The extent of tablet computer use in New Zealand's early childhood education services: Results from a national survey and a collective case study

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In 2017, New Zealand's revised curriculum for early childhood education, Te Whāriki, expanded reference to the use of technology for teaching and learning to include digital media and related devices. This article reports findings from a doctoral study about tablet computer use among New Zealand's four major early childhood service types: education and care centres, home-based services, kindergartens, and playcentres. Data were gathered in 2017, initially through a national survey, followed by a collective case study. Seven services participated in the collective case study which was designed to explain the results of the survey. Descriptive statistics and inferential statistics were used to analyse survey data while cross-case analysis was used to identify themes from the responses from each service in the collective case study.

The results are presented according to two categories of respondents, services who classified themselves as non-users and services who were using tablet computers for teaching and learning at the time of the survey. The national survey results revealed that more than half of the services did not use tablets. Non-users' reasons for not using tablet computers are discussed considering findings from both quantitative and qualitative phases of the study. Services who used tablets did so for a variety of reasons, including for documentation and assessment, to support children's learning and teaching work. Qualitative data regarding policies or guidelines for staff about the use of and access to digital media, teachers' and educators' learning for how to use touchscreen tablets for teaching and learning, as well as services' preferences on the facilitation of children's tablet use are also presented.

An important issue uncovered in this study was the use of personal tablets within ECE services. Among non-users, teachers and educators from more than half of home-based services and playcentres used their personally owned tablet computers, raising concerns about cybersafety and screen time. Many user services did not have formal guidelines or policies regarding tablet use. The data suggest that some services relied on the use of teachers' and educators' personally owned tablets. Implications arising from the findings of this study are explored, including the relevance of using digital technology for supporting distance learning and learning at home as a result of the global Covid-19 pandemic.

Keywords: tablet computers, early childhood education, New Zealand, digital media, early childhood services, iPads

Introduction

Since the iPad's release in April 2010, global tablet computer (hereafter referred to as 'tablets') shipments have reached approximately 1.58 billion (Statista Research Department, 2020). The touchscreen tablet functionality of iPads classifies them as a form

of tablet computers. This study also includes other mobile devices such as mobile phones which have touchscreen functionality similar to tablet computers. During this period, increases in young children's access to tablet computers at home have been noted by Eisen and Lillard (2017) and Rideout (2011, 2013, 2017) in the United States, while in the United Kingdom, Ofcom (2017) has reported that children as young as three years old owned tablet computers. In New Zealand, tablet ownership increased from 29% in 2013 to 51% in 2015 (Research New Zealand, 2015). More recently, Computer World reported an increase in tablet sales in New Zealand for the second and third quarters of 2020 due to the movement towards online learning (Putt, 2020).

International studies have provided evidence of under-two-year-old children operating tablets (e.g., Ahearne et al., 2015; Marsh et al., 2015). These studies investigated how tablets could support teaching and learning, particularly in early childhood education (ECE) settings, by offering touch as an alternative to being able to hold a pen in order for children to engage in learning tasks (Ahearne et al., 2015; Marsh et al., 2015). An abundance of other studies (e.g., Arnott et al., 2016; Fleer, 2014, 2017; Rose et al., 2017) have detailed how tablets, such as iPads, have been used for documentation, planning and assessment, information retrieval, playing music or videos, and taking photos or videos within ECE settings. Studies have also reported the effectiveness of tablets as communication tools between teachers, educators, and parents (Tsumura, 2017).

The New Zealand context

Attention to the place of digital technologies in ECE within New Zealand emerged in 2004, beginning with Bolstad's (2004) literature review of Information Communication Technology (ICT) use in ECE and their impacts. Bolstad (2004) argued that ICT potentially filled a variety of roles in ECE and asserted that adopting ICT into policies, curriculum, and pedagogy, could strengthen teaching practices in ECE. Shortly thereafter, the Ministry of Education released *Foundations for Discovery* (Ministry of Education, 2005), a report which aimed to encourage the use of ICT to support effective learning and teaching in ECE services. This framework supported services in decision-making around investment in and use of ICT, for teaching young children and supporting their learning (hereafter referred to as 'teaching and learning'), administration, and information management. Further policy support was evident in the Ministry of Education's *Kei Tua o Te Pai/Assessment for Learning: Early Childhood Exemplars, including Book 20 Information and Communication Technology (ICT)–Te Hangarau Pārongo me te Whakawhitwhiti* (Carr et al., 2009) which encouraged teachers and educators to use and reflect on how ICT may be used for documentation and assessment of children's learning, exploration, and communication.

More recently, the update of *Te Whāriki* (Ministry of Education, 2017) now specifies how digital media or devices support children's learning within the strands of contribution, communication, and exploration. The curriculum expects kaiako (teachers) to provide a wide range of resources and to make purposeful use of them and has made it explicit that kaiako are expected to help "children to develop an understanding of security and safety when communicating in a digital world" (Ministry of Education, 2017, p. 45).

