

**INVESTIGATING THE INITIATIVE OF
STUDENTS BRINGING THEIR OWN TECHNOLOGY DEVICES
INTO NEW ZEALAND SECONDARY SCHOOLS**

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Abstract

The paradigm shift in education towards equipping people to use knowledge in inventive ways, new contexts and combinations opened the door for technology to be infused into 21st Century learning. Although digital technology facilitates inquiry processes, shared learning and social creation of knowledge through connectivity in supportive environments, it is the personalised, student centred nature of Bring Your Own Device (BYOD) that has caused many educators to justify this initiative. The challenge for educators is to implement successful change using BYOD that maximises the quality of teaching and learning aligned to the institution's goals and visions. The topic of this study is to investigate the initiative of students bringing their own technology devices into New Zealand secondary schools. The first aim of this study is to examine why secondary schools are implementing a technology BYOD initiative. The second aim is to investigate ways in which schools implement and evaluate BYOD initiatives. The last aim is to identify successes and challenges associated with a technology initiative such as BYOD. A qualitative approach was adopted in this study which involved five urban secondary schools in New Zealand. Eight semi structured interviews with leaders, managers, or co-ordinators of the BYOD initiative were conducted. Five focus group discussions involving between four and seven participants consisting of pastoral teachers and leaders, curriculum teachers and leaders, managers or co-ordinators were held. A number of key findings emerged across both the semi structured interview and the focus group discussion. Quality was measured using digital technology best practice models, the key competency of thinking, and links were made to measuring effectiveness and quality through appraisal, reflective practice and conversations about quality. Challenges of this initiative related to change management and student management while the biggest success was noted as a shift to student centred learning. This study had conclusions which pointed to implications for practice. Before implementing a BYOD initiative leaders, managers, co-ordinators or educators in charge, need to decide and facilitate a plan and vision. This plan and vision needs to involve and support those on the receiving end to adjust to change by providing tailor made professional development that suits individual and school needs. Infrastructure and technology must align to this plan and vision and allow educators to be able to do what they need it to do. For students to act collaboratively they need to feel safe and supported in an online environment. Therefore, data management systems that can be used to track behaviour to inform evidence based decisions regarding effectiveness of policies that relate to BYOD and purposeful interventions may be required.

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Abbreviations / Glossary

| | |
|------------------|---|
| BOT | Board of Trustees |
| Blended learning | The combination of traditional and e-learning practices |
| BYOD | Bring Your Own Device |
| CIH | Computers in Homes |
| Device agnostic | Computing components that work with various systems without requiring any special adaptations |
| e-learning | Learning and teaching that is facilitated by or supported through the smart use of information and communication technologies (Ministry of Education, 2006) |
| eLPF | e-Learning Planning Framework |
| eMCAT | electronic Mathematics Common Assessment Task |
| ERO | Education Review Office |
| ICT | Information Communication Technologies (Ministry of Education, 2006) |
| IT | Information Technology |
| NAACE | National Association of Advisors for Computers in Education |
| NCEA | National Certificate of Educational Achievement |
| Net Safe | New Zealand's Internet Safety Group |
| NZC | New Zealand Curriculum |
| NZQA | New Zealand Qualifications Authority |
| PB4L | Positive Behaviour for Learning |
| PD | Professional Development |
| PLG | Professional Learning Group |
| PLN | Professional Learning Network |
| SRF | Self-Review Framework |
| SAMR | Substitution Augmentation Modification Redefinition |
| SOLO | Structure of the Observed Learning Outcome |
| SWPBS | School Wide Positive Behaviour Support |
| TELA | Laptops for Teachers |
| VLN | Virtual Learning Network |
| Wi-Fi | Wireless Networking Technology |

Chapter One: Introduction

Introduction

Schools are facing a paradigm shift in practice trending towards social construction of knowledge where competencies such as managing self, relating to others and participating and contributing are core elements of 21st Century skill sets (Bolstad, Gilbert, McDowall, Bull, Boyd, & Hipkins, 2012; Lai & Pratt, 2007; Ministry of Education, 2007). It is within this context that the topic of this research is ‘Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools’. This introduction will provide a background of the New Zealand context for the research, the rationale for carrying out the study, the research aims and questions and a summary of the thesis chapters.

