interview participants’ data was labelled by an anonymous name, for example, “Participant Q.”

**Conclusion**

Throughout this research process, a qualitative methodology was employed to describe and interpret teachers’ perceptions on the use of digital devices in diverse decile 1 schools in Auckland and South Auckland. Semi-structured interviews and unsupervised online questionnaires were used to gather qualitative data, with cultural and ethical issues considered throughout the process. The data was then analysed using thematic and descriptive statistical analysis to uncover new understandings about teachers’ perceptions and to draw conclusions about recommendations going forward with the digital technologies curriculum content (Ministry of Education, 2018b).
Chapter 4: Findings

Introduction

This chapter reports on the research findings as structured in relation to the central research questions of this project. As discussed earlier in this thesis, the aim of this research project was to explore teachers’ perceptions on teaching with digital devices and to identify the impact of the digital technologies curriculum content (Ministry of Education, 2018b) and the use of digital devices in *The New Zealand Curriculum* (Ministry of Education, 2007), all within the decile 1 environment. These aims were explored through four research questions within the context of decile 1 primary schools in Auckland. The first research question explored how teachers perceive the value of digital devices. The second research question investigated the current strategies teachers use to manage the complexities of digital device use. The last two research questions explored teachers’ perceptions of and recommendations for the digital technologies curriculum content (Ministry of Education, 2018b) and *The New Zealand Curriculum* (Ministry of Education, 2007).

The research questions were explored using a qualitative methodology that utilised semi-structured interviews and online questionnaires to gather data. Both of the methods explored all four research questions, with the questionnaires also gathering some numerical data.

This chapter on the findings of this study is organised into five sections. The first section reports on the participants that took part in the research. The following sections describe the key findings that emerged from each research question, for which, the data from both the interviews and questionnaires have been combined and reported on within the section they fit best. Due to the nature of the research questions, there has been some crossover in the findings.

Where Likert scales have been used, only the meaning of the number ‘one’ and ‘five’ was given to participants. Numbers ‘two’, ‘three’, ‘four’, were left up to participant interpretation. For the purposes of analysing and interpreting the data from the interviews and questionnaires, the interpretation used by the researcher to understand the data has been given for these attitude numbers\(^5\) (see Table 1.)

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\(^5\) ‘Attitude numbers’ refer to the number participants chose to represent their attitude towards a given statement in the questionnaire or interview. This number between one and five was measured using a Likert scale.
<table>
<thead>
<tr>
<th>Tables</th>
<th>Figures</th>
<th>Given to participants:</th>
<th>Interpreted as:</th>
<th>Interpreted as:</th>
<th>Interpreted as:</th>
<th>Given to participants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3</td>
<td>9, 10</td>
<td>Not important</td>
<td>Not very important</td>
<td>Important</td>
<td>Quite important</td>
<td>Very important</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>Less important</td>
<td><em>A little less important</em></td>
<td><em>An equal amount of importance</em></td>
<td><em>A little more important</em></td>
<td>More important</td>
</tr>
<tr>
<td>5, 6, 7</td>
<td>12, 13, 14</td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

Table 1. Interpretation of Likert scale attitude numbers.

Where appropriate, quotes from participants have had minor modifications where grammar, sentence structure, spelling, or punctuation have impacted on the ‘readability’ of the dialogue. These modifications were often a result of common conversational errors and care has been taken to ensure the meaning of the participants’ words have remained intact.

**Caveat**

With the knowledge that digital technologies would be included in *The New Zealand Curriculum* (Ministry of Education, 2007) from 2018, the interview and questionnaire questions were written in time to submit the research project to the Unitec Research and Ethics Committee in November 2017. Whilst the research project was influenced by the draft digital technologies curriculum content due to the timing of the project, the new digital technologies curriculum content had been in place from December 2017, a number of months before research began to be carried out in March 2018. However, there are some differences between the draft digital technologies curriculum content and the finalised digital technologies curriculum content. As the draft digital technologies curriculum content was used within this research project, this may limit the validity and accuracy of the data in particular, in regards to implementing the key findings into schools. This should be taken into consideration when using the results of this research project to inform teaching practice within digital technologies.

At the time that this research project was designed and submitted to the Unitec Research and Ethics Committee, in November 2017, the draft form of the digital technologies curriculum
content (Ministry of Education, 2017c) had been released for consultation, as well as other announcements (Education Gazette Editors, 2016). With the knowledge that digital technologies would be included in The New Zealand Curriculum (Ministry of Education, 2007) from 2018, the interview and questionnaire questions were written. As a result, some of the language used throughout the questionnaire questions, and Participant Information Sheets differs from the language used in the revised technology learning area. In Question 6, 7, 10, and 11, the participants were asked questions that used the wording, ‘digital technologies strand of The New Zealand Curriculum’ (Ministry of Education, 2007a, 2017c). Similarly, in the Participant Information Sheets, this phrase was used to describe the research project. This phrase, ‘digital technologies strand of The New Zealand Curriculum’ refers to what is now called the ‘digital technologies curriculum content’ throughout Ministry of Education documents (Ministry of Education, n.d.-f, 2018d), or just ‘digital technologies’ (Ministry of Education, 2018d). While this language differs slightly with the word ‘strand’, it clearly refers to the changes made to The New Zealand Curriculum in the technological area of Computational thinking for digital technologies (Ministry of Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d). These areas are described as “digital technologies” throughout Ministry of Education documents and there are no other learning areas they resemble. eLearning may be the only area of confusion, however, this term is well established and is only referred to as an area of learning within The New Zealand Curriculum (Ministry of Education, 2007). Where necessary, the phrase “digital technologies strand of The New Zealand Curriculum” has remained unchanged, for example, where questionnaire questions are reported. However to maintain relevance and reduce confusion, the term “digital technologies” or “digital technologies curriculum content” have been used throughout the discussion and reporting of findings, including when the word ‘strand’ was used in the questionnaire questions themselves.

Organisation

The findings and demographic information henceforth relate to the questionnaire questions ordered alphabetically and, following this, the findings and demographic information relate to the interview questions ordered numerically\(^6\). Questionnaire participants have also been relabelled for

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\(^6\) Due to the structure and layout of the questions from the online questionnaire tool, the questions which were organised numerically online have been relabelled alphabetically. This relabelling has been done for the purposes of clarity and comprehension in this chapter, and the chapters to come.
anonymity, for example as ‘P15’, also expanded as ‘Participant 15’. Interview participants have also been relabelled to maintain anonymity, for example as ‘PC-SF’.

Participants

From this point forward the questionnaire participants referred to in this research project only include the participants whose data fit the inclusion criteria and completed the questionnaire (n=11). Similarly, the semi-structured interview participants referred to from this point forward only include the participants who fit the inclusion criteria and were selected to participate in the research project (n=8).

Participant demographic information from the completed questionnaires

Question J: Describe your role in your school.

Four participants identified themselves as holding current teaching positions (n=4/11). Three participants described their roles with more detail, including a rūmaki teacher, sports coordinator, and a bilingual Māori teacher (n=3/11). A further four participants stated they held leadership positions (n=4/11), ranging from middle to senior management levels.

Question K: What year do you currently teach? (New Entrants, Year 1, Year 2, Year 3, Year 4, Year 5, Year 6, Year 7, Year 8)

The participants taught across almost all primary school levels as displayed by Figure 4. For the year levels new entrants (year 0), year 2, year 4, year 7, and year 8 there was an even spread of two participants teaching each year level (n=2/11). There was, however, just one participant teaching year 1 (n=1/11), no year 3 teachers (n=0/11), four year 5 teachers (n=4/11), and five year 6 teachers participating (n=5/11).

It is important to note that it is common for primary school teachers to teach multiple year levels, consequently, the number of year levels taught by participants exceeds the number of participants (n=20/11). Four participants reported teaching one year level (n=4/11), five reported teaching two year levels (n=5/11), and two reported teaching three year levels (n=2/11). Participants who identified teaching just one year level taught in the junior levels, from new entrants to year 2.
Question L: How are the classrooms in your school resourced with IT equipment? (Tick all that apply) (Desktop computers, Laptops, Interactive Whiteboards/Panels, Tablets, iPads, Other: ______)

As shown by Figure 5, ten participants reported that their classrooms were resourced with laptops (n=10/11), nine participants reported having iPads (n=9/11), six had interactive whiteboards or panels (n=6/11), four participants had desktop computers (n=4/11) and another four had tablets (n=4/11). One participant identified ‘other’, reporting that they were resourced with Chromebooks (n=1/11). The data does not provide an indication of the IT equipment at different year levels as the participants identified IT equipment overall across their school.

Smart or mobile phones were not an option to select in the questionnaire, however participants had the option to include them when commenting on ‘other’ types of IT equipment they were resourced with. There were no questionnaire participants who identified the use of mobile or smart phones within their classrooms (n=0).
Question M: Describe the diversity in your classroom.

All the participants described the ethnic diversity of their classrooms ranging from one ethnicity, which in both cases was Māori (n=2/11), three different ethnicities (n=2/11), and five participants described between five to eight ethnicities in their classrooms (n=5/11). Some participants grouped different ethnicities together, for example, “Pacific Islanders” (n=2/11).

Some participants also described diversity in terms of gender (n=2/11), learning or curriculum levels (n=2/11), and one participant described other areas such as ESOL (English for Speakers of Other Languages), behavioural and learning needs (n=1/11).

With all questionnaire participants highlighting ethnic diversity in their classrooms, it is clearly an important factor, which Alton-Lee (2003) comments on. In decile 1 schools in New Zealand, 4.89% of students are European, 49.2% are Māori, 40.6% are Pacific, 4.2% are Asian, and 0.87% are Middle Eastern, Latin American, and African (Ministry of Education, 2019a). Evidently, the majority of students in decile 1 schools are Māori and Pasifika (Ministry of Education, 2019a). However, it is important to note that within these ethnicities there is wide-ranging diversity as well, including iwi and a number of countries that fall under the umbrella term of ‘Pacific’.

Figure 6. Graph showing questionnaire participants’ resourcing of IT equipment in classrooms.
**Question 1: Describe your position/role in your school**

All except one of the participants described additional roles they held within their schools (n=7/8). Three participants held positions relating to ICT or digital devices and/or leadership (n=3/8). Another participant was a curriculum leader (n=1/8). Two participants were team leaders (n=2/8) and another described a project they co-ordinated (n=1/8). One participant described their class as a Māori language enrichment unit (n=1/8), however, this role was not additional to the classroom. One participant held more than one additional role (n=1/8).

**Question 2: What year do you currently teach?**

For new entrants through to year 6, there were a similar number of participants teaching at each level. There were three participants teaching in the new entrant, year 2 and year 3 levels (n=3/8). For year 1, year 5, and year 6, there were two participants teaching these year levels (n=2/8). Year 4 had one participant (n=1/8) and there were no participants teaching year 7 or 8 students (n=0/8), as displayed on Figure 6.

![Figure 7. Graph showing year levels taught by interview participants.](image)

**Question 3: How are the classes in your school resourced with IT equipment (Desktop computers, Laptops, Interactive Boards/Panels, Tablets, iPads, other...)**

Most participants reported more than one type of device in the classroom. Some schools had varying numbers and types of devices in terms of their distribution throughout the year levels. Most commonly, participants reported the use of iPads (n=7/8), Chromebooks (n=6/8), and desktop computers (n=5/8). Other devices included televisions (n=2/8), mirroring technology
(n=2/8), interactive whiteboards (n=4/8), laptops (n=3/8), and tablets (n=1/8), as seen on Figure 7.

Smart or mobile phones were not suggested as an example of IT equipment the participants’ schools were resourced with. However, this question was open ended thus participants were able to identify smart or mobile phones if they were resourced with them. There were no interview participants who identified the use of mobile or smart phones within their classrooms (n=0).

Figure 8. Graph showing IT equipment interview participants’ schools were resourced with.

Only three participants reported the use of laptops which were assigned to teachers, rather than some classes which were included in Figure 7. Despite this, there is sufficient Ministry of Education resourcing for full time teachers to be resourced with laptops (Ministry of Education, 2019d), so it is likely that all participants had laptops but did not comment on them.

One participant reported that some classrooms were equipped with laptops and others with notebooks, both of which have been classed as laptops. Where some schools were equipped with two products of different brands, such as “Chromecast” and “Apple TV” these were counted as one type of equipment.

For some participants, the number of devices each class was equipped with varied within classrooms. Others did not give a clear indication; three reported having a 1:1 (or close to) device-
to-student ratio (n=3/8). Five reported having less than a 1:1 ratio (n=5/8), often the number of devices was less than ten. Three participants reported having computer suites within their schools (n=3/8).

**Question 4: Describe the diversity in your classroom.**

When asked this question, participants were encouraged to describe the diversity in their classrooms, whichever way they interpreted the term ‘diversity’. This yielded a range of responses, however with some commonalities. All participants discussed ethnicity or culture (n=8/8). Figure 8 shows that Samoan, Tongan, and Māori ethnicities or cultures were each identified by five participants (n=5/8). Three of the participants did not detail which particular ethnicities or cultures students in their classes were, instead, grouping them as Pasifika (n=3/8).

Two participants commented on the lack of diversity in their classes (n=2/8). One of these participants grouped all Pasifika ethnicities together. The other identified the different ethnicities including Pasifika, Māori, and Pakistani. Despite the identified range of ethnicities, as one participant described; their class was “not hugely diverse” (PA-SG).

![Ethnic diversity in interview participants' classrooms](image)

Figure 9. Graph showing ethnic diversity in interview participants’ classrooms.

When asked about diversity in their classrooms, responses were similar to the questionnaire participants’ responses in that, all the interview participants automatically began to discuss their students’ ethnicities or cultures. This indicates that this is a large source of diversity within decile 1 schools. However, there are many ways the children are diverse (Darling-Hammond, Wise, &
Klein, as cited in Futrell, Gomex, & Bedden, 2003). This includes “ethnicity, socio-economic status of the student's homes, special educational needs, language background, gender or other differences” (Alton-Lee, 2003, p. 5).

Five participants discussed the academic or learning diversity within their classrooms (n=5/8), commenting on the wide range of student knowledge. Three participants commented on gender balances in their classes (n=3/8), one had a heavy gender imbalance, (n=1/8). One participant commented on the lack of diversity in students’ experiences (n=1/8). Two participants identified behavioural diversity in their classrooms (n=2/8). One participant reported on the ethnic diversity between herself and the other teacher in the learning space (n=1/8).

There was a small amount of discussion on other areas of diversity, with the most commonly mentioned being academic or learning diversity. In 2016, the National Standards data for reading showed that 61.7% of students in decile 1 schools were achieving or exceeding the standard, and 38.3% were not achieving the standard (Ministry of Education, 2017f). This data supports the comments from participants on academic diversity showing that while the majority of students were achieving or exceeding the standard, within this percentage there is diversity between the range of achievement.

**Research Question 1**

**Key finding 1: Teachers perceive digital device use within decile 1 schools as important.**

The majority of the questionnaire participants identified the use of digital devices as being either important or very important (n=6/11). As displayed in Figure 9, no participants identified the use of digital devices as ‘not important’ (n=0/11). The questionnaire participants had a mean score of 3.82 as calculated by Table 2, leaning towards a higher attitude for importance.
Figure 10. Graph showing questionnaire participants’ attitudes towards digital device use in schools.

Table 2. Calculation of mean scores for questionnaire participants’ attitudes towards digital device use in schools.

<table>
<thead>
<tr>
<th>Attitudes towards digital device use</th>
<th>Number of participants x score</th>
<th>Very important (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Not important</td>
<td>1x0=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>2x1=2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>3x4=12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>4x2=8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Very important</td>
<td>5x4=20</td>
<td>(0+2+12+8+2)/11=3.82</td>
<td></td>
</tr>
</tbody>
</table>

Similar to the questionnaire data, the data from the interview participants, as displayed by Figure 10, also indicates participants’ belief that digital device use is important in decile 1 schools, as confirmed by a mean score of 4.19, calculated in Table 3. One participant described their attitude number as between four and five. To represent their choice in the data, this was shown as .5 of a participant for number four, and .5 of a participant for number five. The most frequently occurring attitude number selected by participants was number four (n=4.5/8) with another 2.5 participants selecting number five (n=2.5/8), no participants who selected number two.
Figure 11. Graph showing interview participants’ attitudes towards digital device use in schools.

Table 3. Calculation of mean scores for interview participants’ attitudes towards digital device use.

<table>
<thead>
<tr>
<th>Number of participants x score</th>
<th>Not important (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>Very important (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1x0=0</td>
<td>2x0=0</td>
<td>3x1=3</td>
<td>4x4.5=18</td>
<td>5x2.5=12.5</td>
<td>(0+0+3+18+12.5)/8=4.19</td>
</tr>
</tbody>
</table>

For the participants who selected four and five (n=6/11), three explained that the use of digital devices was a matter of equity and equality for decile 1 students, ensuring that they have similar opportunities for digital device use or opportunities at school due to the lack of access at home. This finding is similar to the findings of Liu's et al. (2016) study revealing that teachers believe digital devices are important in their teaching practice.

**Key finding 2: Teachers perceive digital literacy as important for students.**

When asked to rank their agreement of a statement on a scale, the majority of questionnaire participants selected number, indicating their belief that digital literacy is as important as literacy and numeracy (n=8/11). This was further indicated in the data displayed on Figure 11 and by the mean score of 3.09, as calculated by Table 4. There were a small number of participants who selected other levels (n=3/11). It is important to note that there were no participants who selected number ‘one’, ‘less important’, or number ‘five’, ‘more important’.
Figure 12. Graph showing questionnaire participants’ perception of digital literacy importance.

<table>
<thead>
<tr>
<th></th>
<th>Less important (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>More important (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants x score</td>
<td>1x0=0</td>
<td>2x1=2</td>
<td>3x8=24</td>
<td>4x2=8</td>
<td>5x4=0</td>
<td>(0+2+24+8+0) /11=3.09</td>
</tr>
</tbody>
</table>

Table 4. Calculation of mean scores for questionnaire participants’ perception of digital literacy importance.

Three of the participants who selected number three commented on the changing technological world (n=3/11). Another three participants identified the students’ futures (n=3/11). Both participants who selected number four (n=2/11), explained that digital devices were applicable to all areas of the curriculum.

There is a large achievement gap between decile 1 and decile 10 schools, as shown by National Standard data (Ministry of Education, 2016b, 2016c, 2016a). Consequently, the finding that participants believe digital literacy is as important as literacy and numeracy demonstrates the strength of this belief. This is due to comparison with the highly important curriculum areas such as, literacy and numeracy, that require an intense focus due to the achievement gap.

**Key finding 3: When used effectively, digital devices can be used to support students’ learning when they have low levels of literacy and numeracy.**

There were a number of tensions identified by the interview participants between the use of digital devices in decile 1 classrooms and students’ learning needs. A large group of participants discussed
their students’ levels of learning (n=5/8). Four participants commented that their students’ literacy levels impacted on their ability to use digital devices within their learning contexts (n=4/8) because students were ‘learning to read’ and not yet able to ‘read to learn’.