Early research into the use of ICT in New Zealand ECE services included the New Zealand Council for Educational Research's national survey in 2007 focused on general use of digital technologies across the sector (Mitchell & Brooking, 2008), Terreni's (2009) case study research into use of an interactive whiteboard (IWB) in one kindergarten, and Oldridge's (2010) investigation into EC practitioners' adoption and use of ICT at the service

level. Recurring themes among these studies include the adoption of ICT based on kaiako beliefs and educational philosophies, together with their use for documentation and assessment, and collaborative and creative purposes.

Since the advent of iPads, several case studies have focused on how they have been used in ECE settings to support children's learning (Fagan & Coutts, 2012; Khoo et al., 2015) and to develop children's literacy skills (Hatherly & Chapman, 2013). In a more broadly focused case study, MacCallum and Bell (2019) aimed to determine how mobile devices, including tablets, supported three- to five-year-old children's learning and communication. Studies have also focused on teachers' perceptions on the potential uses of iPads in ECE settings, including Almashaileh's (2016) study involving four ECE teachers and Finch and Arrow's (2017) research with five ECE teachers. Despite New Zealand's revised ECE curriculum, *Te Whāriki* (Ministry of Education, 2017), acknowledging the important role that tools, including digital media and devices, play in children's learning, little information regarding the extent of tablet use in local ECE services was available. While the study reported here aimed to answer four research questions, this article addresses the following two questions:

1. What is the extent of tablet use and non-use for teaching and learning among teachers and educators in four ECE service types in New Zealand?

2. What are the reasons for the non-use of tablets among teachers and educators across these four ECE service types?

Methodology

The study received ethical approval from Victoria University of Wellington's Human Ethics Committee (RM 23433) on 03 December 2016. A sequential explanatory mixed-methods research design (Creswell, 2015) was adopted with the study conducted in two phases: a national survey and a collective case study. The survey comprised 33 questions informed by the literature review and focused on questions not previously covered in prior research on tablets. The survey was piloted with a user and non-user service prior to distribution. Respondents represented their service's teaching team and could answer a maximum of 20 questions depending on their responses. The survey was distributed to 3,464 early childhood services by email and post, drawing from the Ministry of Education's online ECE directory in February 2017 (Education Counts, 2017).

The second phase was a collective case study (Stake, 1995) which aimed to collect qualitative data from several sites, in this case ECE services, in order to provide a rich and thick description of an issue (Merriam & Tisdell, 2016). The second phase aimed to clarify information collected from the survey as per the research design. Data were collected from each case study site using semi-structured interviews (Creswell & Poth, 2017) to further explain the results of the survey. Stimulated recall interviews (Gass & Mackey, 2016) were used to collect further data from user services by recording how tablets were used in their service and using these video-recorded episodes as prompts for discussion during the interviews.

Ethical issues surrounding confidentiality and privacy of participants were addressed: Pseudonyms were assigned to replace the actual names of ECE services, kaiako, and the children who participated in the data collection. Any characteristic or description which could identify each service's and its members' identity were kept confidential and thus not specified in the study.

Descriptive statistics, inferential statistics including the Mann-Whitney U and Chi-Square tests were used to analyse the survey data. Cross-case analysis was used to identify themes and consistencies from the responses from each service in the collective case study.

Results

This section begins with an overview of the respondents to the survey before the case study settings are described. Results from the survey regarding the extent to which services used, or did not use, tablets are presented. Next, data is presented from, firstly, the non-user respondents and then the user respondents. Data from the respective case studies are drawn on throughout to help explain the survey results, in line with the research design.

In Phase One, 3,464 ECE services were invited to participate in the national survey. A total of 361 (10.4%) services responded to the survey overall. Respondents to the survey were invited to participate in the collective case study undertaken as Phase Two; while two services from each service type — a user and a non-user — were initially recruited, a playcentre which used tablets later withdrew from the study before their interview took place and were unable to be replaced, as there were no other user playcentres willing to participate in this phase of the study.

Table 1 presents an overview of the settings that participated in the collective case study. Each service was given a pseudonym to ensure confidentiality.