The New Zealand context

Digital technology is considered to facilitate 21st Century visions of teaching and learning where knowledge is used in problem solving and solution finding, thus providing a transformative framework for teaching and learning (Bolstad et al., 2012). Personalised learning, student led inquiry, collaboration and more opportunities for communities to be involved in their children’s education are parts of this 21st Century vision (Kaye, 2012; New Zealand Qualifications Authority, May 2013). The *Statement of Intent 2013-2018* document, recognises “a wide range of tools and environments including mobile applications” (Ministry of Education, 2013, p. 27). Schools are under considerable pressure from the government to integrate technology into schools. As outlined in the *Future State* document issued by the New Zealand Qualifications Authority (May 2013), the last of the three stages, working online and assessment on demand (transformation years 2017 – 2022) is only three years from the completion date of this thesis, causing some pressure for educators who have yet to instil technology into their schooling system.

Broadly defined, Bring Your Own Device (BYOD) refers to technology models where students bring a personally owned device to school for the purpose of learning (Alberta Education, 2012; Stavert, 2013). However within a New Zealand setting, the BYOD definition ranges from models where schools are “dictating what device a student should bring to school, and having the school manage the device, to having students bring in any device and simply connecting to the school network” (Sweeny, 2012, p. 8). At present, BYOD use ranges from ad hoc use in a traditional classroom environment through to classes

that are targeted to digital learning across a spectrum of subjects. To facilitate technology into classrooms some schools are allowing students to ‘opt in’, or making it compulsory for students to bring their own devices such as laptops, netbooks, tablets, or smart phones.

Schools are attempting to adapt to the changing educational environment, and increase technology, by introducing various BYOD models into schools. As stated in the *Future-focussed learning in connected communities* report (21st Century Learning Reference Group, 2014), of six hundred schools that responded to the 2012 School Information Communication Technologies (ICT) Infrastructure Survey, “twenty five percent were implementing a ‘Bring Your Own Device’ (BYOD) programme, or intended to do so within twelve months of the survey” (p. 11). The *Statement of Intent 2013-2018* document has outlined that where effective deployment and delivery are the focus it will guide “schools to design and implement their local curriculum that is responsive to the needs and wishes of their students, parents, families, whānau, iwi and communities” as well as provide training (Ministry of Education, 2013, p. 5). The *Statement of Intent 2013-2018* document published by the Ministry of Education (2013) states part of its purpose is to provide the infrastructural support schools require for 21st Century learning, as well as the tools and resources to support the use of digital technologies.

Local conditions and social contexts of schools influence learning and teaching opportunities (Bolstad et al., 2012; Ministry of Education, 2007). Technology cannot be viewed in isolation as it is increasingly recognised as being part of a wider system of complex changes, therefore educators are advised to think of equity and access in regards to technology (Bolstad et al., 2012; Craig & Williams, 2011). If educators wish to implement BYOD, considerations include whether students or teachers can afford the device, software, internet connection and the frequency of learning opportunities available (Kaye, 2012; Lai, Pratt, & Trewern, 2001; Ministry of Education, 2007). However, in spite of this Bolstad et al. (2012) state that devices have the potential of producing educational engagement and success for all learners.

Schools need to be led by principals who understand the importance of digital technology as leadership is a major factor in how effectively schools embrace 21st Century skills and transformative learning (Kaye, 2012). Transformational change requires high levels of teacher professionalism and different forms and types of change management and leadership

at different times (Bolstad et al., 2012; Robinson, Hohepa, & Lloyd, 2009). Leadership within schools is offered by senior leaders such as principals, or senior leadership teams as well as individual teachers. It is important to note that “some of the approaches advocated for 21st Century learning and the ideas that underpin them may differ from what today’s teachers, school leaders and educational policy leaders experienced in their own school learning” (Bolstad et al., 2012, p. 5). Schools are being talked about as learning organisations, and educators are encouraged to become involved in professional learning communities or even networked learning communities within and across schools (Bolstad et al., 2012; Kaye, 2012). School leaders have responsibility for supporting and sustaining a continuous culture of learning amongst staff, in a dynamic environment (Bolstad et al., 2012; Robinson et al., 2009).