Some of the children are not fully ready to access that technology. Like, if you can’t write your name, you can’t really log-on, and a few of my lower ones; they have real trouble using the technology. (PA-SA)

The other part to the technology is if the kids can’t spell or write; half the time they can’t enter what you’ve actually asked. (PA-SB)

Research has documented case studies with digital device use in early childhood education (Beschorner & Hutchison, 2013; Couse & Chen, 2010; Schacter & Jo, 2016). This indicates that while participants have identified this as a tension, it is possible to use digital devices with low levels of literacy and numeracy.

When discussing the challenges of teaching decile 1 children with digital devices, there were three participants who stated that low literacy levels were a challenge for their teaching (n=3/8), one explained:

… because they have low levels of literacy and numeracy I want to focus on that a lot more [instead of using devices]. (PA-SF)

You can do all these fantastic things but at the end of the day; if they can’t actually read the words or spell the words, that’s the struggle. That’s where they can’t be independent. (PA-SB)

When explaining the importance of digital device use in decile 1 classrooms, one participant commented:

For me in the baby class I use them sparingly as I’ve got to teach language acquisition/literacy and maths from the foundation up. (P3)

Another participant compared the importance of literacy and numeracy to the use of digital devices in decile 1 schools stating:

I often find that a lot of my students have major gaps in their literacy and numeracy knowledge. I sometimes feel that this should be a focus for them. Having said that, if you know what digital tools and platforms are effective, these can help with numeracy, literacy and digital literacy. (P6)
In one study it was found that digital devices were able to support children in written language when their handwriting skills were not yet well developed, through the use of the keyboard (Beschorner & Hutchison, 2013). Despite only one participant in this research project recognising the ability of digital devices to be used effectively at lower levels of knowledge, in another study, Schacter & Jo (2016) found that first grade children using a mathematical app with their parents at home was able to improve mathematics achievement. Thus, the use of digital devices when used effectively can support or contribute to literacy and numeracy programmes in schools, rather than take away.

**Key finding 4: Digital devices are sometimes unsuitable as learning tools for particular areas of learning.**

When discussing successful ICT/digital device programmes, three participants commented on the range of skills students needed, such as communication and social skills (n=3/8). Another participant discussed the need to ensure there were a range of skills being taught and explained that digital devices were unable to provide all the knowledge and skills students need for this world:

> I think 1:1, so, every child having a device. Then, having it used, not all the time, because you still need regular teaching, like guided reading and things; you still need all that sort of stuff… I think it can be integrated. I think you’ve got to have a mix of traditional and ICT. (PA-SG)

Two questionnaire participants commented on the difficulty of matching digital device use with particular learning needs (n=2/11).

> … sometimes it is not the best tool for the job or you want the students to be focusing on other skills. (P5)

> The ability to communicate their needs/wants effectively. Turn-taking as there are not enough digital devices for one each. (P11)

Similarly, Participant Eleven commented on oral language skills and social skills and went on to identify how this impacted on their classroom, stating:

> Means a more structured approach to the use of devices- in reading tumbles [lesson organisation] etc. (P11)

Throughout discussion from the participants, there was an underlying belief that the digital devices were unable to support students in developing certain skills. For example, oral language, despite literature available on the use of digital devices in this area of learning (Callow & Orlando, 2015;
Fletcher & Brooks, 2006). This belief that digital devices are not always suitable for learning was also highlighted by a participant in another study (Parsons, as cited in Parsons & Adhikari, 2016). In comparison, Sheninger (2013) puts emphasis on the idea that it is how teachers choose to use digital devices that is valuable.

**Research Question 2**

**Key finding 5**: Teaching basic digital skills and the safe use of devices is a key strategy for the successful use of digital devices in classrooms.

The most commonly discussed strategy for successful device use was ensuring that students had a good understanding of the basic aspects of digital device use (n=4/8). This included being respectful of devices, how to care for them, and helping students to keep safe. A similar idea discussed by another participant was the setting up of expectations of how devices were used at school (n=1/8). The participants commented:

Start with basic care first, you know, it’s moving into a house. I try to relate a lot of what happens in the digital world as a reflection of the real world so then you know they begin to understand now this is why you don’t share passwords, this is why you don’t pick your name as a password and it’s like pasting your key to the front door. (PA-SA).

So I had to show them how to use a Chromebook, and now how to put things in folders; how to access different things on their drive, and save things. (PA-SG)

This discussion from participants relates to both basic digital skills, care, and digital literacy. Despite students growing up in a digital world (Prensky, 2001), they do not necessarily have the digital skills that are utilised at school, echoing the comments of Sadaf and Johnson (2017).

One questionnaire participant also acknowledged the processing of online information and cybersafety as a challenge for teaching children in low decile schools (n=1/11). Another interview participant also commented on a similar idea (n=1/8), stating:

We also have digital citizenship that we go through. I try and touch on at least once a fortnight and that just involves they’ve all signed agreements as well. They understand what it’s for; when they can use it; why they’re using it. (PA-SC)

In addition to this, when discussing the complexities of the decile 1 environment, another interview participant explained:
The safety and the child protection and all of those dangers that they can face. Our parents aren’t necessarily aware of that, so we’re kind of trying to educate them at the same time as educating the children about keeping safe online. (PA-SD)

Concerns participants raised over students’ safety on digital devices are similarly highlighted in a report by UNICEF (2017). According to Netsafe, digital citizenship includes developing the skills for online safety, as well as digital literacy (2018). This responsibility, as identified by this participant, digital citizenship needs to be taught due to the risk the use of digital devices pose for students, especially in the way they are used for entertainment in students’ homes, previously discussed by participants.

**Key finding 6: Teachers use digital devices in deliberate, purposeful ways within their classrooms.**

Throughout discussion on utilising digital devices in teaching programmes, one interview participant described their critical thought process, reporting that they always considered whether the digital learning activity was purposeful for students (n=1/10):

“I like to think, “okay is there a purpose for this?” Like I don’t want them to be just on it because it’s digital… So I don’t want it to be… for the sake of it. (PA-SE)

Participants discussed the selection of apps available on devices. For two of the respondents, they stated that this only included learning related apps (n=2/8). Another participant reported regular re-evaluation of apps to ensure they were learning focused (n=1/8).

“It’s a play-based classroom, another thing that we can play with in the classroom [digital devices], but I’ve limited the apps, so that they are either; they’re oral story … telling ones, or a couple of letter-formation ones, but other than that, that’s all that’s on there. (PA-SE)

“It’s really helpful that we’ve only put apps onto [devices] that are learning apps so they can’t go on YouTube and do all that… It’s about teaching them what that is but giving them time to play and to understand that they can be fun but at the same time we’re going to use these for learning. (PA-SH)

Overall, teachers described the deliberate, purposeful decisions they made, aligning with Alton-Lee’s (2003) recommendation for how digital devices are used in classroom programmes. This recommendation involves using digital devices in ways that support the curriculum and students’ achievement (Ministry of Education, 2007a). The participants in this research project were very conscious that the digital device use in their classrooms had a purpose for learning.
Further to this, three interview participants commented that they considered the achievability and purpose of the tasks when selecting learning activities to be completed on digital devices (n=3/8), stating:

What they can do, … can my low levels actually read that? Will it make sense to them? Will that be too simple for my higher kids? Will this challenge my higher kids? Will this provide success for my lower ones? How can I make it easier? How can I make it more efficient? (PA-SA)

Mostly I consider, is it achievable, and is it worthwhile, and considering what the learning objectives are, is it meeting the learning objectives? Is it challenging them without being too hard, because you don’t want something that’s not achievable. (PA-SG)

It goes back to that whole purposefulness. If they’re having fun while they’re doing it; it’s engaging; they can communicate what they’re going; why they’re doing it. (PA-SH)

Two participants identified the connection to learning objectives as an important consideration (n=2/8), and another participant discussed tailoring the content to meet students’ needs (n=1/8). These considerations, contributing to deliberate, purposeful, decisions maintain a focus on student learning for achievement as described by Alton-Lee (2003).

In contrast, Participant Three commented that their students were already familiar with digital devices, and explained the change in practice, stating:

I try not to use technology too much. Just for purposeful focused work. (P3)

This participant maintained the deliberate, purposeful, use of digital devices commented on by other participants. However, due to students’ familiarity with devices, was reluctant to use them too much. In one study, it was found that 60% of primary aged students had unlimited amounts of screen time at home (The University of Auckland, 2017). Perhaps such statistics have contributed to a belief that students are already exposed to too much time on digital devices, thus influencing this participant’s teaching practice.

One participant felt strongly about the rapidly changing technological landscape of our world and believed that individual devices should not be the focus rather, on what we can gain from them. This perspective was explained, with the participant stating:

Authentic; relevant; purposeful. It’s not really about the devices, it’s more about, what’s the purpose? … What can this device do to make our learning better, or support our
learning, or enhance our learning, rather than, you have to have this device because it does this, because it’s going to change, tomorrow and tomorrow, and tomorrow after that. (PA-SE)

Critical thinking skills were a large concern for PA-SH who described the importance of ensuring these skills are not lost in a digital device programme:

It’s integrated; it’s not stand-alone; it’s purposeful. It’s not 1:1 [students:devices]. 1:1 doesn’t involve conversations and conversations and interaction are important. Although you can think; you can’t have those interactions and if you’re thinking something; how do you know your thinking is right? (PA-SH)

Thinking from these participants is reflective of eLearning as described in *The New Zealand Curriculum* (Ministry of Education, 2007), where digital devices are used as tools for learning and are used to support the work of the curriculum in areas such as literacy and numeracy.

**Research Question 3**

**Advantages**

**Key finding 7: The digital technologies curriculum content is relevant to students’ future lives.**

Participant Seven identified an advantage of the digital technologies curriculum content as relating to students’ futures, stating:

Building more specialised skills for future use … Exposes students to technologies/situations they may encounter – Prepares them for the future – high school, university, jobs. (P7)

Another two interview participants discussed the relevance of the curriculum, to students’ futures (n=2/8). One participant explained:

I think it will be a lot more relevant to their lives, like their future lives. It’s going to be one of those things, that actually they just need to be able to do, and it will set them up in better stead for whatever they want to be. (PA-SD)

Other studies have also found that teachers perceive digital learning as important due to students’ futures (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010).
However, when discussing the challenges of the curriculum one participant discussed the unknown future, as previously identified. This participant explained:

> When I look at these kids I find it hard to teach them things that’s for them in the future. I don’t know what their future will look like. So I’m like how can I teach them things that they’re going to be inventing? (PA-SC)

For some participants, discussion on the digital technologies curriculum content (Ministry of Education, 2018b) for students’ futures did not recognise the importance of this learning for the present. This must be expanded to include the relevance to students’ present lives as described by some of the questionnaire participants.

When explaining the importance of digital device use in schools, one of the questionnaire participants commented on the relevance of digital devices to the world students presently live in (n=1/11), and another commented on students’ futures (n=1/11). In addition to this, two interview participants also discussed the present world that their students live in (n=2/8).

In contrast to the discussion on the digital technologies curriculum content (Ministry of Education, 2018d), some participants recognised that the use of digital devices in schools is relevant for students’ present lives. Sadaf and Johnson (2017) recognise this need to utilise digital devices in classrooms due to the weight they hold for students in the present.

**Challenges**

**Key finding 8: There is a lack of access to digital devices and the internet within the homes of students in decile 1 schools.**

When asked about the factors that make teaching low decile children using digital devices difficult, challenging, or complex, the most commonly identified challenge by the questionnaire participants was access to digital devices or the internet in schools and in students’ homes (n=6/11). This factor was also discussed throughout the interviews where three participants discussed the lack of access to digital devices (n=3/8). The participants explained:

> … not as many students can afford to purchase their own devices and continue their learning at home. (P8)

> Accessibility to devices – fortunately my school is part of a cluster which effectively supports getting Chromebooks into homes. Many students don’t have access to the internet at home… (P9)
… learning here is only nine till three. It doesn’t go beyond nine till three because they don’t have access. (PA-SH)

The median income for households in Otara East in 2013 was $16,400 and, in comparison, the median household income for Ponsonby East was $51,300 (Stats NZ, n.d.-e, n.d.-g). The low household income in Otara East, where there are many low decile schools, may explain the low affordability of the internet and digital devices in students’ homes. This is further shown by a survey of New Zealand secondary schools. In one survey, it was reported that in 88% of decile 1-2 schools there was an “inability or unwillingness of parents and whānau to buy a device for their child” (Wylie & Bonne, 2016, p. 32).

In other questions, the possibility of a lack of access to digital devices in students’ homes changed participants’ teaching practice, with them explaining:

Differentiated lessons and an increase of tuakana/teina collaboration situations. (P4)

I went from being very open with my planning [at another school] to very much went very much back to very old school teaching as well… we have to cram everything in so… we didn’t sort of explore a lot more. (PA-SH)

I have started to utilise devices quite a lot in my teaching and class work. … I can set students work via Google Classroom and utilise other websites to help engage students and progress learning. … being more conscious of what students do and use whilst on devices and educating myself on digital literacy. (P7)

Time management – to choose the time for a digital device session when students type their own work. To think about if a teacher aide will be available to assist and the length of the lesson. (P1)

I’m not sure for certain but because they don’t get it [digital devices] at home, it’s really hard to tear them away from it... It takes them a good five minutes to put the iPad down to move to the next [activity]. (PA-SC)

I always say to them, “Well you can stay in at morning teatime if you want to and play with it.” Most choose not to and go outside. (PA-SC)

Discussion from participants, when asked about how a lack of digital devices in students’ homes changes their practice, centred around issues of time. However, notably, there was a lack of discussion from participants on the strategies that schools used to mitigate the lack of digital devices and/or the internet in students’ homes. Currently, there is only a small amount of New Zealand literature that discusses strategies or initiatives focusing on this issue (20/20 Trust, 2017a; Fletcher & Brooks, 2006; Jesson et al., 2014).
Just one participant stated that their school had ways to support students’ home access to Chromebooks, and continued to explain the resulting change:

I make my resources/teaching content available for students no matter where they log in from. (P9)

Participant Nine is the only participant to comment on a strategy being used to address the lack of access to digital devices in students’ homes. In the small amount of literature addressing this issue, Jesson et al. (2014) comments on the availability of affordable digital devices in students’ homes and access to the internet, through the Maniapalani Educational Trust. Another programme run by a charity, Computers in Homes (2019), provides “for a cost of $50 … 20 hours of free training, a refurbished computer or device, 12 months’ subsidised internet connection (optional) and technical support” (para. 2) to families in low decile school areas (20/20 Trust, 2017a).

Key finding 9: Teachers have a limited understanding of the digital technologies curriculum content.

The most commonly identified challenge, for teachers implementing the digital technologies curriculum content identified by the questionnaire participants, concerned the digital technologies curriculum itself (n=6/11). There were a number of participants who reported that their limited knowledge of the digital technologies curriculum content, or need for professional development, would pose a challenge (n=4/8):

I need to understand the curriculum first to be able to apply it… (P3)

I haven’t seen anything about what it is actually going to involve. I haven’t been offered any PD [Professional Development] specifically related to it. (P9)

The draft digital technologies curriculum content (Ministry of Education, 2017c) was open for consultation in mid 2017 (Education.govt.nz, 2017), and the implementation process began in 2018, with a goal of all schools teaching it in 2020 (Ministry of Education, n.d.-f). As this research project was carried out in May 2018 when the digital technologies curriculum content (Ministry of Education, 2018d) had not long been introduced into schools (Ministry of Education, n.d.-f), it is highly likely that schools had not begun their implementation process with teachers. This may explain teachers’ limited understanding of its content.
Figure 13. Graph showing questionnaire participants’ perception of understanding of Computational thinking for digital technologies.

Table 5. Calculation of mean scores for questionnaire participants’ perception of understanding of computational thinking.

<table>
<thead>
<tr>
<th>Number of participants x score</th>
<th>Strongly disagree (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>Strongly agree (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1x3=3</td>
<td>2x3=6</td>
<td>3x3=9</td>
<td>4x1=4</td>
<td>5x1=5</td>
<td>(3+6+9+4+5)/11=2.45</td>
</tr>
</tbody>
</table>

When ranking the statement, “I have a good understanding of what Computational thinking for digital technologies is” on a scale, with ‘one’ representing ‘strongly disagree’, and ‘five’ representing ‘strongly agree’, there was an even number of questionnaire participants who each selected number one, two, and three (n=3/11, n=3/11, n=3/11), as visible on Figure 12. Another one participant each selected number four and five, totalling two participants who agreed with the statement (n=2/11). The mean score for this statement was 2.45 as calculated by Table 5. This indicates that the participants on average neither agree nor disagree that they have a good understanding of Computational thinking for digital technologies.

The combined total participants selecting number one and two was six (n=6/11), and the combined total for participants selecting number four and five was two (n=2/11), showing that overall, more participants disagreed with the statement and do not have a good understanding of Computational thinking for digital technologies, as displayed on Figure 12.
When ranking the statement, “I have a good understanding of what ‘Designing and developing digital outcomes’ is” on a scale, with ‘one’ representing ‘strongly disagree’, and ‘five’ representing ‘strongly agree’, the majority of participants in the questionnaire could be interpreted as neither agreeing or disagreeing with the statement (n=5/11). In addition to this, both the mean and mode for this statement was 3.0 as calculated by Table 6. There were equal numbers of participants who selected one and two (n=3/11), and four and five (n=3/11), showing that teachers have a variety of understandings of Designing and developing digital outcomes, as shown on Figure 13.

![Graph showing questionnaire participants’ perception of understanding of Designing and developing digital outcomes.](image)

Figure 14. Graph showing questionnaire participants’ perception of understanding of Designing and developing digital outcomes.

<table>
<thead>
<tr>
<th>Number of participants x score</th>
<th>Strongly disagree (1) 1x2=2</th>
<th>(2) 2x1=2</th>
<th>(3) 3x5=15</th>
<th>(4) 4x1=4</th>
<th>Strongly agree (5) 5x2=10</th>
<th>Mean (2+2+15+4+10)/11=3</th>
</tr>
</thead>
</table>

Table 6. Calculation of mean scores of questionnaire participants’ perception of understanding of digital outcomes.

Overall, in both areas of the digital technologies curriculum content (Ministry of Education, 2018b), teachers did not strongly agree that they had a good understanding of the two new technological areas. This is likely due to the newness of the curriculum (Ministry of Education,
n.d.-f). Previously, *The New Zealand Curriculum* (Ministry of Education, 2007) only contained references to eLearning and the use of ICT for the future. Consequently, the introduction of the content in the two technological areas of the digital technologies curriculum content (Ministry of Education, 2018d) has likely impacted on teachers’ lack of understanding of what they entail, as they have not been required to teach this content yet.

Figure 15. Graph showing questionnaire participants’ confidence in teaching the digital technologies strand of the curriculum.