Table 1

Case study demographics

Service Pseudonym	Service Type	Number of Kaiako	Maximum Number of Children	Length of teaching experience
Āniwaniwa Kindergarten	Non-user kindergarten	6 fully certificated teachers	16 per teacher (2 to 7 years old)	14 to 20 years
Ekengia Homecare	Non-user home-based service	2 fully certificated visiting teachers and 30 educators	4 per educator (2 under two)	8 to 21 years
Hūmārietanga Childcare	Non-user education and care service	3 provisionally certificated teachers and 3 fully certificated teachers	50 (16 under-twos)	1 to 16 years
Iorangi Playcentre	Non-user playcentre	30 parents of which four parents formed the core leadership team	30 (18 under-twos)	1 term to 20 years
Koanga Wākāinga Homebased	User home-based service	Two visiting teachers and 17 educators	4 per educator (2 under-twos)	6 to 20 years
Manaakitanga ELC	User education and care service	5 fully certificated teachers	40 (12 under-twos)	5 to 15 years
Nunui Kindergarten	User kindergarten	5 fully certificated teachers and one on-site ICT support staff	40 (3 to 5 years old)	5 to 20 years

Analysis of survey results

The number of responding services varies across individual questions as some respondents chose not to answer every question in the survey. Analysis of the survey revealed that, from 338 responses, 176 services (52.1%) did not use tablets, while 162 (47.9%) did. A Chi-Square test identified the relationship between service type and tablet use and non-use. Figure 1 below shows that tablet non-user and user services were not equally distributed per service type: More kindergartens used tablets while most home-based services and playcentres did not. Fifty percent of education and care services used tablets as confirmed by a Chi-Square test result, X^2 (3, n=338), Chi-Square=31.27, p < 0.01.
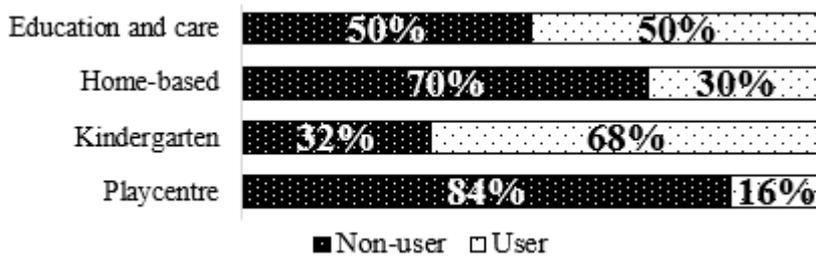

Figure 1. Tablet use and non-use services per service type

A Mann-Whitney U test was used to identify the relationship between use/non-use of tablets and the size of the teaching team. Results revealed a significant association between the number of kaiako and whether a service used tablets or not (p=0.014): user services generally had a smaller sized teaching team of between five to ten kaiako.
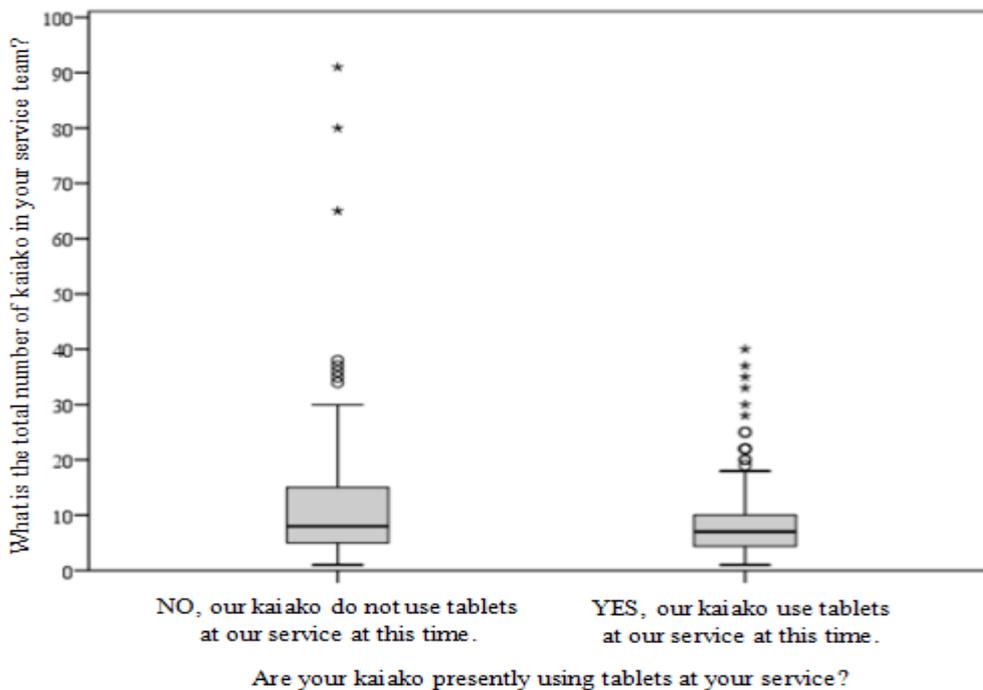

Figure 2. Number of teachers and educators per non-user and user service

Tablet non-users

Survey respondents who did not use tablets were asked to identify, from a pre-determined set of responses, why they did not use them (see Table 2 below). When "almost always applies" and "sometimes applies" responses were combined, educational philosophy (74.0%) and funding (58%) were the two main reasons respondents did not use tablets. Of interest was that while 31% of respondents indicated that company/service policy "almost always applies" at the other end of the scale, 42.1% said that this reason "never applies."