The Ministry of Education *Statement of Intent 2013-2018* places technology as a priority, and expects school clusters to “identify and implement innovative practice” (p. 29). According to several authors coherence is needed across different aspects of system-level support to enable innovation to thrive (21st Century Learning Reference Group, 2014; Bolstad et al., 2012; Kaye, 2012). The first of these is a multi-layered structure of professional learning networks to give schools an innovative edge. The second is innovative curriculum and assessment approaches and resources that involve the active and direct engagement of teachers, particularly in reflecting, practising and researching new teaching methods. The third is creative building policies which involve using networks and loops to allow teachers to collaborate around the country, and to reach more students in a targeted way. The key is in preparing today’s students, educators need to be aware students are “innovators, designers and creators — not just passive consumers” (21st Century Learning Reference Group, 2014, p. 7). Innovation is built around a culture of continuous learning and ‘next step’ thinking requires people to be comfortable with this idea (Bolstad et al., 2012). It is further dependent on schools having the infrastructure, inspiration, capability and opportunities for innovation to achieve these kinds of teaching and learning (Bolstad et al., 2012).

The Ministry of Education takes a system leadership role, where support is given to monitor performance, and develop mechanisms to ensure the necessary changes to deliver outcomes of education in New Zealand, and fund initiatives that are coordinated across the organisation (Ministry of Education, 2013). Despite this, Kaye (2012) writes “there is a lack of professional assessment of the quality and the impact of programmes in New Zealand” (p.

12). Some parts of these new initiatives will work some of the time with some of the people; other parts will work barely at all (Brinkerhoff, 2002; Fullan & Miles, 1992). Two authors state that time is needed for success or otherwise to be realised, which is why evaluation is recommended to be conducted a couple of years into the initiative (Boyd, 2002; Brinkerhoff, 2002). Success or otherwise can be both intended or unintended and does not necessarily imply or equate to quality (Boyd, 2002; Brinkerhoff, 2002). Boyd (2002) states that matching the goals of the evaluation to the goals of the program is crucial to effective evaluation research, as it is the lack of clear programme goals that contributes to the variability of the quality of evaluation.

Rationale

If BYOD is of importance, it would be useful and significant for decision makers like managers, leaders, or co-ordinators and the users of this technology to be able to confirm that technology is working to achieve 21st Century aims, visions or goals. According to the *Future-focussed learning in connected communities* report, a strategy for learning with digital technologies is critically important for New Zealand's future economic and social prosperity (21st Century Learning Reference Group, 2014). De Witt (as cited in Stavert, 2013) writes “the concept of the 21st Century skills is no longer a progressive phase to latch onto but a reality that we need to instil into our school systems” (p. 9). The goal of digital technology is to support individuals to develop to their full potential and to experience success in ways that matter to them and their communities (Bolstad et al., 2012).

It would be useful to know how BYOD decisions were made within schools and communities and how they relate to school settings, the reason being, understanding how these needs are met within the social contexts of schools may improve teaching and learning, the core function of education. The *Future-focussed learning in connected communities* report states that “In a connected world, no individual person or organisation can ‘stand alone’. The success of one depends on others, and the failure of one impacts the others” (p. 37). As Hayes (2007) asserts, it is important to “understand how computer based technologies are influencing learning opportunities and how the local conditions of schooling impact on teachers attempts to integrate this technology into their classrooms” (p. 385). Schools make choices on how to provide equity and access to students, teachers and communities and their decisions affect sustainability and the future of technological initiatives.

Knowledge gained from this study could be used for evaluating future technological initiatives in secondary schools and its sustainability. Implementation encompasses a tension between the device centred focus and what Sweeny (2012) labels ‘the real discussions’ of BYOD, how to deploy and deliver education digitally in the most effective manner (p. 25). On the one hand Bolstad et al. (2012) articulate the need for more effort focused on strategies designed to put personalised learning; equity and access, capacity, reconceptualisation of the roles and responsibilities of teachers and students, continuous professional learning and development of a range of partnerships with communities “that is driven by a coherent set of shared ideas about the future of schooling and its purpose and role in building New Zealand’s future” (p. 7). On the other, Kaye (2012) states the “need [for] a system that analyses better learning pathways, and promotes success stories, so that pockets of excellence that we heard about throughout the inquiry are not considered out of the ordinary” (p. 38). The problem is that because research is focussed so narrowly on local success, it is considered exceptional rather than an achievable norm (Kaye, 2012). Hayes (2007) writes “The gradual emergence of a more critical understanding of the promise and pitfalls of ICT integration suggests that the climate is right to rethink some common assumptions and research questions related to this process in schools” (p. 386). The overarching implication for schools then is how to implement and design strategies that focus on all parts of systems simultaneously to gain the most benefit from BYOD, a role which is often the responsibility of managers, leaders or co-ordinators of initiatives.