![Graph showing questionnaire participants’ confidence in teaching the digital technologies strand of the New Zealand Curriculum](image)

When ranking the statement, “I am confident in my ability to teach the digital technologies strand of *The New Zealand Curriculum*” on a scale, with ‘one’ representing ‘strongly disagree’, and ‘five’ representing ‘strongly agree’, all participants in the questionnaire selected number three, four, or five (n=11/11), positively skewing the data as visible in Figure 14 and resulting in a mean of 3.82, as shown in Table 7. A large number of teachers selected number three, which could be interpreted as neutral, or neither disagree or agree (n=5/11). The majority of participants selected number four or five (n=6/11) indicating their agreeance with the statement. It is significant to note that

<table>
<thead>
<tr>
<th>Number of participants x score</th>
<th>Strongly disagree (1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>Strongly agree (5)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1x0=0</td>
<td>2x0=0</td>
<td>3x5=15</td>
<td>4x3=12</td>
<td>5x3=15</td>
<td>(0+0+15+12+15)/11=3.82</td>
</tr>
</tbody>
</table>
there were no participants who selected number one or two, disagreeing with the statement of confidence in their ability to teach the digital technologies curriculum content \( (n=0/11) \).

Notwithstanding the identified lack of teacher knowledge, teachers agreed that they felt confident in their abilities to teach the digital technologies curriculum content (Ministry of Education, 2018b). This research project recruited participants who were teachers in classrooms, not necessarily those who had high skill levels or interests in digital technologies and eLearning. Despite this, those who are interested in a topic are more likely to want to be involved in research about it. Consequently, it is likely that the participants who volunteered to be involved had high levels of interest and knowledge of these areas, leading to a confidence in their ability to learn about and teach the digital technologies curriculum content (Ministry of Education, 2018d), as demonstrated by the data. Despite this confidence, some participants had doubts about other teachers’ willingness to upskill and learn about digital technologies or eLearning, as identified further on in this chapter.

**Key finding 10: Teachers have misconceptions between eLearning and the digital technologies curriculum content.**

When discussing challenges the digital technologies curriculum content posed, two questionnaire participants commented on their current teaching practice \( (n=2/8) \), with one stating:

> At the moment being a 1:1 environment means that I am doing a lot of these things anyway. It will mean that I am required to think explicitly about how I am meeting the needs of each strand. (P6)

As previously identified, up until 2018, *The New Zealand Curriculum* (Ministry of Education, 2007) did not contain any digital technologies curriculum content (Ministry of Education, 2018b), only a suggestion of eLearning. Thus the comments from this participant citing a 1:1 environment (students-to-devices), and already teaching this content, incites questions on the participant’s current understandings of the digital technologies curriculum content (Ministry of Education, 2018b). In particular, this is due to the participant’s self-identified need to recognise the ways their practice is addressing the curriculum. Perhaps this indicates a misunderstanding between the digital technologies curriculum content (Ministry of Education, 2018b) and eLearning.

Throughout questionnaire participants’ discussions on integrating the digital technologies curriculum content (Ministry of Education, 2018b) into their practice, it was clear that some
participants had misunderstandings about the content of the two new technological areas (Ministry of Education, 2018d).

Two participants discussed ideas relating to eLearning rather than Computational thinking for digital technologies or Designing and developing digital outcomes (n=2/11) (Ministry of Education, 2018b). This was demonstrated when they both discussed researching skills as a benefit for their students, which is an eLearning concept (n=2/11).

Two interview participants also discussed advantages that were more relevant to eLearning than the digital technologies curriculum (n=2/8).

The Ministry of Education describes eLearning as "learning supported by or facilitated by ICT" (2007, p.36), essentially using digital devices as tools for learning. In comparison, the digital technologies curriculum content (Ministry of Education, 2018b) focuses on “teaching students how digital technologies work (the computer science principles) and how they can use that knowledge to solve problems and become creative innovators of digital solutions” (Ministry of Education, n.d.-d, p.3). Both digital technologies learning and eLearning are connected to digital devices and, are therefore likely to cause confusion and misconceptions for teachers. This requires addressing to support the effective implementation of the digital technologies curriculum content (Ministry of Education, 2018b) within schools.

**Research Question 4**

**Key finding 11: Teachers’ perceptions of successful digital device/ICT programmes are rooted in eLearning.**

Significantly, there were no participants who discussed elements of computational thinking in their responses to a question on successful digital device/ICT programmes (n=0/8), instead mainly eLearning. Three participants discussed elements of eLearning. This included using apps or programmes as part of successful classroom learning programmes (n=3/8). Two of these participants and one other specifically discussed digital device use to support literacy and mathematics (n=3/8).

The interview and questionnaire participants commented on successful ICT/digital device programmes, stating:
As a rotation students have follow up activities for their work. Such as, Studyladder or Sunshine Online. For more competent students, they can publish their work onto a word document. (P1)

… a support to the main function of everyday literacy/maths programmes, so apps/programmes that help to add upon the basic foundation. (P3)

What can this device do to make our learning better, or support our learning, or enhance our learning, rather than, you have to have this device because it does this, because it’s going to change, tomorrow and tomorrow, and tomorrow after that. (PA-SE)

It’s integrated; it’s not stand-alone; it’s purposeful. (PA-SH)

It would be embedded and related to whatever else you were doing in the classroom; whether it’s topic, writing, maths is a big one, but I think it can be really important to life. (PA-SD)

… Something that is quite integrated throughout other things and you’re using different tools selected at different times … (Interviewer’s summary of PA-SA’s programme, confirmed by PA-SA)

In another interview question, commonalities between the descriptions of successful ICT/digital device programmes included it being integrated throughout other curriculum areas (n=5/8).

Although these questions asked about successful digital device/ICT programmes, it is interesting that discussion from participants had a common theme of digital device use to support learning, an idea which is rooted in eLearning (Ministry of Education, 2007). This perception positively reflects the quality teaching practice identified by Alton-Lee (2003); however, with the introduction of the digital technologies curriculum content (Ministry of Education, 2018b), this perception requires development to reflect the new curriculum content.

**Key finding 12: Teachers need professional development to build their knowledge of the digital technologies curriculum content.**

When ranking suggestions in order of importance for successfully integrating the digital technologies curriculum content (Ministry of Education, 2018b) into their schools, the questionnaire participants ranked the suggestions as follows; “understanding the curriculum,” as the most important, then “professional development,” “exemplars of teaching and learning activities,” “mentoring/support,” “time for teachers to “figure it out”),” and finally, the least important was “other.” This was indicated by the participants’ rankings and the mean scores calculated as shown in Table 8 and displayed on Figure 15.
Only one participant made a suggestion in the “other” option, stating:

Ongoing sharing of digital learning with other schools. (P10)

Figure 16. Graph showing questionnaire participants’ importance of suggestions for successfully integrating the digital technologies curriculum into schools.

Table 8. Calculation of points for questionnaire participants’ importance of suggestions for successfully integrating the digital technologies curriculum into schools.

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
<th>P6</th>
<th>P7</th>
<th>P8</th>
<th>P9</th>
<th>P10</th>
<th>P11</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of the curriculum</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>Professional development</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>46</td>
</tr>
<tr>
<td>Exemplars of teaching and learning activities</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>Mentoring/support</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Time for teachers to “figure it out”</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>Other (participants could suggest ideas)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

For participants, the most important suggestion was “Understanding the curriculum,” which, due to its recent implementation (Ministry of Education, n.d.-f), is not surprising, in addition to the findings previously discussed identifying teachers’ lack of content knowledge. The second suggestion of “professional development” indicates that this is a favoured vehicle for building teachers’ knowledge and helping them to understand the curriculum content. However, except
for “other,” after “understanding the curriculum,” the suggestions were not separated by a large margin, indicating that each of these holds similar levels of importance for teachers.

Interview participants suggested a number of different ideas for ensuring they were able to feel successful at integrating the digital technologies curriculum content. The most commonly occurring answer was professional development (n=3/8). One participant suggested that management had a role to play in this, and needed to invest in supporting their staff (n=1/8), explaining:

I think your management in your school has to decide on, “Hey we’re going to use this tech. We’re going to try it and we’re going to run with it. If it works it works, if it doesn’t, it doesn’t.” Put a bit of time into it, making sure that as a staff you’ve got PD so that the people know how to use it. (PA-SB)

This finding that identifies professional development as an important factor, allowing teachers to feel successful at implementing the digital technologies curriculum content (Ministry of Education, 2018b) further strengthens the same findings from the questionnaire data. Other studies have found the use of professional development as a factor positively impacting on digital device use in classrooms (Adhikari et al., 2012) and, similarly, that a lack of professional development has a negative impact on its use (Flanagan & Jacobsen, 2003). As indicated by the findings of this research project and literature on similar topics, professional development is likely to have a positive impact on supporting teachers to implement the digital technologies curriculum content (Ministry of Education, 2018b).

**Key finding 13: External professional development and support may suit the needs of some schools.**

One suggestion from an interview participant for enabling them to feel successful at integrating the digital technologies curriculum content included support from IT teacher who was available at all times.

The use of internal professional development or support has been identified in literature (Davis et al., 2015; Overbay et al., 2011; Sheningger, 2013).
However, one participant suggested that professional development provided by staff in the school would not be as effective as using outside facilitators. This perspective was held for a number of reasons, with the participant reporting:

I can just imagine the process of trying to design it ourselves; it would be met with complete and utter resistance. Whereas, if we got somebody from outside, there’s almost, kind of, they’ve got that little bit more, not respect, but authority to be like, “This is what you need to do.” I don’t know. I’d like it to be a balance, because we don’t have the expertise to do it all. Obviously there’s heaps of stuff online but it’s finding the time to sit down and plug it all together. (PA-SD)

The same participant discussed resourcing support, explaining that:

I think that as a school we would have to invest in a heavily dictated kind of programme, where all the planning is done, all of the assessment kind of frameworks are there, the resources are there, and it’s very step by step. (PA-SD)

Both the use of internal (Davis et al., 2015; Overbay et al., 2011; Sheninger, 2013) and external (Sheninger, 2013; Wright, 2017) professional development, or support, for schools has been highlighted in literature. Wright (2017) comments on the ability of external practitioners to provide insight sometimes not offered by internal practitioners. The implementation of the digital technologies curriculum content (Ministry of Education, 2018b) will be individual to the needs of a school. However, there are professional development tools available for schools to use (IT Professionals New Zealand & Ministry of Education, 2018; Ministry of Education, 2018a; The Mind Lab, n.d.), that utilise both knowledge from internal practitioners and external agencies.

Key finding 14: Some teachers may lack motivation to develop their understanding of the digital technologies curriculum content.

One participant who was an IT leader in their school explained that it would be more challenging for the staff at their school than for them when integrating the digital technologies curriculum content (Ministry of Education, 2018b) into their practice (n=1/8), explaining:

I think it will be more of a challenge for my staff and supporting them and encouraging them to allow the kids to give it a go, especially in the areas of coding and robots and that kind of stuff. (PA-SA)

Three participants discussed other teachers’ confidence or willingness to try the new curriculum out (n=3/8). Participants stated that:
A lot of people just get really freaked out by it so; it’s not as bad as it sounds. (PA-SA)

Purely the staff confidence I think. Not necessarily knowledge, because everybody can learn, but the confidence to apply that, and the willingness. There’s a lot of reluctance and hesitation to try new things; even for them, let alone teaching it to the children. (PA-SD)

If they’re not confident; even though their kids could use it and teach them [technology and devices]; that’s a barrier with the tech. (PA-SB)

The need to build teacher confidence for developing successful ICT/digital device programmes was also identified by PA-SD.

Participants described a lack of motivation, willingness, and confidence for other staff at their schools. Perhaps a lack of motivation and willingness is connected to a lack of confidence for teachers, leading to a need to provide abundant support and professional development, as previously identified. Literature comments on the development of culture of risk-taking within a school (Mackey et al., 2015; McLeod, 2015; Seong & Ho, 2012; Yuen et al., 2003) which may speak to a lack of motivation to change, as well as trusting and respectful relationships (Davis et al., 2015; Mackey et al., 2015; Yuen et al., 2003).

In addition to this, Osborne (2014) identifies the importance of bringing teachers into the change process, which helps to build an emotional connection to the idea and give them “a purpose to believe in” (p.6). For teachers who are not motivated or willing to integrate the digital technologies curriculum content (Ministry of Education, 2018b) into their practice, being involved in designing this change process gives control, increasing ownership and participation.

**Conclusion**

This chapter has outlined the findings of this research project in regards to the research questions. It has identified the results of the online questionnaires and semi-structured interviews.

The first research question studied teachers’ perceptions of digital devices. The key findings that emerged included teachers’ perceptions of digital device and digital literacy importance, the effective use of digital devices which can be used to support students’ learning when they have literacy and numeracy levels, as well as the unsuitability of digital devices for some areas of learning.
The second research question explored the strategies that teachers use to manage the complexities of the decile 1 environment. Key findings indicated a need to teach basic digital skills and the safe use of digital devices and highlighted teachers’ use of deliberate, purposeful decisions when utilising digital devices in classrooms.

The third research question investigated the advantages and challenges faced by teachers in decile 1 schools integrating the digital technologies curriculum content (Ministry of Education, 2018b) into their practice. Key finding advantages included the perception that the digital technologies curriculum content (Ministry of Education, 2018b) is an advantage for students’ present lives and future lives, as well as their Digital Native status (Prensky, 2001). Key finding challenges included a lack of digital devices and access to the internet in students’ homes and, in contrast, the use of digital devices for entertainment in students’ homes. Comments from one participant resembled an anti-deficit approach to teaching. Further to this, other challenges presented in the key findings revealed that teachers have a lack of understanding of the digital technologies curriculum content (Ministry of Education, 2018b) which may be impacted by their Digital Immigrant status (Prensky, 2001), and misconceptions between eLearning and the digital technologies curriculum content (Ministry of Education, 2018b) for teachers.

The fourth and final research question explored teachers’ needs for teaching the digital technologies curriculum content (Ministry of Education, 2018b) specifically within the context of decile 1 schools, leading to the development of recommendations relevant to this environment. The key findings showed that participants believed a strong digital device or ICT programme within a school included the use of digital devices as tools to support many learning areas. Other connected key findings include teachers’ need for professional development to build their knowledge of the digital technologies curriculum content (Ministry of Education, 2018b) and the effectiveness of external providers for this task. Another finding was the predicted lack of motivation to implement the curriculum for other staff members in participants’ schools.

The following chapter will discuss the key findings from each of the research questions with respect to literature.
Chapter 5: Discussion

Introduction
This research project has explored teachers’ perceptions of digital devices and the digital technologies curriculum content (Ministry of Education, 2018b) in diverse decile 1 schools. The findings from the semi-structured interviews and online questionnaires were analysed and reported on in Chapter 4, identifying the key findings in this research. In this chapter, the significant findings from this study, identified in the previous chapter, will be discussed in relation to a body of relevant educational literature. To aid clarity, the discussions in this chapter have been organised in order of the research questions and there has been some reorganisation where ideas are linked.

Diversity within decile 1 schools
A key term in the research aims and questions of this research project is ‘diversity’. This term recognises that while this project is set within the context of decile 1 schools, no student, classroom, or school is the same. The findings from this research found that teachers were very aware of the ethnic and cultural diversity of their classrooms. This diversity is also recognised by Alton-Lee (2003) who comments on the importance of this factor for New Zealand schools. The ethnicities in decile 1 schools are largely represented by Māori and Pacific students, who make up 49.2% and 40.6% respectively (Ministry of Education, 2019a). Within these groups there are large diversities, such as, iwi, village, and country. While Māori and Pacific students make up the majority of students, there are many other ethnicities represented in these schools, including Asian, European, Middle Eastern, Latin American, and African (Ministry of Education, 2019a).

As well as ethnic and cultural factors, diversity encompasses many other areas (Alton-Lee, 2003). Darling-Hammond, Wise, and Klein stress that “educators must be prepared to address the substantial diversity in experiences children bring with them to school — the wide range of languages, cultures, exceptionalities, learning styles, talents, and intelligences” (as quoted in Futrell, Gomex, & Bedden, 2003, p. 382). Patterns or groups of ethnicities and cultures play a large role in the diversity of decile 1 classrooms, as identified by the participants in this research project. However, patterns other than ethnicities amongst diversity appear within decile 1 schools. For example, the range of learning needs, and lack of access to digital devices and the internet as identified by participants in this study. While the key findings of this research project are based on the patterns found amongst the perceptions of teachers in decile 1 schools, it is important to
note that each classroom is diverse. Teachers must be observant and responsive to the diversity of the individual learners in their own classrooms (Alton-Lee, 2003).

**Teachers’ perceptions**

The first research question in this project asked, ‘how do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?’ Yan and Zhao (as cited in Nikian, Nor, & Aziz, 2013) indicate that teachers’ perceptions and classroom technology use are linked. Therefore the exploration of teachers’ perceptions holds importance as it “provides a means for promoting a more meaningful use of this technology in the classroom setting” (Domingo & Garganté, 2016, p.22). Value is defined as “The regard that something is held to deserve; the importance, worth, or usefulness of something” (Lexico, 2019, para. 1). Thus, in this research project, the exploration of the teachers’ perceptions on the value of digital devices includes their opinions of digital device importance in the classroom. This exploration is increasingly valuable in light of the requirements of the recently introduced digital technologies curriculum content (Ministry of Education, 2018b) and the large numbers of schools utilising digital devices. Consequently, this research project investigated the perceptions teachers in diverse decile 1 schools held about digital devices. The perceptions relevant to this research question have been discussed with reference to literature in the following section.

**The importance of digital devices and digital literacy**

The key findings of this research project show that a significant number of teacher participants believe that the use of digital devices is important in decile 1 schools. These results confirm the findings of another study carried out by Liu et al. (2016) which revealed that primary teachers believe digital technologies hold importance in their teaching practice and, in particular, teachers with fewer years’ experience hold higher perceptions of importance than those with more experience. Other studies into teachers’ perceptions revealed that teachers felt positively about the use of digital devices in their classrooms due to the benefits of their use (Nikian et al., 2013; Sadaf & Johnson, 2017). Another study also found that teachers felt positively about digital devices use in their classrooms, however, Sánchez et al. (2012) recognises that although teachers may hold strong beliefs about the importance of digital device use, these perceptions may not always be reflected in their classroom practice. This discrepancy may be due to a number of factors and was not investigated in this research project. The findings of this research project are in agreement with literature, confirming teachers’ perceptions that the use of digital devices is
important. This key finding adds to the educational literature, specifically confirming this teacher perception within the context of decile 1 schools.

Further supporting teachers’ belief of digital device importance, participants in this study revealed a perception that digital literacy is as important as literacy and numeracy, within the context of decile 1 schools. The Ministry of Education (n.d.) defines digital literacy as “know[ing] how to use digital technologies and what to do with them” (para. 1). This perception is significant for decile 1 schools when in comparison with decile 10 schools there are significantly lower levels of achievement in reading, writing, and mathematics (Ministry of Education, 2016b, 2016c, 2016a). In 2016, decile 1 schools’ national standard achievement was between 25.3%-27.1% behind that of decile 10 schools in these areas of learning (Ministry of Education, 2016b, 2016c, 2016a). This large achievement gap between decile 1 and decile 10 schools intensifies the need to focus on these curriculum areas for teachers teaching in decile 1 schools. This comparison of equal importance between digital literacy and other curriculum areas reveals a teacher perception that digital literacy is important within the context of decile 1 schools. This is a valuable insight gained in light of the weight this perception holds for teaching actions which are linked (Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013).