Table 2

Reasons for non-use of tablets

Reason	Almost always applies		Sometimes applies		Rarely applies		Never applies		Total
	%	n	%	n	%	n	%	n	
Educational philosophy	56.9	83	17.1	25	4.8	7	21.2	31	146
Company/service policy	31.0	39	13.5	17	13.5	17	42.1	53	126
Funding	27.8	35	30.2	38	4.0	5	38.1	48	126
Use of another type of technology (Smartboards, overhead projectors, laptop computers)	22.0	27	13.8	17	9.8	12	54.5	67	123
Initial teacher training did not cover tablets	12.6	14	12.6	14	12.6	14	62.2	69	111
Equipment needs repair/incompatibility	9.7	11	11.5	13	10.6	12	68.1	77	113
Lack of technical expertise	7.6	9	26.1	31	16.8	20	49.6	59	119
Lack of professional development	6.9	8	25.0	29	14.7	17	53.5	62	116
We used them before, but we stopped	5.3	5	5.3	5	2.1	2	87.4	83	95

Data from the Phase Two collective case study provide further insights into services' reasons for not using tablets. For example, *Āniwaniwa Kindergarten, Ekengia Homecare,* and *Iorangi Playcentre* explained that using tablet computers did not match the philosophy of their service. They expressed caution in adopting touchscreen tablets because they perceived that the negative impacts of digital technology use on young children outweighed their benefits. At the time of data collection, *Iorangi Playcentre* had recently received a new iPad. While initially intended only for documenting occupational health and safety, the leadership team decided that this iPad could also be used for documenting and assessing children's learning in order to resolve cybersafety and privacy concerns involving personal tablet and mobile phone use by other parent-educators and adults visiting the service. During the case study interview, the leadership team decided to prohibit use of personally-owned devices in the centre and create a formal policy and set of guidelines for educators regarding digital technology use.

Kaiako from *Āniwaniwa Kindergarten* and *Ekengia Homecare* believed that young children should not have access to digital technology. *Āniwaniwa Kindergarten's* educational philosophy did not allow the use of digital technologies, while *Ekengia Homecare's* head teacher clearly specified that their company policy only allowed their kaiako to use their personal tablets and phones to document children's learning as long as children did not directly engage with these devices. As for *Hūmārietanga Childcare*, the service did not use tablets due to lack of funding because, as a private centre, the owner could not apply for grants. To compensate for this, the service allowed kaiako to use their personal touchscreen devices such as their mobile phones to play music and let children watch videos with kaiako. The discussion during the interview led *Hūmārietanga Childcare* to consider how they might incorporate the use of their owner's iPad who offered to "bring my iPad in. … And we could probably trial it with the transition class."

When asked if their service intended to use tablets in future, 93 (55.7%) of the survey respondents indicated they had no intention of using them for teaching and learning, 50 (29.9%) were unsure at that time, and 24 (14.4%) intended to acquire tablets. The time of acquisition ranged from within one month to 36 months with a median of six months. Non-users who were likely to use tablets in the future reported that they would most likely use these devices for documentation and assessment (66.2%), documenting events (63.6%), exploration (55.9%), and playing music (52.4%).

From a list of possible barriers, non-users were asked to rate the likelihood of each impacting on their use of tablets. The majority of these services responded that they preferred traditional practices (77.3%) and that using apps did not fit their educational goals (76.2%)—aligning with the prime reason non-users did not use tablets, their educational philosophy. Internet connection problems (34.4%) and the lack of professional development on the basic use of ICT (26.2%) were the next two most likely barriers. Each of the non-user case study teams believed that preferring traditional or non-digital practices was not a barrier per se; instead seeing it as their choice in accordance with their respective service's educational philosophy or company policy.

A key finding was the use of personally owned tablets within non-user services by children, whānau/parents, and kaiako. Figure 3 shows that among non-users, more home-based services and playcentres allowed the use of personal tablets than did education and care or kindergartens. Chi-Square analyses resulted in a significant difference among service types and use of personal tablets: X^2 (3, n=168), Chi-Square=14.32, p < .01.
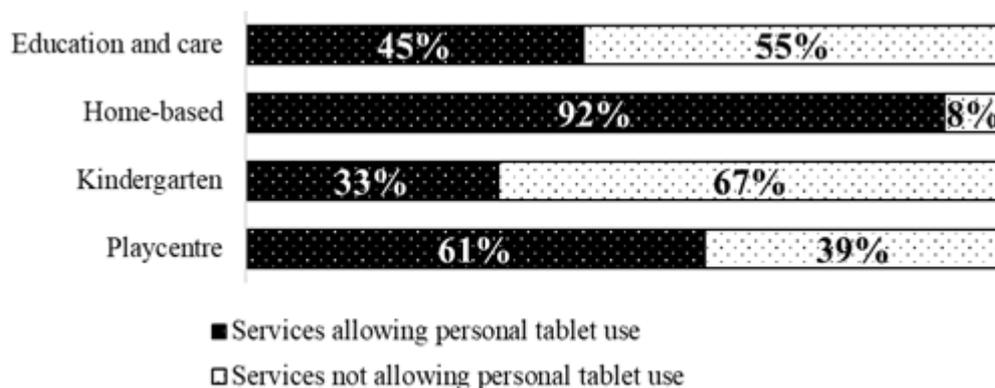