It would be useful to investigate the role that leadership plays in a BYOD initiative in regards to managing and leading change that results in success. If leaders are expected to be successful with new initiatives, then leaders would benefit from knowing what success looks like, how it affects learning and future strategic planning that is all inclusive (Cowie, Jones, & Harlow, 2011). Digital technologies create “shifts in thinking and behaviour, and the consequent changes in expectations that are created, present fundamental challenges to many of the structures and roles upon which our traditional system is established” (21st Century Learning Reference Group, 2014, p. 35). Many teachers make the initial step into technology because they are swept along by changes originating from the administrative values of their school, in addition to the shifting values of their larger community culture (Schwartz & Schmid, 2012). Thus, changes with respect to technology use come to teachers principally from the outside – and from the top putting “tremendous pressure on teachers to change – change that is neither personally initiated nor always welcome” (Schwartz & Schmid, 2012,

p. 233). BYOD is the current mechanism in some schools by which teachers teach and students experience their digital education, thus leadership for change needs to be thought of as situated within this particular context (Cowie et al., 2011). Because 21st Century skills are different to what educators know and may have experienced themselves this has implications for thinking about professional learning approaches and structures for teachers and school leaders (Bolstad et al., 2012; Wright, 2010). Unfortunately, there are no “ready-made examples or models that exist to show exactly what that ‘different’ should look like” (Bolstad et al., 2012, p. 62). Several authors state the educational problem in secondary schools is that leaders are more than likely to encounter the same sort of problems that occur in other school settings especially in the context of forces that work for and against change (Elkin, Jackson, & Inkson, 2008; Sweeny, 2012).

Examining innovation as part of this research would be significant in the context of New Zealand schools, as Leadbeater (2011) states the reason we need innovation in learning is due to the space created between “what we have, what we need and what is possible” (p. 2). Innovation strategy in education is about framing challenges and opportunities so that a range of people recognise both the scale of the need and the scale of the possibility to meet these emerging needs in new and more effective ways (Leadbeater, 2011). Innovation can involve physical products or services, new ideas or even revamping old ideas to create new value or unexpected value from them. Confronting and dislodging entrenched ideologies can be achieved through highly collaborative internal cultures that blend different insights ideas and knowledge (Kaye, 2012; Leadbeater, 2011). In other words, an innovative education system would need not just innovative practices but innovative organisational models that work to generate growth (Leadbeater, 2011). However, according to Leadbeater (2011), very little has been done on understanding how innovative schools have gone about innovating and whether they have common characteristics or whether they are very different in approach (p. 9). Kaye (2012) wrote “While we heard many submissions describing individual success stories, we would like to have been presented with research that analyses the common characteristics of these successes” (p. 13). A challenge stated in the *Future-focussed learning in connected communities* report was normalising innovative practices by ‘scaling up’ examples of success (21st Century Learning Reference Group, 2014).

This research could prove important in identifying best practices and increase the knowledge base of organisations that are BYOD. Several studies have shown that research and evaluation are a key factor in government-funded programmes to improve the next generation of technology applications for teaching and learning (Alberta Education, 2012; Boyd, 2002, p. 59; Ministry of Education, 2006). On-going evaluation enables schools to know where they are, where they want to go and how to get there. However, only a very small number of the literature reviews included any discussion of how evaluation “fitted into either a model of evaluation or a model of school change” (Boyd, 2002, p. 18). If lack of evaluation and review remains an issue, the capacity of the organisation to sustain a quality initiative may be undermined (Razik & Swanson, 2001). Both past and recent literature points to a need for more ‘useable evaluation orientations for the future’ (Kaye, 2012; Razik & Swanson, 2001).

The problem is educators cannot know if a technological initiative is successful unless they are able to measure its success. Alberta Education (2012) and Sweeny (2012) both state that schools need to determine goals for policy decisions regarding technology that state the educational outcome they expect to achieve. However, Kaye (2012) also recommends that it is worthwhile knowing when educators “have reached that outcome, how judgements were decided, and if the outcome is quality education” (p. 13). This may enable educators to modify and improve their current practice and to design new directions for e-learning (Ministry of Education, 2006, 2013; Quinones & Kirshstein, 1998). After all, conceptions about integrating technology into classrooms “must yield performance outcomes of students that are significantly higher than if technology is not used” (Schwartz & Schmid, 2012, p. 238). Recognising and understanding some of these measures of evaluation would go some way to resolving the fundamental question of whether or not BYOD increases student learning outcomes. Quality information can inform participants and stakeholders where efforts are required and what needs to be done to achieve valued results.