Unqual access to digital devices and the internet

For 36.8% of the participants, the importance of using digital devices in decile 1 schools was linked with the issue of home access to devices and/or the internet. One participant commented on this issue, explaining, “in order for our kids to have that step up and to be able to have that same advantage as those kids in Remuera or the kids out in Botany; they’ve got to have every step and every helping” (PA-SH). This statement echoes the comments of Nicholas and Fletcher (2017) who identify that “the lack of internet connections and computers in poorer [lower socio-economic] homes did not allow for a level playing field for all children” (p.487). In another New Zealand study carried out by Johnson et al. (2017), household access to the internet was comparatively lower in low decile schools than in high decile schools. This inequality and importance of this issue described by the participants in this study and the discussed literature highlights the need to for more to be done in this area.

Some strategies used within low decile schools that respond to the lack of internet and digital devices in students homes on a school level, include a reliance on charities for additional funding (Fletcher & Brooks, 2006) and, at some secondary schools, devices owned by schools for student
use (Cathy Wylie & Bonne, 2016). However, initiatives that mitigate the impact of a lack of digital devices and/or the internet in students’ homes, by addressing this issue within the homes of students are few. However, there are some identified initiatives to address this issue. These include a charitable trust, Computers in Homes (2019) which supports families in decile 1-3 schools across New Zealand. This initiative is separate from schools, but, supports them and their students’ families (20/20 Trust, 2017a). This charitable trust provides “for a cost of $50 … 20 hours of free training, a refurbished computer or device, 12 months’ subsidised internet connection (optional) and technical support” (Computers in Homes, 2019, para. 2) to families in low decile school areas (20/20 Trust, 2017a). As a charitable trust, Computers in Homes (2019) was funded by the Ministry of Education, however, this funding ceased in mid 2017. Another initiative addressing this issue within students’ homes includes the Manaiakalani Education Trust (Jesson et al., 2014). This trust provides community internet access and low-priced digital devices which encourage the flow of learning between school and home for a group of schools in Tamaki, Auckland (Jesson et al., 2014). Further to this, this particular initiative “draws on resources from philanthropy, the New Zealand Government and national and local businesses to ensure the programme’s long term sustainability” (Manaiakalani, n.d.-a, para. 3). The funding used by these two initiatives demonstrates the importance and large scale nature of the lack of access to the internet and digital devices issue, and perhaps, the inability of schools to address these issues alone.

A noticeable finding in this research project was the small number of initiatives that schools use to respond to a digital device inequality and/or internet access in students’ homes, which address this issue within students’ homes. While these initiatives were not overtly inquired into, only one participant in this research project commented on a school programme that supported families to mitigate the impact of digital device inequality by supporting families to access digital devices. Further to this, only a small number of initiatives and strategies were found throughout literature addressing these issues (20/20 Trust, 2017a; Fletcher & Brooks, 2006; Jesson et al., 2014; Cathy Wylie & Bonne, 2016). The findings from this research project and available literature confirm a lack of access to digital devices and/or the internet for households in decile 1 communities. The small amount of discussion and literature identifying initiatives mitigating this, add to the current educational literature, exposing a need for more initiatives and programmes that address this issue. As Nicholas & Fletcher (2017) explain, without these we are unable to “level [the] digital playing field for all children” (p. 487).
Home lives and use of digital devices

One perception raised by the teacher participants in this research project was that digital devices and the internet, when available in students’ homes, were used for entertainment purposes. One questionnaire participant discussed students viewing digital devices as entertainment (n=1/11).

Other interview participants explained:

My kids are particularly used to digital devices because with the PlayStation or the games they have at home … they’re given that freedom to go on YouTube so it becomes a battle of their own personal attitudes and what I’m actually wanting to achieve as a teacher. (PA-SF)

I guess the way that most of my children, from what I see, is that they’re using it for YouTube, and trying to help them unlearn that it’s not a device to just watch movies, is difficult. (PA-SE)

… just sitting in front of the TV, and in front of the iPad with mum’s phone, or whatever. That reliance on technology we’re finding that’s a big thing… (PA-SD)

The use of digital devices for entertainment is also reflected in a study by The University of Auckland (2017) who found that 27% of primary school boys said the most commonly used function of their cell phones was gaming. The use of digital devices for entertainment in students’ homes is in contrast to the data from this research project on the lack of access to digital devices in students’ homes. Both of these key findings provide interesting insights into the impacts on students in decile 1 schools.

Despite a number of participants discussing an inequality of access to digital devices and the internet, a contrasting theme that presented in the findings was the large use of digital devices for entertainment purposes in students’ homes and the impact this had on classroom use. Literature highlights the widespread use of digital devices in students’ lives (Prensky, 2001; UNICEF, 2017) and in a report, UNICEF (2017) commented that “the rapid proliferation of information and communications technology (ICT) is an unstoppable force, touching virtually every sphere of modern life” (p. 8). One participant in this project highlighted a similar belief stating, “students are growing up in a digital world” (P8). This prolific use of digital devices was also identified by participants in this research project in regards to how they are used, with 35.3% of participants also commenting that in students’ homes digital devices are used for entertainment (television, movies, gaming). However, it has been found that despite students living in digitally rich worlds with regular access to digital devices and/or the internet, this does not guarantee they hold the necessary skills for interacting in the digital world (Sadaf & Johnson, 2017). The participants’
statements in this study agreed with this idea, with one participant explaining that “…kids are not learning how to use these things [digital devices] properly; social media and all that kind of stuff. They’re just landing themselves in all sorts of trouble…” (PA-SA). One such skill that prepares students for living in a digitally rich world is digital literacy, that is “know[ing] how to use digital technologies and what to do with them” (Ministry of Education, n.d. para. 1). This skill is identified by many studies that discuss the necessity of digital literacy for the future world students will interact in (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010; Sadaf & Johnson, 2017). However, only a few recognise the importance of digital literacy for the present day (Engelhard and Seo, and Collis and Moonen, as cited in Adhikari, Parsons, & Mathrani, 2012). The findings of this research project highlight the importance of teaching digital literacy for today, not just tomorrow, due to the high use of digital devices in students’ homes, particularly for entertainment purposes.

Life outside the computer – A range of skills

Another key finding of this research project showed that teachers had differing perceptions on the ability of digital devices to address the range of skills students require. These skills included social and oral language skills, physical skills and real experiences rather than only virtual experiences. While participants believed that digital devices are important, some also felt strongly that “there is life outside of the computer” (PA-SB) and that digital devices are not necessarily used to support students in developing all skills their students required. This perception is also reflected in literature which recognises that digital devices are not always well suited to every learning opportunity (Parsons, as cited in Parsons & Adhikari, 2016). This perception is not widely researched throughout literature and, if investigated, could offer insight into possible limitations for digital device use in classrooms (Sheninger, 2013).

Some participants in this study commented on the struggle to balance students’ oral language learnings needs with digital device use in classrooms, implying that digital devices are unable to support oral language development. However, in contrast to this perception, one participant commented on the ability of digital devices to support oral language development through the apps and activities that are used. This participants’ comment is reflective of Sheninger’s (2013) statement in a practitioner article claiming “the true value of technology rests on how it is used to support learning and to create experiences that students find meaningful and relevant” (p. 62). Other case studies show that digital devices are able to support oral language development (Burt, 2007; Callow & Orlando, 2015; Fletcher & Brooks, 2006) and literacy instruction (Callow &
Orlando, 2015; Schechter, Macaruso, Kazakoff, & Brooke, 2015). The results of this study identified a teacher perception that digital devices cannot be used to address all learning needs that students have. This perception is in conflict with statements by Sheninger (2013), who identifies that the way digital devices can be used allows them to support learning (2013), suggesting that there is an opportunity for schools to widen teachers’ understanding of the particular ways digital devices can be used to support certain areas of learning.

**Teachers’ strategies**

The second research question asked, ‘what are the current strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?’ All classrooms are complex environments that have a number of factors impacting on their day to day running, regardless of decile. However, decile 1 classrooms have common factors that impact on students and, consequently, are likely to have common strategies that teachers use to address the complex needs of their students. The investigation of this research question has led to a widened understanding of the needs of students in decile 1 classrooms and offers a more informed view of some successful and applicable strategies teachers and schools can use. This section explores the relevant strategies from the key findings that teachers use when integrating digital devices into their classrooms in diverse decile 1 schools, with reference to educational literature.

The participants’ discussions relating to the second research question addressed the specific strategies that the teachers used within their classrooms to mitigate the complexities of the factors impacting on digital device use within the decile 1 environment. However, due to the large scale nature of the factors raised by some participants, such as access to digital devices and/or the internet, it is recognised that to some degree, teachers are unable to address these complexities within the scope of their classrooms. Further research into the strategies schools can use to mitigate these complexities is likely to provide a more in depth understanding.

**Factors impacting on students**

Throughout the research project comments were made by participants on the wider group of factors that impact on students. When commenting on the challenges of incorporating the digital technologies curriculum content into their teaching one participant explained:

… poor knowledge of the world from the children starting school. It is a challenge as their language is poor anyway let alone when incorporating technical jargon. (P11)
Milne (2014) highlights the injustice of an education system that places value on knowledge belonging to particular groups of people, thus, devaluing knowledge belonging to other groups of people. In particular, Milne (2014) recognises “normalised practice that damages Māori and Pasifika learners” (p. 224) within education. This participants’ comments highlight that the world knowledge schools value may not be in accordance with the world knowledge that students bring to school. These comments look to students and families to explain students’ school performance and reflect deficit thinking (Valencia, 1997b).

However, when discussing the factors that made teaching low decile children with digital devices difficult, one interview participant stated that there wasn’t ‘anything’, instead commenting that it was the teacher’s mindset that made teaching low decile children difficult (n=1/8).

I don’t think our kids can’t do anything, and if they don’t know it, then I take it; it’s on me, to scaffold, or to break it down, or to do micro-steps. Yeah I don’t think they can’t do anything. (PA-SE)

The discussion from this participant resembles anti-deficit thinking, which holds teachers and schools solely accountable for achievement, rather than looking to the student (Thrupp, 2014).

However, when answering the same question, a significant number of interview and questionnaire participants identified the lack of access to digital devices or the internet in students’ homes (n=8/19), which PA-SE had recognised in an earlier part of their interview. Other factors identified by the participants included low literacy levels (n=3/8), ESOL, social and oral language skills, and internet safety.

PA-SE’s comments are in line with quality teaching practices identified by Alton-Lee (2003) and hold the teacher accountable for their effectiveness, as with anti-deficit thinking (Thrupp, 2014). Previously in their interview PA-SE identifies a lack of family access to the internet, however in this instance does not appear to acknowledge the wider group of factors that impact on students’ learning, as identified by other participants in the same interview question. Thrupp (2014) highlights the need to recognise these factors impacting on education in order to address them.
Deficit and anti-deficit thinking

While not overtly inquired into in the online questionnaires or semi-structured interviews, deficit and anti-deficit thinking are relevant to discussions about decile 1 schools and, thus, this research project. Valencia (1997a) describes deficit thinking as the “person-centered explanation of school failure among individuals … rooted in students’ alleged cognitive and motivational deficits, while institutional structures and inequitable schooling arrangements that exclude students from learning are held exculpatory” (p. 9). Essentially, this thinking is “blaming the victim” (Valencia, 1997b, p.x), whereas anti-deficit thinking is described as “put[ting] all the responsibility for student achievement on teachers and schools” (Thrupp, 2014, p.88). Throughout the interviews, a comment one participant made reflected deficit thinking putting the responsibility of student achievement on families (Thrupp, 2014). This participant discussed the little knowledge students bring to school with them. However, students bring a wealth of knowledge about their own worlds to school and raises the matter of “whose knowledge really counts” (Milne, 2014, p. 224) in schools. In contrast, one participants’ comments suggested their teaching practice is rooted in anti-deficit thinking. The participant commented, “I don’t think our kids can’t do anything, and if they don’t know it, then I take it; it’s on me, to scaffold, or to break it down…” (PA-SE). This strong belief is aligned with Alton-Lee’s (2003) research identifying features of quality practice for teachers, including high expectations of students and for achievement, resembles anti-deficit thinking. However, this participant’s comments may also suggest a lack of engagement with the realities of the factors impacting on the learners in the decile 1 context.

In this instance, the comment PA-SE made strongly portrayed teachers as catalysts for student achievement, without recognising the wider group of factors that impact on student learning (Thrupp, 2014), acknowledged by other participants in this study. Although this participant had earlier recognised a lack of access to devices and the internet in students’ homes, this comment appears to show their practice is rooted in anti-deficit thinking (Thrupp, 2014). According to Callow and Orlando (2015), “pedagogy that does not address the needs of low SES [socio-economic status] communities can amplify rather than alleviate these existing challenges for learning” (p. 367), and perhaps a more holistic approach may recognise the teachers, school, students’ homes and environments as important factors, all of which can impact on student achievement. As Thrupp (2014) explains:

…The New Zealand schools that are most effective at dealing with poverty are those who recognise its effects cannot just be left at the school gate. Rather they have a realistic understanding of their disadvantaged contexts. Their school policies and practices reflect that understanding as they seek to make a difference in numerous ways… (p. 99-100).
There are a number of examples of “realistic understanding” (Thrupp, 2014, p. 99) where schools have employed initiatives reflecting this and address the issues that impact students in low decile schools such as KickStarter, Fruit in Schools and KidsCan (Wynd, 2014). Despite this, there appears to be a lack of documented New Zealand digital initiatives that reflect this understanding, such as Manaiakalani (Jesson et al., 2014). Consequently, these particular perceptions and comments from this research project remain somewhat unexplored due to the focus of the research questions and the scope of the project. Despite this, they bear weight and, consequently, further investigation into teacher perceptions and digital initiatives that surround deficit and anti-deficit thinking in decile 1 schools in New Zealand may provide insights into effective strategies schools and teachers can use.

**Basic skills and safe use of devices**

A large group of the interview participants discussed the teaching of basic digital skills within their classroom programmes as a strategy to manage the complexities of decile 1 classrooms. The teachers described a range of skills that needed to be taught before students were able to effectively utilise digital devices in their classrooms. These skills included word processing, keyboard navigation, management of online content, boundaries of internet use, care and handling of devices, cyber security and safety, account navigation, and digital citizenship. In addition to this, many questionnaire participants identified the importance of teaching digital literacy. Similarly, one teacher from Parsons and Adhikari's (2016) study also commented on the surprising need to teach basic skills to students. The skills such as account navigation and word processing, described by the participants in this study are reflective of the Ministry of Education's (n.d.) description of digital literacy, defined as “know[ing] how to use digital technologies and what to do with them” (para. 1). In a census of school aged children by The University of Auckland (2017), gaming for 27% of boys, and messaging for 32% of girls, were named as the most popular uses of digital devices in primary aged students' own time. This high use of digital devices for entertainment purposes equips students with the digital skills for entertainment. Although these students possess entertainment skills, while likely to be transferrable to some degree, differ from the skills students are required to use when using digital devices for learning at school, such as word processing and account navigation. Although the students in primary schools are Digital Natives who have grown up immersed in a digital world (Prensky, 2001), students’ proficient use of digital devices does not necessarily correlate to digital literacy (Sadaf & Johnson, 2017) in all areas. This echoes the findings of this research project and, consequently, teachers should include basic digital device skills in their teaching programmes. These skills will support the effective use of digital devices in decile 1
schools and students’ homes, due to the experiences with digital devices that students bring to their learning.

**Deliberate, purposeful decisions for learning experiences**

Teachers described the deliberate and purposeful ways they made decisions when choosing the activities that their students completed using digital devices in their teaching and learning programmes. Participants explained that they ensured the use of digital devices in their classrooms was suitable for the learning focus, relevant, achievable, able to be completed independently, and supportive of present learning. According to Sheninger (2013), it is the way that digital devices are used that holds significance for learning. Sheninger's (2013) suggestion affirms the strategy described by teachers in this research project who identified the use of deliberate, purposeful decisions to guide digital device use. Further to this, these deliberate, purposeful decisions align with the best evidence for teaching practice identified by Alton-Lee (2003), who suggests that resources should be used in agreement with the curriculum and with “an unrelenting focus on students achievement and learning” (p. ix). For these teachers, this strong focus on student learning was shown through the deliberate choices they made when selecting activities for their students on digital devices. This is demonstrated by one teacher’s comments that their use of digital devices wasn’t “just for the sake of using technology” (PA-SH). The purposeful use of digital devices that emerged in this research project is similarly found throughout literature where digital devices have been used to tailor learning to the needs of students (Ottenbreit-Leftwich et al., 2010; Schechter et al., 2015), encourage learning in particular areas of need (Fletcher & Brooks, 2006), and engage students in literacy learning through particular activities (Fletcher & Brooks, 2006; Fletcher & Nicholas, 2018). The findings of this research project highlight the deliberate, purposeful nature of the decisions that teachers make about how digital devices are used within their classrooms and are supported by relevant literature where digital devices have been used in deliberate ways for learning.

However, participants in this research project commented on the tension between the need to focus on literacy and numeracy due to low levels. Despite the tension identified by participants, studies have shown meaningful uses of digital devices in the context of early childhood and early primary school education within literacy (Beschorner & Hutchison, 2013; Couse & Chen, 2010) and numeracy (Schacter & Jo, 2016). In a study carried out by Berkowitz et al. (2015) it was found that first grade children and parents’ home use a particular app showed an increase in mathematics achievement, similarly, the findings of Beschorner and Hutchison’s (2013) study found that the
use of digital devices could support literacy in early childhood education. These examples of digital
device use in early childhood and early primary school environments are perhaps comparable to
possible uses of digital devices with primary school children who have low literacy and numeracy
levels and demonstrate the ability of digital devices to be used with these levels of learning. As
indicated by one participants’ comments in this research project, “if you [the teacher] know what
digital tools and platforms are effective, these can help with numeracy, literacy and digital literacy.”
Thus, the findings of this research project identifying the use of deliberate, purposeful decisions
when using digital devices and literature affirming that digital devices can have meaningful uses in
eyearly childhood education (Beschorner & Hutchison, 2013; Couse & Chen, 2010) suggests that
digital devices can be meaningful when used with students who have low levels of literacy and
numeracy. This is further confirmed by the comments from one participant in this research project
in agreement with Sheninger’s (2013) assertion that the way digital devices are used holds
importance.

**The digital technologies curriculum content: Advantages and challenges**

The key findings of the third research question revealed interesting ideas in relation to the digital
technologies curriculum content (Ministry of Education, 2018b). It asked, ‘what do teachers in
diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating
the new digital technologies curriculum content in the technology learning area of *The New Zealand
Curriculum* into their practice?’

The digital technologies curriculum content (Ministry of Education, 2018b) has recently begun to
be implemented into schools from 2018 (Ministry of Education, n.d.-f). The curriculum content
includes two new technological areas, Computational thinking for digital technologies (Ministry of
Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d).
The first technological area focuses on computational thinking; this includes the use of algorithms,
problems and solutions, the storage of digital information, and programming (Ministry of
Education, 2018b). The second technological area teaches students about ways that humans
interact with the digital world, including designing and producing outcomes using digital tools
(Ministry of Education, 2018b).