Figure 3. Non-users allowing or not allowing use of tablets according to service type

Tablet users

Survey respondents who had indicated that they used tablets within their services were asked how they used these devices for teaching and learning, indicating all that applied from 11 choices (see Table 3). The most frequent (almost every day) purpose was for documentation and assessment (53.1%). When "almost every day" and "twice/thrice a week" were combined, the most frequent purpose became playing music (70.7%) followed closely by documentation and assessment (68.1%). The third way tablets were used was for creativity (i.e., for content creation through video- or voice-recording features and music, art, or story telling apps, including drawing and colouring apps) whether "almost every day" and "twice/thrice a week" were combined (65.3%) or not (41.7%).

Table 3

User services: Purposes of tablet use

Purposes	Almost every day		Twice/thrice a week		Once a week or less		Never		Total
	%	n	%	n	%	n	%	n	
Documentation and assessment	53.1	78	15.0	22	17.0	25	15.0	22	147
Playing music	46.0	69	24.7	37	14.7	22	14.7	22	150
Creativity	41.7	60	23.6	34	17.4	25	17.4	25	144
Communication with children's families/whānau	37.4	52	18.0	25	18.7	26	25.9	36	139
Documenting events	31.2	44	14.9	21	35.5	50	18.4	26	141
Exploration	30.4	41	12.6	17	35.6	48	21.5	29	135
Information retrieval	26.5	36	30.2	41	32.4	44	11.0	15	136
Watching videos	12.1	17	23.6	33	42.1	59	22.1	31	140
Playing games	7.5	10	9.7	13	32.8	44	50.0	67	134
Communication with other services or umbrella corporation	5.5	7	6.3	8	20.3	26	68.0	87	128
Communication with institutions (universities, government offices, etc.)	1.6	2	4.7	6	18.8	24	75.0	96	128

A follow-up qualitative question then asked respondents to describe how they supported children's learning using tablets; 143 responses were obtained with all the user playcentres indicating that they did not use tablets with children. Responses from the other service types were grouped into themes with the two most frequently occurring themes being research and extending children's interests (58 education and care services, two home-based services, 22 kindergartens) and facilitating children's use and access to

tablets (53 education and care services, three home-based services, 25 kindergartens). Other major themes were supporting learning through apps (27 education and care services, 22 kindergartens) and assessment and documentation (29 education and care services, one home-based services, 18 kindergartens). An education and care service gave an example on how they used tablets for research and extending children's interests by using "it to research things about a cockroach … and looked up on the iPad to see what it ate and if it would cause harm to the children … and what type of cockroach it was." As for facilitating children's use and access to tablets, another education and care service reported that "our children are always monitored by a teacher" while a different response from a third education and care service explained that kaiako "sit alongside them to scaffold skills and correct use."

Each of the three case study user services noted that they used their tablets for documentation and assessment, playback of music and videos, and for creativity. For example, *Manaakitanga ELC's* kaiako specified using drawing and photography apps to purposefully teach children skills. They commented on the iPad's convenience with drawings easily printed out or saved online and how using open-ended creative apps made children's activities easier to manage and time efficient as there was less time required for set up and tidying up. Kaiako from *Manaakitanga ELC* and *Koanga Wākāinga Homebased* described how other functions of tablets and their apps let children explore other creative activities, such as movie making, although a *Koanga Wākāinga Homebased* home educator emphasised the importance of providing a balanced set of both creative digital and non-digital activities.

User services were asked a number of questions in the survey about how their children were allowed to use tablets, including the number of children able to use tablets at any one time. Most users (52.5%) allowed fewer than five children while 32.9% allowed groups of between five to nine children to use tablets together. Fewer than fifteen percent of user services allowed groups of more than 10 children to use tablets at any one time.

When asked about monitoring children's use, most survey respondents specified that a fully certificated teacher (58.7%) or provisionally certificated teacher (23.8%) monitored children's tablet use. Peer monitoring by older or same-aged children occurred in 12.6% of services while 3.4% reported monitoring by parents or adult whānau. Three services (1.5%) indicated that there was no monitoring/facilitator, while one service selected all five facilitative options. Children typically used tablets in groups with a kaiako (39.6%) or individually with a kaiako (32.1%).