The BYOD initiative is worth researching because, if an initiative is found “to help some people achieve valuable results, and it is apparent that more results of the same or better would be possible or worthwhile, then it makes sense to identify ways to improve the initiative” (Brinkerhoff, 2002, p. 13). Even in cases where reform eventually succeeds, things will often go wrong before they go right (Fullan & Miles, 1992). This underscores the point that while “technology has the potential to lead to high-quality achievement, there are influential factors that may operate to limit technology’s potential” (Schwartz & Schmid,

2012, p. 242). Almost never, will change work perfectly well with everyone, nor is it likely that change will be a total failure – “someone, somehow, will make at least some of them work” (Brinkerhoff, 2002, p. 2). Therefore, the first rationale is to celebrate success, while the second is to identify potential crises or problems so they can be corrected before more serious problems occur (Kotter, 1996; Ministry of Education, 2006, 2013; Quinones & Kirshstein, 1998; Sweeny, 2012). Overcoming barriers is essential to organisational learning, therefore it is important that challenges are identified and possible resolutions are made easily accessible (Argyris, 2010; Cardno, 2012; Sun & Scott, 2003). If educators are able to identify what works or does not work, they have a stronger chance of effecting positive change (Kotter, 1996; Ministry of Education, 2006, 2013; Quinones & Kirshstein, 1998; Sweeny, 2012). It is better to learn from others, than to make these mistakes ourselves.

This study is of interest to the researcher because her school introduced the initiative for students to bring their own technology devices into her secondary school in 2013. The reasons the school implemented BYOD was to improve learning outcomes through one to one devices as well as equity and access opportunities for students. Most of the computer room timetables were booked up with senior classes making it extremely difficult for junior classes to access these facilities. Also there was a gap between junior students enrolling in the school who were used to being in technology rich environments who were now entering a technology wasteland which hindered learning opportunities. The researcher’s school is not in a position to provide one to one computers for every student, therefore, junior students were able to opt into e-learning classes and bring their own device based on specifications in order to access technology and learning opportunities. The intent was to implement BYOD school wide by introducing it incrementally every year commencing at juniors and culminating at the senior level. Because BYOD is so new, the researcher was interested in understanding how to recognise if this initiative was effective in improving student outcomes and how to measure its success. Also she wanted to know if the issues of implementation, that leaders and teachers in her school faced, were the same in other schools and if so what were some possible solutions to these problems. The researcher wanted to investigate other schools, their style of implementation and the benefits or challenges that were presented. Most of all, she wanted to be able to transfer this information to her own school setting in order to improve student learning outcomes.

Research aims and questions

Given the importance of digital technology to the New Zealand context, the first aim of this research was to identify the motivators and drivers of BYOD, the ways in which leaders established conditions for change and the resulting impacts on all parts of the schooling system. When an initiative is implemented educators need to know if the initiative is working to improve teaching and learning the core function of education. Therefore part of the purpose of this research was to examine how the BYOD initiative was evaluated and measured and if this resulted in quality education. Because it is expected that schools may experience the same or similar challenges in implementation and recognition of measurements of quality, it is important that challenges associated with this initiative are identified as well as possible resolutions to effect positive change. This research will investigate common characteristics of success so other schools may also be able to experience these benefits and improve on the initiative within their own school setting.

The research aims guiding this study are to:

- (1) Examine why secondary schools are implementing a technology Bring Your Own Device (BYOD) initiative.
- (2) Investigate ways in which schools implement and evaluate the effectiveness of the BYOD initiative.
- (3) Identify successes and challenges associated with a technological initiative of Bring Your Own Device (BYOD).

The research questions used to guide this study are:

1. Why have secondary schools implemented a technological initiative called Bring Your Own Device (BYOD)?
2. a) How have schools implemented this initiative?
b) How have schools measured the effectiveness of this initiative?
3. What successes and challenges are these schools experiencing in relation to this technological initiative of Bring Your Own Device (BYOD)?

Thesis outline

This thesis is made up of five chapters, all of which contribute to the identification, justification and understanding of the topic ‘Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools’.

Chapter one begins with a background of the New Zealand context for the research followed by the rationale for this research topic. Then the relevance of the research aims and questions is explained and finally the thesis structure is outlined.

Chapter two is comprised of literature associated with relevant topics that support the main themes of this research. The six literature themes have been defined as technology and education, technology equity and access, implementation, leadership for change, innovation and evaluation of quality.