Given the short period of time the document had been in place when this research was conducted,
it appeared that teachers were discussing the curriculum with limited understandings of its full
content, likely limiting their ability to answer the interview and questionnaire questions. However,
this section discusses the findings of this research project in relation to some relevant educational literature and begins examining the advantages of implementing the digital technologies curriculum content (Ministry of Education, 2018b) as a result of the data that was gathered.

**Advantages of the digital technologies curriculum content**

Overall, when discussing the advantages the digital technologies curriculum content (Ministry of Education, 2018b) would bring for students, there was a lack of strong themes that emerged from the participants from within the findings. Some of the advantages that participants discussed included integration throughout the other areas of the curriculum, new skills that students would be learning, introducing new ways of thinking, and bringing structure within digital technologies learning. However, one theme of significance was the future-focused view participant teachers had of the digital technologies curriculum content (Ministry of Education, 2018b).

**Students as Digital Natives**

Comments from some participants described the way that digital devices are normal in students’ worlds. Two interview participants identified their students’ worlds as their strengths (n=2/8), commenting that technology is all around their students, facilitating their use of digital devices. Similarly, another participant discussed their students’ interests (n=1/8). One connected this to the idea that digital devices are already part of students’ worlds (n=1/8). In contrast, the other participant commented that their students were fast learners, which was beneficial for those who did not have access to digital devices in their homes (n=1/8). These factors were explained with participants commenting:

They're just willing to give it a go. And I guess it’s ‘cause they see it everywhere. (PA-SA)

This is what they're growing up on now. They probably weren’t all born with the latest tech because our kids are about 11… I’m not having to go, “Push that home button there. That’s how you get on it.” They can all pick up something and use it… It’s quick for them to pick up because they do play with it at home. (PA-SB)

He loves Prodigy. He will take himself to do that; log himself on and he’s happy to sit on there and play Prodigy, so I guess that’s him going, “I want to be responsible for my own learning…” I guess it’s given him the opportunity to progress his own learning without me. (PA-SE)

The comments of these participants demonstrate the Digital Native status of the students in their classes, as described by Prensky (2001). These students described by participants are immersed in
a digitalised world and have never lived outside of this kind of environment, thus many digital concepts are second nature (Prensky, 2001).

Future-focused

The digital technologies curriculum content (Ministry of Education, 2018b) was perceived by a small number of teachers as a positive component of learning that prepares students for their futures. This positive perception recognises that this curriculum content (Ministry of Education, 2018b) is important and relevant for the students who fill teachers’ classrooms. Prensky (2001) uses the term Digital Native to describe the people or students who have only ever lived in a digital world, and the term Digital Immigrants that describe the people or teachers who have not. Despite this divide described by Prensky (2001), significantly, the participants in this project recognised the importance of this curriculum content for their students’ futures (Ministry of Education, 2018d). This way of thinking may be connected to The New Zealand Curriculum (Ministry of Education, 2007) where it describes a “future focus” (p.9) as one of the principles that underpin schools and their teaching and learning programmes. Within its supporting documents for introducing the digital technologies curriculum content (Ministry of Education, 2018b), the Ministry of Education (n.d.-d) identifies this principle as a motivation to change the curriculum to include digital technologies due to the relevance it holds for students. While only a small number of participants commented on the benefit the digital technologies curriculum content (Ministry of Education, 2018b) would bring for students’ futures, this perception is in agreement with other studies where teachers identified the importance of digital learning as necessary for students’ futures (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010). Interestingly, in conflict with this view, one teacher commented on the mystery of the future and, therefore, the inability to fully predict relevant digital technologies teaching content. Instead, this participant cited soft skills that are applicable across situations as important qualities to be taught, regardless of what the future entails. This participants’ concerns are valid due to the rapidly evolving nature of technology and, in contrast, the transferability of soft skills across situations as they deal with how to interact with people (Doyle, 2018). Similarly, another participant commented on this rate of change, describing how their cell phone was once an advanced piece of technology however many new versions have been released with newer technology. In light of these concerns, the suggestion that soft skills are important due to their transferrable nature is a justifiable application for schools when considering how they introduce the digital technologies curriculum content (Ministry of Education, 2018b) into their teaching and learning programmes.
Despite the positive perception that the digital technologies curriculum content (Ministry of Education, 2018b) is relevant to students’ futures, it is also a limiting perception that neglects the significance of the present. In agreement with this, Sadaf and Johnson (2017) recognise the necessity to include digital literacy in education for students’ future lives, however this does not address the issues of today. A small number of participants acknowledged the importance of digital device use for students’ present lives, however, this was not recognised for the digital technologies curriculum content. While Sadaf and Johnson’s (2017) study focuses on digital device use, the ideas are likely applicable to the digital technologies curriculum content (Ministry of Education, 2018d). The lack of comments from some participants on the present may indicate teachers’ misconceptions of the relevance of the digital technologies curriculum content (Ministry of Education, 2018b) for the present and not just the future. In 2001, Prensky identified the present generation of students as Digital Natives (Prensky, 2001), and despite this term being coined eighteen years ago, it holds even more weight and truth for today’s students in our schools due to the continual advancement of the digital world. According to UNICEF (2017), “the rapid proliferation of information and communications technology (ICT) … [has been] an unstoppable force, touching virtually every sphere of modern life” (p.8), as evident by the use of digital devices in homes and throughout society. The perceptions held by the teachers in this research project pose a challenge to schools to develop teachers’ perceptions of digital technologies and their understanding of the relevance this area of learning has to students’ present lives, not only the future, when beginning to implement the digital technologies curriculum content (Ministry of Education, 2018b).

Challenges of the digital technologies curriculum content

Teachers as Digital Immigrants

In contrast to the digital native status of students, participants discussed the difficulty of teachers using digital devices and integrating the digital technologies curriculum content (Ministry of Education, 2018b) due to their own levels of knowledge. Two interview participants identified that their own knowledge would be a challenge for integrating the curriculum (n=2/8), both of whom relied on other teachers to support their professional development in this area. One of the participants explained that, while they had tried to focus on upskilling, this was a difficult task:

… I’m still waiting for that one-to-one help to happen and the only thing I can do is to really nab people whenever I can which is very, very difficult because they have their own work to do. (PA-SF)
I think my own knowledge. I have to sort of stay one step ahead, because technology’s not my strength. So for me, I’m going on my CRT [Classroom Release Time] day, and seeing our IT leader, and she will sort of teach me something, and then I’ll go back and try that, and then I’ll come up with more questions… (PA-SG)

One factor influencing teachers’ lack of knowledge may be their Digital Immigrant status (Prensky, 2001, p. 2). Teachers’ digital experiences are vastly different from students’ due to the rapid advancement of digital technologies. These teachers described an adoption of digital knowledge, relying on someone else to support them, rather than being Digital Natives who have grown up with this knowledge surrounding them (Prensky, 2001).

**Teachers’ lack of digital technologies curriculum content knowledge**

A number of participants identified a lack of knowledge on the content of the digital technologies curriculum content (Ministry of Education, 2018b) either in themselves or in other teachers. The questionnaire revealed teachers neither agreed or disagreed that they had a good understanding of Designing and developing digital outcomes (Ministry of Education, 2018d) and generally they did not have a good understanding of Computational thinking for digital technologies (Ministry of Education, 2018d); the two technological areas of learning in the digital technologies curriculum content. This lack of knowledge is to be expected with the implementation of new curriculum content (Ministry of Education, 2018d), which previously has not been widely explored across schools. Up until 2017 when the draft digital technologies curriculum content was released (Ministry of Education, 2017c), The New Zealand Curriculum (Ministry of Education, 2007) did not contain any reference to digital technologies. Instead, the curriculum only contained references to the use of ICT for future education, and as an eLearning tool used to support the work of The New Zealand Curriculum and the key competencies (Ministry of Education, 2007). This may explain the lack of content knowledge identified by the participants in this research project.

Another factor that may have impacted on teachers’ lack of content knowledge of the digital technologies curriculum content (Ministry of Education, 2018b) is teacher age. Overwhelmingly, 96.08% of primary school teachers are over the age of 25 (Ministry of Education, 2019c), whereas today’s students are Digital Natives (Prensky, 2001); consequently, the vast majority of primary school teachers have had very different digital experiences from their students. Teachers who are under this age are the most likely to have some similarities in their digital experiences to the students they teach. Naughton (2016) argues that 2007 was a significant year for the world as Apple released their first iPhone, dramatically changing the way that people communicated with
each other and used the internet, meaning that the students in primary schools have never lived in a world without rapid communication over distance and prolific internet use that came with the rise of the iPhone. As the majority of primary school teachers are not Digital Natives, rather are Digital Immigrants who have adopted new digital ways, Prensky (2001) suggests that “our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language” (p.3). This is evidenced through the lack of content knowledge the majority of teachers hold. Some participants in leadership positions briefly discussed staff confidence as a challenge for implementing the digital technologies curriculum content (Ministry of Education, 2018b). The lack of knowledge described by teachers for various reasons, including the newness of the curriculum content, being Digital Immigrants and the lack of confidence described by leaders are possibly linked, and pose a challenge for schools to provide adequate opportunities for teachers to build their content knowledge when implementing the digital technologies curriculum content (Ministry of Education, 2018b).

**Misconceptions between digital technologies and eLearning**

Some discussion participants had on the digital technologies curriculum content (Ministry of Education, 2018b) exposed a misconception in their understanding and knowledge of the differences between the digital technologies curriculum content (Ministry of Education, 2018b) and eLearning. This was clear from the scenarios participants gave when discussing the curriculum content. For example, one participant described an eLearning activity, such as using an iPad to search Google for information as a digital technologies activity. A lack of understanding around these two concepts may lead to an inaccurate interpretation of the progress outcome statements used in the wording of two revised technological areas, Computational thinking for digital technologies (Ministry of Education, 2018d), and Designing and developing digital outcomes (Ministry of Education, 2018d) amongst teachers. This hinders the ability of the curriculum content to progress students’ understandings of digital technologies. This misconception between eLearning and the digital technologies curriculum content (Ministry of Education, 2018b) held by some participants may be representative of other teachers and, therefore, is an important misunderstanding for schools to address throughout the implementation process.

**The digital technologies curriculum content: Implementation**

The final research question of this project asked, ‘what are some recommendations for schools in diverse decile 1 communities when supporting The New Zealand Curriculum with digital devices and implementing the digital technologies curriculum content?’ Throughout the discussion of this
research question, two themes that emerged included teachers’ need for support when beginning to integrate the digital technologies curriculum content (Ministry of Education, 2018b) and the importance of using digital devices as tools which are integrated throughout different areas of The New Zealand Curriculum (Ministry of Education, 2007). The following section discusses these themes including connections to relevant literature.

From eLearning to digital technologies

Overall, the majority of participants discussed the use of digital devices within classroom programmes as integrated tools for use within The New Zealand Curriculum (Ministry of Education, 2007), as well as a tool to support areas of learning. This perception was valued by the participants as a marker of a successful digital device programme, with one participant stating, “it’s integrated; it’s not stand-alone; it’s purposeful” (PA-SH). They described a belief that the use of digital devices should be “embedded and related to whatever else you were doing in the classroom; whether it’s topic, writing, maths…” (PA-SD). This belief reveals an underlying perception that digital device use within classrooms should be rooted in eLearning. This perception is likely influenced by The New Zealand Curriculum (Ministry of Education, 2007) which previously only included the use of digital devices as a support for the curriculum, not including digital technologies content within the curriculum itself (Ministry of Education, 2007). Within the curriculum, the Ministry of Education (2007) describes eLearning as "learning supported by or facilitated by ICT" (p. 36). Therefore the perceptions of successful digital device programmes described by the participants are aligned with eLearning. eLearning is found throughout educational literature, where researchers have described teachers’ use of digital devices to support areas of learning such as literacy (Callow & Orlando, 2015; Fletcher & Brooks, 2006; Schechter et al., 2015). In one practitioner article, Sheninger (2013), a principal, stated that “the true value of technology rests on how it is used to support learning and to create experiences that students find meaningful and relevant” (p. 62). Like the perception held by the teachers in this research project, this view is rooted in eLearning. However, we can postulate that as the role of digital devices within society evolves, so must the understanding of the role that digital devices play within education. Therefore the perception that the successful role of digital devices within a classroom is as an eLearning tool must be expanded to include the new digital technologies learning presented in the digital technologies curriculum content through Computational thinking for digital technologies (Ministry of Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d).
A reason to change

While it is valuable for teachers to understand that digital devices can be used as tools, the digital technologies curriculum content (Ministry of Education, 2018b) has been updated to recognise that students are required to know about how digital technologies work, not merely how to use them as tools (Ministry of Education, n.d.-f). The digital technologies curriculum content (Ministry of Education, 2018b) focuses on “helping students to develop as digitally capable thinkers, producers, and creators” (Ministry of Education, n.d.-b, p.3). The findings of this research revealed teachers’ beliefs in the importance of eLearning and, consequently, schools will need to modify their school curriculums and accommodate the digital technologies curriculum content (Ministry of Education, 2018b). Comments from some participants in this research project suggested that some teachers in their schools were not motivated to develop their teaching ability in this area. Lawson and Price, as cited by Osborne (2014) recommend that for change to occur, teachers need more than just an understanding of the reasons for the change, they also need to be emotionally connected to the idea, feeling a sense of ownership. This suggests that schools should develop teachers’ knowledge of why the digital technologies curriculum content (Ministry of Education, 2018b) has been introduced, extending their perceptions of how successful digital device programmes may be structured and what they include within their school curriculums. Osborne (2014) advises that teachers should be consulted and have input in the change process, giving them “a purpose to believe in” (p.6), further developing an emotional connection. The importance of teachers having a sense of ownership, input in the vision, or plan for change is recognised in a number of other articles from academic and professional journals (Davis et al., 2015; Larson et al., 2009; McLeod, 2015; Overbay et al., 2011). The findings of this research project reveal a need to extend teachers’ present understandings of successful digital device programmes throughout the implementation of the digital technologies curriculum content (Ministry of Education, 2018b) and to be included in the change process, developing ownership of the journey for teachers. This allows teachers to be emotionally connected, ultimately supporting the change process (Lawson & Price, as cited in Osborne, 2014). As highlighted by research. This ensures teachers understand why the change to include the digital technologies curriculum content (Ministry of Education, 2018b) is required and, in addition to this, involving
them in the process, provides a sense of ownership encouraging change and the successful implementation of the curriculum within schools.

**School culture that is conducive to change**

In addition to supporting teachers to develop an emotional connection to the digital change process (Osborne, 2014), the development of a culture that is conducive to change. Literature asserts the importance of a risk taking culture (Mackey et al., 2015; McLeod, 2015; Seong & Ho, 2012; Yuen et al., 2003). The lack of motivation identified by participants in this study may also be a result of a lack of confidence or a fear of the unknown digital world. This thinking is reflective of a Digital Immigrant status (Prensky, 2001) where digital ideas have been adopted in a conscious effort to learn what Digital Natives have grown up with (Prensky, 2001). Developing a school culture where risk-taking is encouraged will remove fear, allowing teachers to feel free to innovate (Sheninger, 2013). However, for some teachers, the idea of taking risks may be too far out of their reach. Thus, this culture must be built on an understanding that it is the teachers, the people that are important, as they are the ones implementing the digital technologies curriculum content (Overbay et al., 2011); they are the ones with the power. The concept of developing trusting respectful relationships (Davis et al., 2015; Mackey et al., 2015; Yuen et al., 2003) ultimately conveys the importance of teachers and values them more than the digital ideas. As Overbay et al. (2011) highlights, “technology initiatives are about people—the people who plan with, teach with, and learn with the technology” (p.56). Hence the culture of a school will play an important part in the implementation of the digital technologies curriculum content (Ministry of Education, 2018d) in response to a lack of motivation identified by participants in this research project.

**Professional development and support**

In the interviews, participants discussed a number of ideas relating to how they could be supported when integrating digital technologies curriculum content (Ministry of Education, 2018b), ranging from professional development, IT specialist teachers, and support from management. This finding was strengthened by the findings from the questionnaires in which participants identified the importance of having professional development for successful integration. The need for professional development is likely connected to the newness of the curriculum content and the lack of content knowledge identified and previously discussed. One participant in this study highlighted the importance of managements’ decision to invest time in professional development for teachers. According to Flanagan and Jacobsen (2003), a lack of professional development hinders the use of digital technology in classrooms, supporting the argument for providing strong
professional development for teachers. Further to this, another study found that professional development had a positive impact on the use of digital technology in classes (Adhikari et al., 2012). This finding is likely to be applicable to schools when implementing the digital technologies curriculum content (Ministry of Education, 2018b). From the findings of this research and other literature, it is evident that schools should invest time in professional development for teachers to develop their understanding of the digital technologies curriculum content (Ministry of Education, 2018b), enabling its integration in classroom programmes.

Further to professional development, support from experts, IT specialists or other personnel was recognised as needed in order to ensure successful implementation of the curriculum by participants. One study suggested that leaders and teachers with high levels of skills should be placed across different levels of the school to ensure there is adequate support for teachers that require it (Overbay et al., 2011). Another approach, identified by Glazer, Hannafin, Polly and Rich (2009), was the use of teacher buddies who provided support for each other rather than mainly relying on school leaders. One participant in this research project suggested that outside agencies would provide more effective professional development than what could be provided internally by teachers. This was due to the weight that outside providers hold in terms of their authority. Wright suggests that external practitioners may offer insight that is not seen by internal practitioners (2017), and the results of Wright’s study showed that teachers valued the input of an external practitioner to support their professional development (Wright, 2010). This suggestion is contrary to the approach taken in one case study, where the school chose to engage in in-house professional development rather than external professional development through teacher-led groups (Davis et al., 2015). However, Sheninger (2013) also describes the use of internal professional development and external professional development when it was available, and McLeod (2015) also recognises the value of professional development where teachers from across schools are able to support one another. Due to the newness of the digital technologies curriculum content (Ministry of Education, 2018b), an approach that combines both external and internal support for professional development may be effective when implementing the change into schools.

**Online tools for professional development**

There are a number of online tools schools can utilise for professional development when implementing the digital technologies curriculum content (Ministry of Education, 2018b). Some of these tools have connections to the Ministry of Education and some are developed by outside
agencies. Professional development tools include Kia Takatū a-Matihiko: Digital Readiness (Ministry of Education, 2018a), Digital Passport (The Mind Lab, n.d.), Tahi Rua Toru Tech (IT Professionals New Zealand & Ministry of Education, 2018), and CS Unplugged (Computer Science Education Research Group, n.d.). These tools (Ministry of Education, 2018a; The Mind Lab, n.d.) have a range of content, some provide videos and information to build teachers’ knowledge of the curriculum (Ministry of Education, 2018b) and others equip teachers with lesson plans and resources (Computer Science Education Research Group, n.d.; IT Professionals New Zealand & Ministry of Education, 2018; The Mind Lab, n.d.). There are a number of other resources identified by the Ministry of Education (n.d.) which can be found through Te Kete Ipurangi that are available for teachers and schools to use as part of their professional development for implementing the digital technologies curriculum content (Ministry of Education, 2018b). This will support them to build content knowledge, as well as providing outside agencies or tools for digital leaders in schools to use as professional development for teachers.