All three case study user services expected a kaiako to monitor tablet use. At *Nunui Kindergarten*, for example, children frequently used the iPads in an area where they could sit comfortably together. Due to the number of children on the roll, kaiako put children's name tags on a whiteboard as a turn-taking system. This board was often checked by a kaiako and by children waiting for their turn. Children were never left using the iPad unsupervised because the layout of the *Nunui Kindergarten* allowed kaiako to "observe what's going on." Each user case study service only allowed up to five children to use a tablet as supervision of children's use was easier if tablets were used in pairs or small groups.

The survey also asked user services whether they had formal guidelines for staff on using tablets for teaching and learning. While 60% responded that they had formal policies, 82.2% did not have a screen time policy. A Chi-Square analysis was used to examine the relationship between formal policies or guidelines for staff and service type. Results showed a significant association when tested at the 5% significance level, X^2 (3, n=152),

Chi-Square=8.49, p=.04 (see Figure 4), with teacher-led service types more likely to have implemented a formal policy or guidelines for staff on the use of tablets than playcentres.
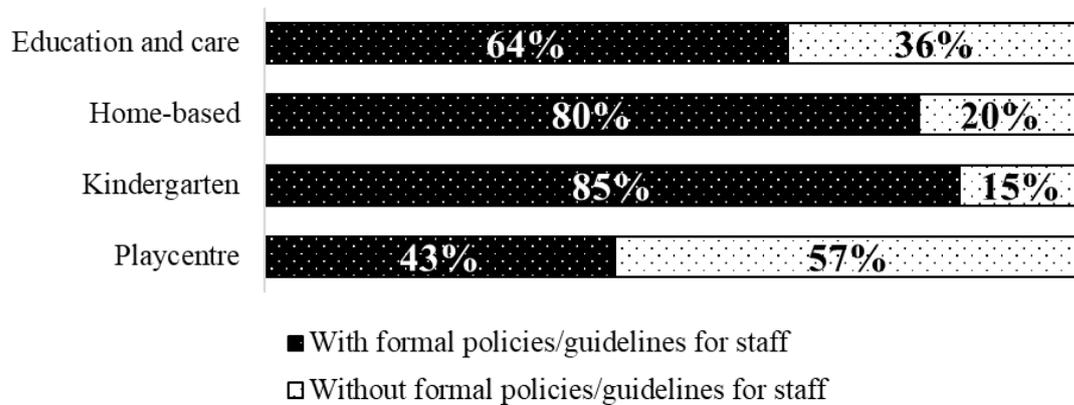

Figure 4. Formal policies or guidelines implemented by users per service type

Chi-Square was used to analyse users' responses about implementation of a screen time policy for children who engaged in digital media with their responses about having a formal policy or guidelines for staff on tablet use. The results of a Chi-Square analysis showed a significant association when tested at the 5% significance level, X^2 (3, n=152), Chi-Square=4.37, p=.04. Figure 5 illustrates that very few services had both formal policies/guidelines for staff and a screen time policy.
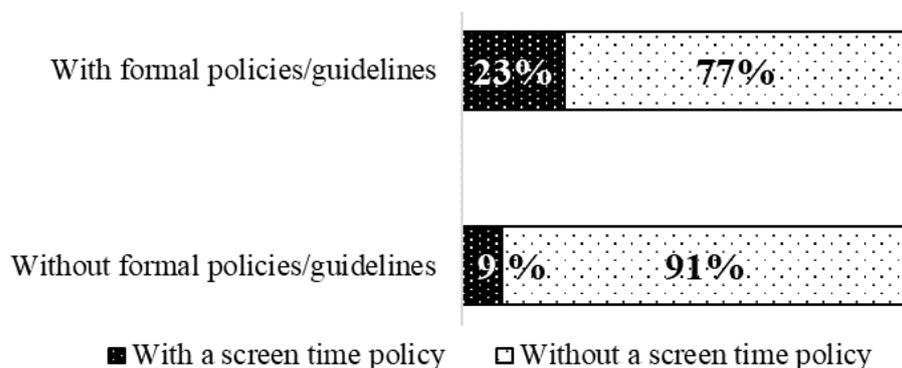

Figure 5. Formal policies or guidelines and screen time policy according to users

While the survey results identified variations between users' formal policies or guidelines for staff about the use of tablets for teaching and learning and screen time policies, the three case study user services felt that their current policies and guidelines, together with how they monitored children's use of tablets, were sufficient enough that there was no need for a strict screen time policy. In addition to a tablet assigned to each kaiako, *Nunui Kindergarten* also had two tablets freely accessible by children which did not have internet access. One kaiako in both *Nunui Kindergarten* and *Manaakitanga ELC* also took responsibility for managing issues regarding iPads, including selection and evaluation of apps for teaching and learning. These two services also had staff in their respective

umbrella organisations who approved purchases and app installations for their iPads. At *Koanga Wākāinga Homebased*, visiting teachers used company-owned iPads and frequently observed and evaluated tablet computer use within their networks. Only three educators used their personally owned tablets and specified that because they were their own tablets, they were careful with children's access to and use of them.

Discussion

Results from both the survey and collective case study showed diversity in the integration of tablets across New Zealand's ECE services. The finding that kindergartens used tablets more than education and care services, home-based services and playcentres builds on Gerritsen et al.'s (2016) study which indicated that playcentres, in particular, did not use tablets within their programmes. Of interest is the relationship between the size of the teaching team and the use/non-use of tablets: User services tended to have a smaller sized teaching team compared to non-users. There are several possible explanations for this finding, including that having a smaller number (e.g., four-five) of kaiako could ease provision and management of tablet use alongside being able to collaboratively learn how to use tablets for teaching and learning.

Factors influencing services' decisions not to use tablets

A central focus within this study was understanding why ECE services chose not to use tablets to support teaching and learning. The results presented above revealed three core reasons that underpinned decisions of kaiako: Their educational philosophy, the availability of company or service policy surrounding digital technology use, and funding issues.

The central factor influencing non-users' decisions not to use tablets was their educational philosophy. Non-users were firm in their beliefs that tablet use did not bring any benefits to teaching and learning in ECE. This finding aligns with Blackwell et al.'s (2013) research which emphasised the important role of ECE professionals' beliefs in deciding whether to adopt tablets.

In this study non-users explained that, according to their educational philosophies, children were expected to engage in physically active play, preferably outdoors, using non-digital tools. These services felt that tablet use led to a lack of physically active play which impacted on children's physical and gross motor development. Their perceptions about the negative impact of tablets, such as sedentary learning, have also been found in earlier studies (Gerritsen et al., 2016; Howie et al., 2017). According to Gerritsen et al. (2016), services preferred that children engage in more physically active play and because most of them perceived that tablets could not provide this type of play, they did not use tablets. Similarly, in this study, many non-users saw tablet use and outdoor play as diametrically opposite activities despite prior studies (e.g., Hipp et al., 2017; Neumann, 2018) that have identified the benefits of using these devices as long as children's use is monitored by a kaiako, particularly through scaffolding their engagement.

To non-users, activities such as mark making or handwriting on pen and paper, gross motor activities, and play using real-world toys were not possible using tablets. Their perceptions contrast with findings from some international studies that the multimodality of tablets supports children's mark making activities and that tablets add to the diversity of children's play and other creative activities (e.g., Aldemir & Kermani, 2017, Neumann et al., 2018). Such perceptions reflect Tsumura's (2017) research which identified that because iPad-based activities did not match Canadian kindergarten teachers' preferences

for play-based learning or traditional activities, they chose not to use tablets for teaching handwriting and printing.

Such decisions are interesting given the emphasis within *Te Whāriki* (Ministry of Education, 2017) on the importance of tools that support children's exploration and learning, and the encouragement given to kaiako to offer children opportunities to use a wide range of tools. Fleer and Hedegaard (2010) have argued that teachers are expected to understand commonly available tools in ECE and use them to support children's learning. Of interest is that while the non-user kaiako interviewed in Phase Two acknowledged that tablets are tools to support children's learning, their educational philosophy held them back from incorporating tablet use into their programme. This finding is useful in expanding our understanding of the impact of educational philosophy on practice in New Zealand's ECE sector.

The study also found that users and non-users differed in their policies and guidelines regarding tablets. Where services used tablets, either their umbrella organisation's or the service's policy determined procurement of the device and how its use was supported and managed. Where services did not use tablets because of their educational philosophy, their policies tended to reflect this stance. Services' policies also governed whether they allowed the use of touchscreen devices that were personally owned by kaiako and parents/whānau. Of interest were those services which did not allow the use of service-owned tablets but did permit kaiako and parents/whānau to use their personally owned touchscreen devices. This issue is examined further in the section below.

This study's results aligned with Flewitt et al.'s (2015) findings that cost was one of the many reasons why ECE services did not adopt tablets. As already noted, some services that could not afford tablets allowed kaiako to use their own tablets as an alternative. Phase Two revealed that these services were not entirely non-users because even though they did not have a service-owned tablet, personal devices were still being used. These findings are significant because they add new understandings about the nature of ownership and use of tablets in New Zealand's ECE services.