**Conclusion**

This chapter has discussed the key insightful findings gained from this research project into teachers’ perceptions on the use of digital devices in diverse decile 1 schools. This includes teachers’ perceptions on the factors impacting on digital device use in these schools and the strategies they employ when utilising digital devices. Discussion has also centred around the advantages and challenges faced by teachers when implementing the digital technologies curriculum content (Ministry of Education, 2018b), and supporting *The New Zealand Curriculum* with digital devices (Ministry of Education, 2007) indicating some recommendations for schools when beginning their implementation journey.

The final chapter continues to identify the conclusions drawn from this research project, discussing recommendations for schools and teachers as well as recommendations for future research within this field of study.
Chapter 6: Conclusion

Introduction
This research project has set out to explore teachers’ perceptions on the use of digital devices and the digital technologies curriculum content in diverse decile 1 schools. The need for this research has arisen from the increasingly digital world our students interact in (UNICEF, 2017), which is so vastly different from teachers’ school experiences and own personal lives. This has created a divide in ability, skills, and use of digital devices (Prensky, 2001). The recent introduction of the digital technologies curriculum content (Ministry of Education, 2018b) in 2018 has presented new content and challenges for teachers who already have full classroom programmes and manage the impact of the complexities that affect digital device use in the decile 1 school environment. This has resulted in an increased need to understand teachers’ perceptions of digital devices and the content of the new curriculum (Ministry of Education, 2018b).

The identified needs have guided the aims of this research project. The first research aim has explored teachers’ perceptions on teaching with digital devices in a diverse decile 1 environment. The second research aim has identified the impact of the digital technologies curriculum content (Ministry of Education, 2018b) and the use of digital devices in The New Zealand Curriculum (Ministry of Education, 2007) within diverse decile 1 schools. These aims were investigated using semi-structured interviews and online questionnaires with teacher participants working in decile 1 schools.

From the two research aims, four research questions were developed and are reiterated as follows:

Research questions:
1. How do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?
2. What are the present strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?
3. What do teachers in diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating the new digital technologies curriculum content in the technology learning area of The New Zealand Curriculum into their practice?
4. What are some recommendations for schools in diverse decile 1 communities when supporting *The New Zealand Curriculum* with digital devices and implementing the digital technologies curriculum content?

The findings relating to the first research aim have shown teachers’ perception of digital device importance in decile 1 schools, the importance of having a realistic understanding of students’ situations. They continued to identify the lack of strategies addressing the unequal access to digital devices and the internet in students’ homes, and teachers’ need to teach basic digital skills and digital literacy to their Digital Native students (Prensky, 2001). It has also identified the deliberate, purposeful decisions that teachers use to guide the use of digital devices, which has been connected to teachers’ limiting perception of digital device use in classrooms. The second research aim has revealed that teachers’ have a limited understanding of the digital technologies curriculum content (Ministry of Education, 2018b) including some misconceptions with eLearning. In addition to this, some teachers have a future-focused mindset of the digital technologies curriculum content. This leads to a need to provide professional development and support for teachers.

**Diversity within decile 1 schools**

This research project did not specifically aim to investigate the diversity within decile 1 schools, however, the term ‘diversity’ was key in the wording of the research aims and questions. As previously identified in this thesis, this term recognises that no student, classroom, or school is the same. Decile 1 schools are filled with ethnically diverse students as identified by the participants of this research project and current statistics (Ministry of Education, 2019a). To a lesser extent, participants also recognised some of the other diversities within their classrooms such as academic ability, gender, and students’ experiences. This is supported by literature that recognises many areas of diversity for students such as “learning styles, talents, and intelligences” (Darling-Hammond, Wise & Klein, as quoted in Futrell, Gomex, & Bedden, 2003, p. 382). Care should be taken to observe and respond to the individual needs of classrooms and schools. As Alton-Lee (2003) explains, “teaching that is responsive to student diversity can have very positive impacts on low and high achievers at the same time” (p. v), thus ‘one size does not fit all’. Research-based ideas, even if well proven must be responsive to the environment they are applied to. Thus, the key findings of this research project, while based on the patterns that emerged from the from a number of participants may not perfectly represent the learners in all decile 1 classrooms.
**Personal reflection**

Personally, through this research project, I have developed and grown my own knowledge of the digital technologies curriculum content (Ministry of Education, 2018b). I have further expanded my own thoughts on the realistic understanding we can have of students’ situations that school systems, and the ‘with’ that students bring to decile 1 schools. Within my own practice, I have been challenged to evaluate how my own ways of thinking are represented in my classroom and how I can redesign it to reflect my students’ ways of thinking (Milne, 2014). In addition to this, I have explored the wide ranging perceptions of teachers and been reminded of the diverse ways that different people think, providing new perspectives and insights.

**Strengths**

One strength of this research project is the investigation into teacher’s perceptions on digital devices. As discussed in this thesis, teachers’ perceptions have the ability to impact and inform their teaching practice (Yan and Zhao as cited in Nikian, Nor, & Aziz, 2013). According to Domingo and Garganté (2016), understanding teacher’s perceptions supports purposeful digital device use, thus this study produces important knowledge. The insights gained from this research project are specific to New Zealand schools, where there appears to be no available literature on the perceptions teachers’ hold about digital devices. This research has shown that New Zealand teachers in decile 1 schools value digital devices and hold the perception that they are important in the context of their classrooms. They hold that perception that basic digital skills and digital literacy need to be taught to students due to a number of reasons, as identified in this research project. These findings from this research project are a strength as they have produced a better understanding of how teachers think and how these perceptions translate to digital device use in the classroom, supporting better classroom practice.

A strength of this research project is the specificity of the study within decile 1 primary schools. Presently there is little research set within decile 1 primary schools in New Zealand with a specific focus on digital devices. As previously identified, decile 1 schools are 10% of the schools in New Zealand and are thus responsible for teaching a large portion of New Zealand’s children (Ministry of Education, 2017g). Many of these children are at risk of low achievement as indicated by National Standard results (Ministry of Education, 2017i, 2017e, 2017f). Consequently, research that identifies the successful strategies that teachers in decile 1 schools use produces valuable knowledge that can be implemented within other low decile classrooms, informing practice for teachers. Currently, there is little New Zealand research set in decile 1 schools relating to strategies
or initiatives used for digital devices. Articles describing initiatives include the Manaiakalani collaboration (Jesson et al., 2014) and Manaiakanlani Digital Teacher Academy (Hipkins et al., 2015). However, these initiatives are not replicable across other low decile schools without sufficient funding and support. Therefore, the strengths of this research project include the specificity to the decile 1 context and digital devices and applicability in other low decile schools. This is due to the nature of the conclusions drawn from the project, adding to the body of New Zealand educational research, specifically focusing on digital devices in decile 1 schools.

Another strength of this research project has been the exploration of the digital technologies curriculum content (Ministry of Education, 2018b). As a recently introduced document into schools, there is only one scholarly article locatable. This examines the content of the entitlement and specialist sections of the digital technologies curriculum content (Ministry of Education, 2018b) and digital fluency within it (Parsons et al., 2018). This research offers a different scholarly angle on the digital technologies curriculum content, focusing on teachers’ perspectives. The newness of the digital technologies curriculum content (Ministry of Education, 2018b) has enabled conclusions to be drawn on the gaps in the participants’ knowledge and understandings of the curriculum content, which are likely to reflect the levels of understanding of teachers within other schools. It has begun to paint a picture of the challenges faced and benefits to be gained by teachers and schools when implementing the digital technologies curriculum content (Ministry of Education, 2018b) into their programmes. In addition to this, it has explored ways to support the development of digital device use within The New Zealand Curriculum (Ministry of Education, 2007), as well as the integration of digital technologies curriculum content (Ministry of Education, 2018b) into schools. This research has provided a starting point for schools and leaders beginning to develop the digital technologies curriculum content (Ministry of Education, 2018b) within their classroom programmes, informing them with research-based ideas.

**Limitations**

As identified earlier in this thesis, this research project used the draft digital technologies curriculum content to inform the questions used in the questionnaires and interviews, and possibly the responses given by participants, due to the timing of the research project proposal to the Unitec Research and Ethics Committee (Ministry of Education, n.d.-f). Despite the new digital technologies curriculum content having been implemented in schools at the time the research was carried out (Ministry of Education, n.d.-f), the draft content may have impacted on the data gathered. This may limit the validity of the data and its accuracy when applying the key findings.
to the finalised digital technologies curriculum content and its implementation within schools. However, the results identify some key findings that are applicable regardless of the draft state of the curriculum content used, including the development of school culture.

This research project has been limited by a relatively small sample size. The number of participants in the interviews totalled eight (n=8) and the number of participants in the questionnaires totalled eleven (n=11), amounting to nineteen participants (n=19). Overall, the questions used in the interviews and questionnaires were similar in order to allow the responses to crossover to support the understandings gained from each dataset. However, it was generally found that the questionnaire participants wrote short answers and did not expand on their ideas. Although the sample size was small, throughout the interview process the interviewer was able to ask follow up questions and prompt the participants to explain their thinking. This was used when their responses did not provide much information, ensuring sufficient, detailed data was collected.

Three of the interview participants who volunteered to be involved in this research project described themselves as holding some form of an ICT leadership position within their schools (n=3/8). In addition to this, some of the other participants are likely to have had high levels of digital skills, eLearning, and interests in digital device use and the digital technologies curriculum content (Ministry of Education, 2018d). This is due to the volunteer nature of the research project; those who are interested in a topic are more likely to be interested in participating in research about it. The interest shown in digital learning and high levels of digital skills by the participants may have influenced some of the data and consequently the conclusions, such as the perception of digital device importance within decile 1 schools. To reduce the risk of this limitation, the Participant Information Sheets for the interviews (see Appendix D) and questionnaires (see Appendix G) included an acknowledgement that the research project needed “a range of teachers” as they all “have valuable knowledge” even if they “don’t know much about the topic”. One participant stated that they needed a lot of support to use ICT and was wanting to improve their skills, and thus this acknowledgement may have encouraged participants with lower digital skills to participate.

When responding to questions on the ways teachers address the complexities of the decile 1 environment within their classrooms, participants were not able to offer much discussion on the strategies they employed in their classrooms to address these complexities. This lack of discussion was perhaps reflective of the large scale nature of these factors and the small scale nature of
classrooms. While teachers are able to have a significant impact on children and their achievement, they are limited by the parameters of their jobs. Teachers may also have been unaware of the strategies their schools have put in place at a policy level, or where there are systems they are not privy to. This question is likely to have been better targeted at senior management within schools as it is beyond the scope of the teacher, classroom, and research project.

**Conclusions**

The conclusions from this research project crossover and have thus been synthesised to enable a better understanding of the knowledge gained from this study. Although the findings have previously been ordered by the research questions as a key organisational frame, they are now brought together under the two central aims of this research project. These are teachers’ perceptions of digital devices and strategies for this use, and *The New Zealand Curriculum* (Ministry of Education, 2007) and the digital technologies curriculum content (Ministry of Education, 2018b).

**Teachers’ perceptions of digital devices and strategies for their use**

**Digital device importance: A lack of access and home entertainment**

A significant number of participants in this research project held the perception that the use of digital devices in decile 1 schools is important. This perception was similarly found in other literature (Liu et al., 2016; Nikian et al., 2013; Sadaf & Johnson, 2017). Nevertheless, the findings of this research project extend the literature as they have confirmed these findings specifically for teachers in decile 1 schools. Current New Zealand literature describes unequal access to digital devices and the internet (Johnson et al., 2017) which impacts on students from low-socioeconomic areas, attending decile 1 schools (Nicholas & Fletcher, 2017). The findings of this research project show that 36.8% of the participants linked the importance of using digital devices in decile 1 schools to the issue of access to digital devices or the internet in students’ homes. In addition to this, 35.3% of participants discussed the large use of digital devices within students’ homes for entertainment purposes. This data is reflective of teachers’ perceptions and does not necessarily reflect the actual realities of students’ homes, however, the findings add to the New Zealand literature reporting on children’s entertainment use of digital devices in homes (The University of Auckland, 2017) providing a different perspective. The skills students are required to use for entertainment are different from the skills required for using digital devices at school. In addition to this, there is a difference in the apps or programmes that are used, as well as the knowledge required for learning. The combination of these findings, the lack of digital devices and the
internet in students’ homes coupled with the use of digital devices for entertainment purposes, both contribute to teachers’ perceptions of digital device importance in decile 1 schools. This has led to the conclusion that there is a need to teach students basic digital skills and digital literacy within classrooms, a key issue also raised by participants in this study.

Digital literacy and basic digital skills
One strategy identified by participants to manage the complexities of decile 1 classrooms such as the lack of access to digital devices and/or the internet in students’ homes, is the teaching of basic digital skills. It has also found that teachers also believed that teaching digital literacy is as important as literacy and numeracy in decile 1 schools. This comparison demonstrates the strength and significance of this perception held by teachers. This strategy is likely to have been discussed due to its ability to begin to address the issues created by the impact of a lack of access to digital devices and the internet. It also appears to have been overlooked in educational literature on digital device use in classrooms, perhaps due to the simplicity of the idea. However, one participant in a study carried out by Parsons and Adhikari (2016) also commented on this need. Although today's students are Digital Natives who have grown up in a highly digital world (Prensky, 2001), as Sadaf and Johnson (2017) point out, this does not necessarily translate to automatic knowledge of digital literacy. Teaching students how to use digital devices effectively, efficiently and safely are necessary skills to possess, supporting students to interact in the increasingly digital world they currently live in.

Realistic understanding
Comments from one participant in this research project resembled anti-deficit thinking, holding the teacher ultimately responsible for students’ learning (Thrupp, 2014) and reflecting elements of quality teaching practice (Alton-Lee, 2003). However, teachers must also consider the wider factors that have contributed to students’ learning (Thrupp, 2014; Valencia, 1997b). Alton-Lee (2003) identifies quality teaching as a factor strongly contributing to student achievement. Thus, holding the teacher accountable for their teaching practice, as described by the participant in this research project. Although quality teaching indeed has a strong impact on achievement, Thrupp (2014) also recognises the effectiveness of having a realistic understanding of the impact students’ home environments have on their education, some of which require addressing at a school level. In a broad sense, this includes questioning “whose knowledge really counts” (Milne, 2014, p. 224) in schools. More specifically, this research project has begun to investigate the perceptions teachers hold on the complexities of teaching in diverse decile 1 schools, particularly with reference
to digital devices. It has identified a lack of access to digital devices and the internet in students’ homes as a complexity of this environment. This factor, coupled with the high use of digital devices for entertainment, impacts on classrooms, highlighting a need to teach students basic digital skills and digital literacy. To mitigate the effects of this complexity, this issue requires addressing within, outside of, and through schools.

**Initiatives addressing unequal home access to digital devices and/or the internet**

Although this research project has investigated the strategies that teachers use in their classrooms, there was minimal discussion on school-wide strategies that address the lack of access to digital devices and internet within students’ homes. It is surprising that schools do not appear to address this issue in light of data showing this shortcoming, also confirmed by other studies (Johnson et al., 2017) and in combination with teachers’ perception of digital device importance in schools. Other literature has identified a small number of strategies used by New Zealand schools (Jesson et al., 2014; Fletcher & Brooks, 2006). Despite this, overall, strategies appear to be either non-existent or undocumented within the existing New Zealand literature. This may be due to a non-existence of strategies or a result of a number of factors including a lack of perceived importance by decision makers in schools, including principals and Boards of Trustees, or an inability to address these issues due to their scope. However, it is also likely that there are some strategies in place that remain undocumented. Research carried out by Johnson et al. (2017) investigates the types of digital devices owned by primary schools across different deciles and the number of digital devices owned by students in their schools, although, this does not shed light on how these numbers compare. It is likely that a strategy decile 1 schools use to mitigate the impact of this issue includes the provision of digital devices for use at school, owned by the school itself. This particular strategy does not appear to have been investigated in Johnson et al.’s (2017) study and, even so, does not address the lack of digital devices and internet specifically within students’ homes.

One such initiative includes the Manaiakalani Education Trust (Jesson et al., 2014) which is not able to be implemented across other schools without sufficient funding. Another initiative is the Computers in Homes (2019) charity which supports families in decile 1-3 schools across New Zealand, however this initiative is run separately from schools (20/20 Trust, 2017a). This charitable trust provides “for a cost of $50 … 20 hours of free training, a refurbished computer or device, 12 months’ subsidised internet connection (optional) and technical support” (para. 2) to families in low decile school areas (20/20 Trust, 2017a). However, Computers in Homes (2019) no longer has Ministry of Education funding for its programmes. These two initiatives, through
their very definitions as a trust (Manaiakalani, n.d.-a) and a charitable trust (20/20 Trust, 2017a) perhaps show the need to address this issue of a lack of access to the internet and digital devices and shed light on the inability of schools to address these issues alone. If students in low decile schools are to have the same access and opportunities to students in higher decile schools, then there needs to be more initiatives addressing this lack of access in homes. Granted this issue is of large scale and thus requires a large scale effort and cannot be addressed by teachers or schools alone.

**Deliberate, purposeful decisions for a range of learning needs including low levels of literacy and numeracy**

The findings of this research project have shown that teachers have differing opinions on the ability of digital devices to address the skills students need to develop at school. Many participants commented on the range of skills their students required that they felt were not well suited to the use of digital devices such as oral language and physical skills. This inability was also commented on in other research (Parsons, as cited in Parsons & Adhikari, 2016). However, this perception is challenged by Sheninger (2013) who comments that the way that digital devices are used holds value, which was reflected in the comments from one participant in this study. This revealed the participant’s belief that it is the experiences a teacher selects that are able to target these particular skills and areas of learning. In addition to this, participants also explained that learners’ literacy and numeracy needs were a tension with the use of digital devices. However, one participant recognised that digital devices can support these areas of learning despite students’ needs dependent on how they are used. In accordance with this, studies of digital device use with early childhood age groups have shown that devices are able to be effectively used at lower levels of literacy and numeracy (Beschorner & Hutchison, 2013; Couse & Chen, 2010; Schacter & Jo, 2016). Thus, depending on the way that the devices are used (Sheninger, 2013), they are able to support students at appropriate levels of learning (Beschorner & Hutchison, 2013).

Teachers in this research project also described the very deliberate and purposeful decisions they made when selecting digital learning experiences for their students. Participants scrutinised the experiences to determine their suitability for the learning focus to support achievement as well as other factors. These decisions are reflective of Alton-Lee’s (2003) statements on quality teaching practices. The participants described the use of digital devices as having purpose in their learning programmes, supporting Sheninger’s (2013) statements about the ways digital devices are used. This was also found across other literature (Ottenbreit-Leftwich et al., 2010; Schechter et al., 2015).
Evidently, the findings of this research project and current educational literature (Alton-Lee, 2003; Beschorner & Hutchison, 2013; Couse & Chen, 2010; Ottenbreit-Leftwich et al., 2010; Schacter & Jo, 2016; Schechter et al., 2015; Sheninger, 2013) show that the deliberate, purposeful ways digital devices are used within teaching programmes can target the specific needs of students including low levels of literacy and numeracy, to support their learning goals. However, some participants’ comments on the inability of digital devices to achieve this reveal a potential avenue for exploration within academic research and areas of development within schools. Teachers may be unaware of the different ways digital devices can be used within their teaching programmes and may have begun to view the use of digital devices rigidly, making them unaware of the possibilities of their use.

The New Zealand Curriculum and the digital technologies curriculum content
This research has set out to investigate both The New Zealand Curriculum (Ministry of Education, 2007) being supported with digital devices, and the implementation of the digital technologies curriculum content (Ministry of Education, 2018b). Many of the significant conclusions that have been drawn relate to the digital technologies curriculum content (Ministry of Education, 2018b), and are expanded on henceforth.

Present and future-focused relevance
Comments from a small number of participants in this study have shown that teachers perceive the digital technologies curriculum content (Ministry of Education, 2018b) as a positive component of learning for students’ futures. This future-focus was perceived as an advantage the curriculum (Ministry of Education, 2018b) brought to students’ education (Ministry of Education, 2017c). This perception is reflective of other literature not specific to the digital technologies curriculum content (Ertmer et al., 1999; Ottenbreit-Leftwich et al., 2010), although it is also shown in The New Zealand Curriculum (Ministry of Education, 2007) where it describes a “future focus” (p. 9) as underpinning schools’ programmes. The future is rapidly evolving; ideas dreamed up in the past of what the future would look like are not reflective of today’s world. The instant food hydration machines and flying cars depicted in the year 2015 from the 1989 film, Back to the Future II (Canton, Gale, & Zemeckis, 1989), are not reality. As one participant in this research project highlighted, the future is unknown, thus soft (people) skills are transferrable and are important to learn.
Discussion from participants on the value of the digital technologies curriculum content (Ministry of Education, 2018b) for students’ future lives was positive. However, other participants also recognised the importance of digital devices for students’ present lives, as identified by Sadaf & Johnson (2017). The absence of discussion on students’ present lives in regards to the curriculum content (Ministry of Education, 2018d) may indicate that their students lead very different digital lives from their own digital lives (Prensky, 2001), hence the present relevance for them remains unseen. It could also indicate that these teachers are users of digital technology without an awareness of how they work, and without an understanding of what is going on ‘behind the screens’. Consequently, they do not see the importance of this knowledge for the present. This absence of understanding could be due to their Digital Immigrant status as described Prensky (2001), leaving them to engage in and adopt digital knowledge as they see necessary. The implementation of the digital technologies curriculum content (Ministry of Education, 2018b) will be more effective in schools for these teachers, if they are able to develop an emotional connection to a schools’ vision for its use (Osborne, 2014). This can be facilitated through involvement in the change management process, which is expanded on further on in this chapter. If all teachers develop an understanding of the relevance the content of the digital technologies curriculum content has to students’ present lives, not just futures, it is more likely that teachers will invest their valuable time into professionally developing and understanding the curriculum content (Ministry of Education, 2018d).

**Teachers’ knowledge of the digital technologies curriculum content**

Teachers currently hold little knowledge on the digital technologies curriculum content (Ministry of Education, 2018b) as identified by the findings of this research project. This presents a challenge for schools to face when implementing it into their teaching programmes. When asked to assess their level of understanding of Designing and developing digital outcomes (Ministry of Education, 2018d) in this research project, teachers neither agreed or disagreed that they had a good understanding of this technological area. Generally, they did not have a good understanding of Computational thinking for digital technologies (Ministry of Education, 2018d) either. The introduction of this content (Ministry of Education, 2018b) in 2018 is the first time learning about digital technologies has officially been included in The New Zealand Curriculum (Ministry of Education, 2007), making it new, unknown content. For teachers, much of this content will need to be learned or adopted as they are likely to have little experience with it, unlike today’s Digital Native children (Prensky, 2001). Teachers’ lack of knowledge may also be a result of an absence of professional development in schools at the point in time when this research was carried out.
The little knowledge that teachers’ hold requires attention from leaders in school when beginning to implement the digital technologies curriculum content (Ministry of Education, 2018b) within their teaching and learning programmes, ensuring they are supporting teachers to build their knowledge of what it entails.

**Misconceptions between eLearning and the digital technologies curriculum content**

Further to a lack of content knowledge of the digital technologies curriculum content (Ministry of Education, 2018b), another challenge presented is that teachers also have a misconception between eLearning and the digital technologies curriculum content. Overall, teachers perceived the definition of a successful digital device programme as integration and a support tool for *The New Zealand Curriculum* (Ministry of Education, 2007). However, this is a dated idea that does not acknowledge learning about digital technologies and how they work; rather, this idea is rooted in eLearning (Ministry of Education, 2007). Previously digital devices were widely used to support other areas of learning as ‘eLearning’ within the curriculum (Ministry of Education, 2007), which a large amount of the New Zealand literature on digital device use focuses on (Bishop & Lepou, 2018; Fletcher & Brooks, 2006; Kemker, Barron, & Harmes, 2007; Manaiaikalani Film Festival, n.d.; Hedquist, 2006; Fletcher, Parkhill, & Fa’ofoi, 2005). Teachers’ vast knowledge of digital devices as eLearning tools and the unfamiliarity of the content covered in Computational thinking for digital technologies (Ministry of Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d) has likely contributed to the misconceptions they hold between eLearning and the content of the digital technologies curriculum content. This has ultimately produced a teacher perception that successful digital device programmes are rooted in eLearning, as revealed in the findings of this research project. Without supporting teachers to expand their understanding of eLearning and the digital technologies curriculum content (Ministry of Education, 2018b) and how these areas work together, the implementation of the revisions to the technology learning areas will be hindered. This is due to inaccurate interpretations and understandings of the progress outcome statements used in Computational thinking for digital technologies (Ministry of Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d).

**Professional development**

Teachers acknowledged professional development as important for the successful implementation of the digital technologies curriculum content (Ministry of Education, 2018b) within their schools. The little knowledge teachers held on the digital technologies curriculum content (Ministry of
Education, 2018b), coupled with their misconceptions between the digital technologies curriculum content and eLearning (Ministry of Education, 2007) as previously identified, also points to this need. This importance is also supported by literature (Adhikari et al., 2012; Flanagan & Jacobsen, 2003). In addition to this, the findings from this research project add to the literature stating that both internal support (Davis et al., 2015; Glazer et al., 2009; Overbay et al., 2011; Sheninger, 2013) and external support are valuable (McLeod, 2015; Sheninger, 2013; Wright, 2017). Possible options combining both approaches include professional development that can be delivered internally through such options as Kia Takatū a-Matihiko: Digital Readiness (Ministry of Education, 2018a) and Digital Passport (The Mind Lab, n.d.). Providers who have produced teaching content and exemplars include Technology Online (Ministry of Education, n.d.-i), Enabling eLearning (Ministry of Education, n.d.-g), Tahi Rua Toru Tech (IT Professionals New Zealand & Ministry of Education, 2018), and CS Unplugged (Computer Science Education Research Group, n.d.). All of these tools are freely accessible online and support professional development in schools. As the findings of this research have suggested, professional development and support for teachers is required to facilitate the successful integration of the digital technologies curriculum content (Ministry of Education, 2018b) due to teachers’ current knowledge levels. For schools, this requires decisions about how this support is delivered, whether internally from staff or through external agencies to best suit the needs of their teachers.

**School culture: Valuing teachers, risk-taking, and ownership**

Findings from this research project have shown that teachers need to develop their understandings of eLearning and the digital technologies curriculum content (Ministry of Education, 2018d). In addition to this, some leaders commented on other teachers at their schools, explaining that they would be unwilling, reluctant, or lacking in confidence when implementing the digital technologies curriculum content (Ministry of Education, 2018d) within their teaching practice. Ensuring teachers feel free to innovate and are encouraged to take risks (Sheninger, 2013) may begin to ease teachers’ fear of digital ideas, perhaps due to their Digital Immigrant status (Prensky, 2001). This freedom to take risks is in agreement with a number of studies (Mackey et al., 2015; McLeod, 2015; Seong & Ho, 2012; Yuen et al., 2003) and is conducive to the change to new curriculum content (Ministry of Education, 2018d) where teachers will need to try new ideas. In addition to this, it is the teachers who hold the power when delivering digital content (Overbay et al., 2011), thus, they must be valued as an important part of the implementation process. Within a school culture, teachers deserve respect and value due to the power they hold when engaging with the digital technologies curriculum content (Ministry of Education, 2018d). This concept is also supported
by literature on digital change management (Davis et al., 2015; Mackey et al., 2015; Yuen et al., 2003). Further to this, literature places high importance on giving teachers a sense of ownership in the change process through input into the vision or plan for change (Davis et al., 2015; Larson et al., 2009; McLeod, 2015; Overbay et al., 2011). This is further supported by Lawson and Price (as cited by Osborne, 2014) who recommend allowing teachers to develop an emotional connection to the reasons for change through involvement in the process, increasing ownership over the change journey. From a leadership position, participants also commented on a reluctance to engage with digital devices and predict the same for the digital technologies curriculum content (Ministry of Education, 2018b) for other teachers within their schools. Due to the change in the curriculum (Ministry of Education, 2007), the perceived importance of this area of learning, the discussed lack of confidence or willingness for some teachers, there is a need to develop a school culture that encourages risk-taking, values teachers, and involves teachers in the change process. This culture will support the effective implementation of the digital technologies curriculum content (Ministry of Education, 2018b).

**Recommendations**

There are a number of recommendations as a result of the conclusions drawn from this research project. They have been organised into categories of the group of people the recommendation is most relevant to, although some recommendations crossover between groups.

**Teachers’ practice**

- View students’ contexts with a realistic understanding and deliver classroom programmes that are responsive to the digital needs of students. Teachers can do this by ensuring digital literacy and basic digital skills are being taught, which include using digital devices effectively, efficiently, and safely. This will support students to gain the skills they need to safely and effectively interact in the digital world they are living in.

**Leaders within schools**

- Attempt to realistically understand the factors that affect students’ education, including a lack of access to digital devices and the internet in homes. Explore the impact these
findings have on students’ education. This will allow the development of school initiatives that can respond to this need.

- Support all teachers to develop an understanding of the relevance the digital technologies curriculum content (Ministry of Education, 2018b) has to students’ present lives and the future, leading to a more effective implementation of this curriculum content.

- When building teachers’ understandings of the digital technologies curriculum content (Ministry of Education, 2018b), investigate tools and providers for professional development. Explore whether internally delivered, externally provided, or a mix of the two is the best option to meet the needs of the teachers in their school.

- Tackle teachers’ misconceptions between eLearning and the digital technologies curriculum content (Ministry of Education, 2018b). This can be done by providing professional development that supports teachers to grow their knowledge of these areas including the differences between them and how they work together.

- Develop a school culture where teachers are valued, encouraged to take risks and involved in creating a plan and school vision for eLearning and the implementation of the digital technologies curriculum content (Ministry of Education, 2018b). These concepts will lead to a stronger emotional connection to the change process, supporting the effective implementation of the curriculum content (Ministry of Education, 2018b).

**Policy and decision makers**

- Explore the impact that the lack of access to digital devices and the internet in students’ homes has on a students’ education. Develop equity programmes that mitigate the effects of this issue or address the needs within students’ homes.

**Implications for future research**

- As commented on earlier in this thesis, there was an absence of discussion from teachers on the strategies they use to mitigate the complexities impacting on digital device use in their classrooms. However, it was also recognised that perhaps this question is better addressed at senior management within schools. Research aimed at school senior management developing a realistic understanding of the complexities impacting on digital
device use in decile 1 schools and the strategies schools use to mitigate these issues and their impact would provide a better understanding of this issue and more precise recommendations.

- Investigating the ways that deliberate, purposeful decisions about digital device use in classrooms can be used to support the learning needs of students and, in particular, in areas of learning where teachers’ typically do not believe digital devices are suitable tools to use.

- Exploration of teachers’ perceptions of digital devices in action. As previously recognised, teachers’ perceptions and their teaching actions do not always align (Sánchez et al., 2012), thus a research project exploring teachers’ perceptions as well as observing teaching actions would gain further insight into the use of digital devices in decile 1 schools.

**Final statements**

“I’ve given up on desiring for the latest technology, because the resource is me.
Whether we have a device or not; I’m the resource.” (PA-SE)

Teachers are the vehicles from which knowledge and skills are delivered to our precious students. Their perceptions are connected to their teaching actions (Pajares, 1992; Yan & Zhao, as cited in Nikian, Nor, & Aziz, 2013). Consequently, what teachers believe about digital devices and the digital technologies curriculum content (Ministry of Education, 2018b) impacts on their implementation within classrooms. It is teachers’ deliberate, purposeful decisions that powerfully determine classroom programmes. To support schools to effectively implement the recently introduced digital technologies curriculum content (Ministry of Education, 2018b) into their programmes, it is important to explore teacher perceptions due to the influence they, as key resources have. This exploration leads to an increased understanding of how teachers can be supported to develop digital device and digital technologies programmes (Ministry of Education, 2018b), improving their practice and, ultimately, impacting on their Digital Native students (Prensky, 2001).

The students in today’s classrooms have only ever lived in a digitalised world, making them Digital Natives (Prensky, 2001). As the use of digital devices in society grows (Netsafe, 2018; UNICEF, 2017), so does the need to equip students with the necessary skills to safely and effectively interact
in this world. The recent introduction of the digital technologies curriculum content (Ministry of Education, 2018b) into New Zealand schools presents new content and reflects the digital knowledge that is relevant to students. This includes Computational thinking for digital technologies (Ministry of Education, 2018d) and Designing and developing digital outcomes (Ministry of Education, 2018d). Previously, The New Zealand Curriculum encouraged eLearning; that is, learning with digital devices (Ministry of Education, 2007). The digital technologies curriculum content adds to this, requiring learning about digital technologies and how they operate (Ministry of Education, n.d.-f). Together the increasing digitalisation of our world and the introduction of the digital technologies curriculum content (Ministry of Education, 2018b) have guided the focus of this research project, set within decile 1 schools.

The diverse, vibrant and dynamic children who attend decile 1 schools, like all children, attending any school of any decile, are influenced by a number of diverse factors (Alton-Lee, 2003). As “the 10% of schools with the highest proportion of students from low socio-economic communities” in New Zealand (Ministry of Education, 2017g, para. 5), they are often viewed by what students come ‘without’ rather than what they come ‘with’. While the ‘without’ should not determine students’ paths in schools, it is important to realistically understand these factors and how they impact on students’ learning to determine how schools can address them (Thrupp, 2014). Significantly, decile 1 schools represent 10% of New Zealand’s schools and are responsible for the learning of the children that attend them (Ministry of Education, 2017g). These children deserve the best quality education; this is a privileged task entrusted to those who choose to teach in these schools. Thus this task requires a realistic understanding of the factors that influence these students as well as the strategies educators can use to address them within the scope of the classroom and the school itself (Thrupp, 2014).

Collectively, we as teachers are all responsible for the learning journeys of the students in our classrooms as well as those who are not. Together, as valuable resources, we must share our pedagogical knowledge with other educators as a commitment to the students we teach and the teaching profession (Education Council, 2017), paddling together as one (Makiha, n.d.).

“Kia kotahi te hoe o te waka kia whaia te matauranga.
Towards knowledge and excellence we paddle as one.”
(Makiha, n.d., para. 1)
References


Computers in Homes. (2019). How it works – digital skills and access. Retrieved February 28,
2019, from https://computersinhomes.nz/the-programme/how-it-works/


https://www.computerworld.co.nz/article/500495/pt_england_school_goes_air/


Learning-area-structure


Progress-outcomes


curriculum: Who are the computational thinkers? FLANZ 2018 Conference, Palmerston North, New Zealand.


### Appendices

**Appendix A: School recruitment email for principals – interviews**

<table>
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<td>Bcc:</td>
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<tr>
<td>Subject:</td>
<td>Permission to conduct research</td>
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Kia ora,

My name is Sarah-Jane and I am a teacher at [redacted]. I hope that you are well and that the school year has been off to a good start.

I would really appreciate it if you could take the time to consider my request. I am emailing to ask permission to conduct research with two teachers at your school between March and May, as part of my Master of Applied Practice at Unitec. I know that teachers already have significant workloads so I am not requiring a large amount of work for those who choose to participate. I would like to interview two teachers for up to one hour each, on site at your school in order to make it as easy as possible to participate. **Through these interviews I will be exploring the use of digital devices in classrooms throughout diverse decile 1 schools.**

Please let me know if you have any questions about my research, I am available by email or phone (outside of teaching hours) to answer them, otherwise I can come and meet with you to discuss it. If you are happy to grant me permission to conduct these interviews please let me know and I will forward you the Unitec template for organisation consent.

Thank you very much for your time,
Sarah-Jane Khor
[redacted]
Appendix B: Participant recruitment email for principals to forward – interviews

Kia ora, Malē e lelei, Talofa lava, Namaste,

My name is Sarah-Jane Khor and I am a teacher at [redacted]. I am currently completing a Master of Applied Practice through Unitec, Mt Albert campus, and am investigating teacher perceptions on digital device use in decile 1 schools. This research will investigate the complexities of teaching in our diverse communities, and make recommendations going forward.

In order to gather information about this topic I am looking for two fellow colleagues (teachers) from your school to participate in interviews. Interviews will take between forty five and sixty minutes long. Please forward this email onto all the classroom teachers at your school. I have attached the participant information sheets that provide teachers with the information required to make a decision about participating in this research. If teachers are interested in participating they can register their interest by following this link.

Faafetai lava, Dhanyawaad, Mauri ora, Faka’apa’apa atu,

Sarah-Jane Khor
Appendix C: Participation Information Sheets – Interviews

Information for participants – Interviews

Research Project Title: Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools

Synopsis of project

What I am doing
I am trying to find out what my fellow colleagues (teachers) in decile 1 schools think about and consider when they use digital devices as part of their teaching programmes. I am trying to establish the impact that the devices have on their teaching programmes and explore how these teachers view the new digital technologies strand of the New Zealand Curriculum. This study will inform recommendations for decile 1 schools using digital devices.

What it will mean for you
You will participate in one interview for forty five to sixty minutes.

What if I don’t know much about the topic?
I (the researcher) am looking for a range of teachers that teach in decile 1 schools. As a teacher you have valuable knowledge that will inform recommendations for the use of digital devices in decile 1 schools.

If I agree to participate, what will I have to do?
• Sign a consent form.
• Participate in one interview for forty five to sixty minutes that will be audio recorded if you agree.
• Read through the transcript of your interview, confirm with your statements, amend, or remove certain parts if you feel uncomfortable with the information you have shared.

What if I don’t want to participate anymore?
You can withdraw from participating in the project at any time. However, please be mindful that any withdrawals of data (your interview notes, audio recording and transcript) must be done within two weeks after you have been interviewed. There is no expectation that you participate in the research, however if you choose to, you are able to withdraw at any time.