How tablets are being used by services

The majority of user services participating in both phases of this study responded that they used tablets for documentation and assessment. This finding is supported by the literature (e.g., Fleer, 2017; Moore et al., 2018; Vaughan & Beers, 2017). Earlier studies in New Zealand (e.g., Khoo et al., 2015; MacCallum & Bell, 2019) and internationally (e.g., Moffett et al., 2017) have described the various ways tablets have been used for documentation and assessment such as photography, video recording, moviemaking, and linking these to children's learning stories. In this study, respondents reported that children's learning was often documented through photography or video-recording and assessments were made using learning stories apps which were shared online with parents and whānau through e-portfolios. At times, children were encouraged to use apps on the tablet to take photos and videos or make drawings which could then be combined to make video compilations or short movies and uploaded to a learning story app or online portfolio.

Findings from both phases of this study builds on Rose et al.'s (2017) research which revealed that the multifunctionality of tablets allowed playback of music or videos. User services' qualitative responses from the survey included listening to music or watching videos, some by connecting their tablets to a speaker to play music in the background. In Phase Two, *Ekengia Homecare* allowed kaiako to use their personally owned digital

devices for documentation and to play music in the background as long as they did not let children engage directly with these devices. Kaiako at *Koanga Wākāinga Homebased, Manaakitanga ELC, and Nunui Kindergarten* used their tablets to play music and videos. At *Manaakitanga ELC, and Nunui Kindergarten,* this activity sometimes led to children using the musical instruments. These findings aligned with Neumann et al. (2018) who reported on how the multifunctionality of tablets enabled children to engage in a multimodal environment.

As for creativity, results from Phase One found that many services used apps to support this by referring to creativity apps which included art apps and related picture or movie-making apps. Services supported children's use of creative apps to teach creative arts through photography or movie-making such as *Manaakitanga ELC* and *Nunui Kindergarten*. These findings build on MacCallum and Bell's (2019) research which found that the multifunctionality of tablets supported how kaiako engaged in collaborative and creative activities with children.

The role of personally owned tablets

A significant finding to emerge from this study was that non-user services often allowed the use of personally owned tablets and similar devices, such as touchscreen phones, as substitutes for the non-use or unavailability of service-owned tablets. However, this practice was not uniformly evident across different service types. For example, while the survey data revealed almost half of education and care services allowed their kaiako to use their own tablets, kindergartens and education and care services which used service-owned tablets did not allow personal tablet use. Thus, most personal tablet use could be linked to services that could not or would not purchase these devices themselves. Some services indicated that because they could not afford tablets, they allowed kaiako to bring in and use their own tablets as an alternative. This parallels Flewitt et al.'s (2015) finding that cost was one of many reasons why ECE services did not adopt the use of tablets.

This practice raises two important issues: Firstly, the impact on kaiako who end up using their own devices because their service will not or cannot purchase tablets for their use, and secondly, the potential for cybersafety and privacy breaches that may occur when personally-owned tablets are used within the programme or to document and assess children's learning. Kaiako expressed concern about the risk of damage to their own devices and the potential for additional internet data costs when the only access to internet-based resources or for taking video or photographs for assessment purposes was through using their personal devices. Such practices suggest that some services may be taking advantage of the goodwill of kaiako as well as shifting the financial cost of tablet use from the service to each kaiako.

Two key issues around cybersafety and privacy emerged about the use of personally owned tablets. Services expressed concern that when teachers' personal tablets were used in the ECE setting they may not be monitored to the same degree that service-owned devices would be and that children may inadvertently be able to access inappropriate sites if appropriate security levels were not set. Maintaining children's privacy when personal devices were used to collect images for inclusion in assessment documentation was a concern for some services, particularly playcentres, where a broader group of parents and whānau contributed to the assessment process.

Of interest was that in Phase Two, the stimulated recall interview discussions between team members created opportunities for teachers and educators in some services to explore issues such as the relevance of tablets generally in their programme

or, more specifically, the place of personally-owned tablets and cybersafety. This suggests that for some services limited attention had been paid to thinking about some of these issues. Taking time to examine why tablets might — or might not — be a useful tool to incorporate into the programme to support children's learning and developing careful policies that inform and support appropriate tablet use is an essential aspect of their effective introduction and use in ECE settings.

Conclusion

This research highlights the expanding role of kaiako as facilitators and gatekeepers of appropriate use of digital technologies for learning in their early childhood services. In the context of the Covid-19 pandemic happening globally, there has been an increase in the use of digital technology for supporting distance learning and learning at home (Putt, 2020). The implications arising from the findings of this study reveal that children in many ECE services have not explored using tablets for learning. The relevance of using digital technology for supporting distance learning has become increasingly important. The multifunctionality of tablets make it easy for young children to communicate and learn from home. For those services who are already using tablets, it is timely for them to consider how they might enhance their use to strengthen learning while those non-user services might want to consider whether there is a future place for tablets within their ECE programmes, given the impact of Covid-19.

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