Will people know who I am?
Your name, school, and information that may identify you will be kept completely confidential. All information collected from you will be stored on password protected hard drives and only myself as the researcher will have access to this information.

What happens to my data when the research project has finished?
Your data will be stored securely by me for a period of five years.
What will my data be used for?
I will analyse your data, in combination with up to nine other participants’ interview data, as well as up to fifty participants’ questionnaire data, in order to draw conclusions, make recommendations, and identify implications for teachers in decile 1 schools teaching with devices. This information will be presented in my Thesis and may also be used for other published articles.

What if I have more questions?
Please contact me (the researcher) if you need more information about the project. At any time if you have any concerns about the research project you can contact my supervisor:

Researcher: Sarah-Jane Khor [redacted]
Supervisor: Jo Mane phone 815-4321 ext. 7146 or email jmane@unitec.ac.nz

UREC REGISTRATION NUMBER: 2017-1093
This study has been approved by the UNITEC Research Ethics Committee from March 2018 to May 2018. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix D: Participant Consent Form - Interviews

Participant Consent Form - Interviews

Research Project Title: Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools.

I have had the research project explained to me and I have read and understand the information sheet given to me.

I understand that I don’t have to be part of this research project should I choose not to participate and understand that I may withdraw at any time prior to the completion of the research project.

I understand that I can withdraw my data (interview notes, audio recording and transcript) from the research project up to two weeks after my interview, after that my data will remain part of the research project.

I understand that everything I say is confidential and none of the information I give will identify me and that the only person who will know what I have said will be the researcher. I also understand that all the information that I give will be stored securely on hard drives with the researcher for a period of five years.

I understand that my discussion with the researcher will be recorded and transcribed.

I understand that the information I share will be used to contribute to the researcher’s Masters Thesis and any articles written that relate to this project.

I understand that I can see the finished research document.

I have had time to consider everything and I give my consent to be a part of this project.

Participant Name: ............................................................................................................................

Participant Signature: ................................................................. Date: .............................................

Project Researcher: ................................................................. Date: .............................................

UREC REGISTRATION NUMBER: 2017-1093
This study has been approved by the UNITEC Research Ethics Committee from March 2018 to May 2018. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix E: Transcriptionists’ Confidentiality Agreement

Research Title: Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools

Researcher/s Name: Sarah-Jane Khor

Address: [Redacted]

Phone number: [Redacted]

Email: [Redacted]

I ____________________________ (full name - please print) agree to treat in absolute confidence all information that I become aware of in the course of transcribing the interviews or other material connected with the above research topic. I agree to respect the privacy of the individuals mentioned in the interviews that I am transcribing. I will not pass on in any form information regarding those interviews to any person or institution. On completion of transcription I will not retain or copy any information involving the above project.

I am aware that I can be held legally liable for any breach of this confidentiality agreement, and for any harm incurred by individuals if we disclose identifiable information contained in the audiotapes and/or files to which we will have access.

Signature: .......................................................... Date: ..................................................

UREC REGISTRATION NUMBER: 2017-1093
This study has been approved by the UNITEC Research Ethics Committee from March 2018 to May 2018. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix F: Participant recruitment email for principals to forward – questionnaires

To:  
Cc:  
Bcc:  

Subject: Questionnaire participant recruitment

Kia ora, Malō e lelei, Talofa lava, Namaste,

My name is Sarah-Jane Khor and I am a teacher at [redacted]. I am currently completing a Master of Applied Practice through Unitec, Mt Albert campus, and am investigating teacher perceptions on digital device use in decile 1 schools. This research will investigate the complexities of teaching in our diverse communities, and make recommendations going forward.

In order to gather information about this topic I am looking for fellow colleagues (teachers) from decile 1 schools in Auckland to answer questionnaires. Questionnaires will take approximately up to thirty minutes to complete. I would appreciate your support by forwarding this email onto the classroom teachers at your school. I have attached the participant information sheets that provide teachers with the information required to make a decision about participating in this research. If teachers are willing to participate, they can do so by clicking on this link.

Faafetai lava, Dhanyawaad, Mauri ora, Faka'apa'apa atu,

Sarah-Jane Khor
Appendix G: Participation Information Sheets – Questionnaires

Information for Participants – Questionnaires

Research Project Title: Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools

Synopsis of project

What I am doing
I am trying to find out what my fellow colleagues (teachers) in decile 1 schools think about and consider when they use digital devices as part of their teaching programmes. I am trying to establish the impact that the devices have on their teaching programmes and explore how these teachers view the new digital technologies stand of the New Zealand Curriculum. This study will inform recommendations for decile 1 schools using digital devices.

What it will mean for you
You will participate in one questionnaire that will take approximately up to thirty minutes. Permission given for this questionnaire, signals your consent for your information to be part of this research.

What if I don’t know much about the topic?
I (the researcher) am looking for a range of teachers that teach in decile 1 schools. As a teacher you have valuable knowledge that will inform recommendations for the use of digital devices in decile 1 schools.

If I agree to participate, what will I have to do?
- Follow the link provided by my email to be taken to the questionnaire.
- Check the boxes that indicate your consent to participate.
- Participate in the questionnaire that will take approximately up to thirty minutes.

What if I don’t want to participate anymore?
You can withdraw from participating in the project at any time by not completing your questionnaire. However, please be mindful that as the questionnaire is anonymous you are unable to withdraw your data once you have submitted your response. There are no penalties, disadvantages, or consequences for withdrawing or not participating in this research.

Will people know who I am?
I am not asking for contact details as this questionnaire is anonymous. Unless you identify yourself in your responses, or contact me, there is no way for to know who you are. If you have disclosed very specific information about yourself or your school in the questionnaire, only those who read the research and already have this information will be able to identify this.
What happens to my data when the research project has finished?
Your data will be stored securely by me for a period of five years.

What will my data be used for?
I will analyse your data, in combination with up to forty nine other participants’ questionnaire data, as well as up to ten participants’ interview data, in order to draw conclusions, make recommendations, and identify implications for teachers in decile 1 schools teaching with devices. This information will be presented in my Thesis and may also be used for other published articles.

What if I have more questions?
Please contact me if you need more information about the project. At any time if you have any concerns about the research project you can contact my supervisor:

Researcher: Sarah-Jane Khor [Redacted]
Supervisor: Jo Mane phone 815-4321 ext. 7146 or email jmane@unitec.ac.nz

UREC REGISTRATION NUMBER: 2017-1093
This study has been approved by the UNITEC Research Ethics Committee from March 2018 to May 2018. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8351). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix H: Participant Consent Form – questionnaires

Participant Consent Form - Questionnaire

Research Project Title: Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools

I have read and understand the above participant information. (In the questionnaire this question will come after the participant information).

- Yes
- No

I understand that I do not have to be a part of this research project. Should I choose not to participate, I understand that I may withdraw by not completing the questionnaire.

- Yes
- No

I understand that everything I write is confidential, none of the information I am asked for will identify me, and that the only person who will know my full questionnaire responses will be the researcher. I also understand that all the information that I give will be stored securely on hard drives with the researcher period of five years.

- Yes
- No

I understand that my responses in the questionnaire will be anonymously recorded.

- Yes
- No

I understand that the information I share will be used to contribute to the researcher’s Masters Thesis and any articles written that relate to this project.

- Yes
- No

I have had time to consider everything and I give my consent to be a part of this project.

- Yes
- No

UREC REGISTRATION NUMBER: 2017-1093
This study has been approved by the UNITEC Research Ethics Committee from March 2018 to May 2018. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix I: Interview schedule

Khors02 - Exploring teacher perceptions on the use of digital devices in diverse decile 1 schools

Interview Schedule
| Participant name | | | |
| Date | | | |
| Interview topic | | | |

Introduction
- Start interview: Begin recording the audio from the interview.
- Introduce myself (the interviewer/researcher): junior school teacher, currently study in am completing (Master of Applied Practice).
- Participant Information Sheet: Draw attention to the audio recording part
  - Research approach: During this forty five to sixty minute interview, I will take notes, record the audio, roughly use an interview schedule.
  - Research aim: To explore your ideas around the challenges and impact of teaching with digital devices in the context of your diverse decile 1 school.
  - Confidentiality: Your name, school, and information that may identify you will be kept completely confidential. All information collected from you will be stored on a password protected hard drive and only you, myself (the researcher) and my supervisors will have access to this information.
- Consent: Sign the consent form
- Mohirotanga: Acknowledge that the participant has valuable knowledge that to be shared, no matter what their ethnicity, background, or perceived knowledge on the subject.
- Questions: Do you have any questions before we begin?

Context building questions:
1. Describe your position/role in your school.

2. What year do you currently teach?

<table>
<thead>
<tr>
<th>New Entrants</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 5</td>
<td>Year 6</td>
<td>Year 7</td>
<td>Year 8</td>
<td>Other</td>
</tr>
</tbody>
</table>

3. How are the classes in your school resourced with IT equipment (desktop computers, laptops, interactive boards/panels, tablets, iPads, other...)

4. Describe the diversity in your classroom.
<table>
<thead>
<tr>
<th>Questions to be selected from (relating to the research questions):</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research Question 1:</strong></td>
</tr>
<tr>
<td>How do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?</td>
</tr>
<tr>
<td>1. How important is the use of digital devices across decile 1 schools?</td>
</tr>
<tr>
<td>Not important 1 2 3 4 5 Very important</td>
</tr>
<tr>
<td>a) Explain your answer.</td>
</tr>
<tr>
<td>2. What tensions are there between the use of digital devices in decile 1 classrooms and the learning needs of your students?</td>
</tr>
<tr>
<td>3. Describe the factors that are out of your control that impact on your students learning.</td>
</tr>
<tr>
<td>4. In what ways do your students’ strengths work well with using digital devices?</td>
</tr>
<tr>
<td><strong>Research Question 2:</strong></td>
</tr>
<tr>
<td>What are the current strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?</td>
</tr>
<tr>
<td>5. When you are designing your teaching programme that utilises digital devices, what makes you think, “That won’t work for my children,” or “This is exactly what I need”?</td>
</tr>
<tr>
<td>6. When selecting learning activities for your students to complete on digital devices, what do you think about or consider?</td>
</tr>
<tr>
<td>7. What do you do to make sure the use of digital devices in your classroom is successful?</td>
</tr>
<tr>
<td>8. What about teaching low decile children makes using digital devices difficult/challenging/complex?</td>
</tr>
<tr>
<td>a) How does this change your practice?</td>
</tr>
<tr>
<td>Research Question 3: What do teachers in diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating the new digital technologies curriculum content in the technology learning area of The New Zealand Curriculum into their practice?</td>
</tr>
<tr>
<td>10. How will the digital technologies curriculum impact on your students’ teaching and learning?</td>
</tr>
<tr>
<td>• Advantages</td>
</tr>
<tr>
<td>• Challenges</td>
</tr>
<tr>
<td>Research Question 4: What are some recommendations for schools in diverse decile 1 communities when supporting The New Zealand Curriculum with digital devices and implementing the digital technologies curriculum content?</td>
</tr>
<tr>
<td>a) How do you get to that stage?</td>
</tr>
<tr>
<td>12. What will you need to feel successful at integrating this curriculum?</td>
</tr>
<tr>
<td>Revisit</td>
</tr>
</tbody>
</table>

**Generic/Prompting Questions**

- Can you tell me more about...?  
- Can you elaborate on that?  
- So you’re saying that... (rephrasing)?  
- So what do you do about that?  
- Can you clarify what you mean by...?  

**Conclusion of the interview**

- Thank the participant for their time.  
- Remind them that they will be emailed a transcript of the interview in the next week. Ask them to read through it, and change any statements they made that they disagree with, or don’t properly emphasise what they mean.  
- End interview – stop audio recording.
Appendix J: Questionnaire schedule

Layout in this schedule is different from the layout of the online questionnaires due to the set-up of the online website used. The content remains the same.

<table>
<thead>
<tr>
<th><strong>Questionnaire Questions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Link to online questionnaire:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Part 1: Inclusion Criteria</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Are you currently working as a classroom teacher?</td>
</tr>
<tr>
<td>• Yes</td>
</tr>
<tr>
<td>• No</td>
</tr>
<tr>
<td>B. Do you use digital devices in your classroom, as part of students' learning?</td>
</tr>
<tr>
<td>• Yes</td>
</tr>
<tr>
<td>• No</td>
</tr>
<tr>
<td>C. Do you teach at a decile 1 school in Auckland?</td>
</tr>
<tr>
<td>• Yes</td>
</tr>
<tr>
<td>• No</td>
</tr>
</tbody>
</table>

If the participant answers 'Yes' to all three of the Part 1 questions, they will proceed to Part 2.

If they answered 'No' to any of the questions, they will be prompted to submit their responses and end their questionnaire participation. These responses will not be included in the data.

<table>
<thead>
<tr>
<th><strong>Part 2: Participant Information and Consent Forms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Information Form – Sheet 1 Questionnaires</td>
</tr>
</tbody>
</table>

My name is Sarah-Jane Khor. I am currently enrolled in the Master of Applied Practice degree in the DCL Pathway at Unitec, Mt Albert Campus, and seek your help in meeting the requirements of research for a Thesis course, which forms a substantial part of this degree.

The aim of my project is:
To explore teacher perceptions on the challenges of teaching with digital devices in a diverse decile 1 environment.
To identify the impact of digital devices on decile 1 teaching environments in diverse communities.

I request your participation in the following way:
Participating in one questionnaire that will take approximately thirty minutes.

Neither you nor your school will be identified in the Thesis. The results of the research activity will not be seen by any other person in your school without the prior agreement of everyone involved. You are free to ask me not to use any of the information you have given, and you can, if you wish, ask to see the Thesis before it is submitted for examination.
Permission given for this questionnaire, signals your consent for your information to be part of this research.

I hope that you find this invitation to be of interest. If you have any queries about this research, you may contact my principal supervisor at Unitec New Zealand.

My supervisor is Jo Mane phone 815-4321 ext. 7146 or email j mane@unitec.ac.nz

UREC REGISTRATION NUMBER: ######## (Insert application number)
This study has been approved by the UNITEC Research Ethics Committee from (date) to (date). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
If there are any questions that you feel you are unable to answer, please type "N/A" or "Unsure."

D. I have read and understand the above participant information.
   • Yes
   • No

E. I understand that I don’t have to be a part of this research project. Should I choose not to participate, I may withdraw by not completing the questionnaire.
   • Yes
   • No

F. I understand that everything I write is confidential, none of the information I am asked for will identify me, and that the only persons who will know my full questionnaire responses will be the researcher and her supervisor. I also understand that all the information that I give will be stored securely on a computer at Unitec for a period of 10 years.
   • Yes
   • No

G. I understand that my responses in the questionnaire will be anonymously recorded.
   • Yes
   • No

H. I understand that my responses may be used in the researcher’s thesis and any articles written that relate to this project.
   • Yes
   • No

I. I have had time to consider everything and I give my consent to be a part of this project.
   • Yes
   • No

**Part 3: Context building questions**

J. Describe your role in your school.

K. What year do you currently teach?
   - New Entrants
   - Year 1
   - Year 2
   - Year 3
   - Year 4
   - Year 5
   - Year 6
   - Year 7
   - Year 8
   - Other...

L. How are the classes in your school resourced with IT equipment?
   - Desktop computers
   - Laptops
   - Interactive Whiteboards/ Panels
   - Tablets
   - iPads
   - Other...

M. Describe the diversity in your classroom.
### Part 3: Questions relating to the research questions

#### Research Question 1:
How do teachers perceive the value of digital devices in the context of teaching in a diverse decile 1 school?

<table>
<thead>
<tr>
<th>N.</th>
<th>Rank the statement on the scale. How important is the use of digital devices in decile 1 schools?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not important</td>
<td>1</td>
</tr>
</tbody>
</table>

- Explain your answer.

<table>
<thead>
<tr>
<th>Q.</th>
<th>Rank the statement on the scale. In comparison with literacy and numeracy, how important do you think digital literacy is?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not important</td>
<td>1</td>
</tr>
</tbody>
</table>

- Explain your answer.

<table>
<thead>
<tr>
<th>P.</th>
<th>How difficult or easy is it to match the learning needs of your students to use of digital devices in your classroom?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very difficult</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Research Question 2:
What are the current strategies that teachers in diverse decile 1 schools use to manage the complexities of digital device use in diverse decile 1 environments?

<table>
<thead>
<tr>
<th>Q.</th>
<th>What about teaching low decile children makes using digital devices difficult/challenging/complex?</th>
</tr>
</thead>
</table>

| R. | How does this change your practice? |

#### Research Question 3:
What do teachers in diverse decile 1 schools perceive as the advantages and challenges they face in terms of integrating the new digital technologies curriculum content in the technology learning area of The New Zealand Curriculum into their practice?

| Rank the statements on the scale |
| Strongly disagree | 1 | 2 | 3 | 4 | 5 | Strongly agree |

- I am confident in my ability to teach the digital technologies strand of the New Zealand Curriculum.
- The digital technologies strand of the New Zealand Curriculum is challenging for my practice.
- I have a good understanding of what "Computational thinking for digital technologies" is.
- I have a good understanding of what "Designing and developing digital outcomes" is.

(Text answer)

- List ways in which integrating the digital technologies strand of the New Zealand Curriculum into your teaching programme will be a challenge.
- List ways in which integrating the digital technologies strand of the New Zealand Curriculum into your teaching programme will benefit your students.

#### Research Question 4:
What are some recommendations for schools in diverse decile 1 communities when supporting The New Zealand Curriculum with digital devices and implementing the digital technologies curriculum content?

<table>
<thead>
<tr>
<th>Y.</th>
<th>In your opinion, what would a successful ICT/digital device programme look like in your classroom?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Z.</th>
<th>Rank the following suggestions in order of importance for successfully integrating the digital technologies curriculum into your school.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional development</td>
<td>Mentoring/support</td>
</tr>
</tbody>
</table>

#### Revisit

| AA. | Are there any other comments you would like to add? |

#### Conclusion of the Questionnaire
Full name of author: Sarah-Jane Gaiksim Khor

ORCID number (Optional):

Full title of thesis/dissertation/research project (‘the work’):
Exploring teachers’ perceptions on the use of digital devices and the digital technologies curriculum content in diverse decile 1 schools

Practice Pathway: CISC9090

Degree: Master of Applied Practice

Year of presentation: 2019

Principal Supervisor: Jo Mane

Associate Supervisor: Hayo Reinders

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AND

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___________________________
Signature of author: 

Date: 8/3/19
Declaration

Name of candidate: Sarah-Jane Gaiksim Khor

This Thesis/Dissertation/Research Project entitled: Exploring teachers’ perceptions on the use of digital devices and the digital technologies curriculum content in diverse decile 1 schools

is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Applied Practice

Principal Supervisor: Jo Mane

Associate Supervisor/s: Hayo Reinders

CANDIDATE’S DECLARATION

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.
  Research Ethics Committee Approval Number: 2017-1093

Candidate Signature:  
Date: 8/3/19

Student number: 1148396