Chapter three presents a justification and a rationale for adopting a qualitative interpretive approach to methodology, data collection and analysis. An explanation of sampling decisions is also provided, together with descriptions of the two data collection methods, semi structured interviews and focus group discussions. Finally the procedure of inductive analysis that was used to manage the data and issues regarding trustworthiness, rigour and ethics related to the study is explained.

Chapter four presents the significant findings of the data collected from the five schools starting with the semi structured interviews and focus group discussions. Four sub headings represent the key categories as outlined by the research questions. A summary will be provided at the end that compares school data.

Finally, chapter five draws out themes that make important links to the literature, and provides discussion that helps to contextualise and define the issues pertaining to the research questions. Conclusions have been drawn from the process of writing the discussion and recommendations have been made for the way schools might change their practices regarding students bringing their own technology devices to the classroom. The limitations outlined help to realise how the research could have been improved while the strengths of the study support the trustworthiness and rigour of the thesis.

Chapter Two: Literature Review

Introduction

Because this thesis focuses on the introduction of Bring Your Own Device (BYOD) initiatives the following are the key themes of interest searched for in the literature.

- Technology and education
- Technology equity and access
- Implementation
- Leadership for change
- Innovation
- Evaluation of quality.

Technology and education

As this research investigates digital technologies in New Zealand secondary schools it is imperative that the link to technology and education as well as its impact is made clear.

To realise the potential of technology, educators need to align technology use to purposes of teaching and learning. It is not all about the tools and how to use them but what to do with these tools that is so important (Bolstad, Gilbert, McDowall, Bull, Boyd & Hipkins, 2012). If technology is just a tool, it is a very expensive one to continue doing ‘old things in new ways’ (Bolstad et al., 2012). Therefore, for technology to foster high quality learning for students it must be integral to teaching and learning (Schwartz & Schmid, 2012). Jonassen (as cited in Schwartz & Schmid, 2012) asserted that “technology should not be used as a teaching appliance used to instruct learners per se, but instead as a construction tool with which – not from which – learners interpret and organise their own existing personal knowledge” (p. 237). Thus, technology in classrooms becomes an effective tool when teachers deliberately use it in relation to appropriate and targeted pedagogical practices (Wright, 2010).

Technology changes the way we learn when it is supported by ideas and social contexts that enable transformative practice (Bolstad et al., 2012). The result of an intellectual partnership with the computer is that “the whole of learning becomes greater than the sum of its parts” thus making technology transformative (Jonassen, Carr, & Hsiu-Ping, 1998, p. 31). Schwartz and Schmid (2012) state that ‘mindtools’ which are “computer applications that scaffold the

kind of reasoning that leads to critical thinking” (p. 237) yield significant impacts on learning outcomes. Likewise, Wright (2010) affirms that higher order thinking involving collaborative and problem solving pedagogies supports students to retain learning and become better at using metacognitive strategies. Schwartz and Schmid (2012) believe that “thinking with technology has the capacity to build into the educational structure a transformative framework of learning” (p. 237) which they claim is the essence of quality. This is especially relevant to New Zealand educators as thinking is a Key Competency of the New Zealand Curriculum (NZC) (Ministry of Education, 2007).

To be engaging and motivating, learning needs to be intimate to the person and meet their different needs and capabilities in different ways (Leadbeater, 2011). An emerging principle for the 21st Century is the idea of building the education system around the learner rather than the learner being required to fit to the system, a more personalised learning approach (Bolstad et al., 2012). In a New Zealand study, independent and student centred research using digital technology allowed students to learn in ways most suited to their learning style resulting in students learning faster and accessing new learning opportunities (Lai & Pratt, 2007). The design of digital age learning experiences focuses on the teachers’ role as a facilitator where students are encouraged to set their own educational goals, as well as being given a real voice in the process; learning increasingly encourages self-regulation and assessment of their performance against key competencies (Leadbeater, 2011; Ministry of Education, 2007; Schwartz & Schmid, 2012; Wright, 2010). Personalised does not mean learning should be a solo activity. Learning is an interactive process of dialogue, as much with peers as with teachers (Leadbeater, 2011).

The Ministry of Education (2013) and Lai and Pratt (2007) write that digital technologies enable students to learn by ensuring high interest, engagement, participation and motivation leading ultimately to improved educational outcomes. The vision of the NZC is that learners connect with and be actively involved in their learning (Ministry of Education, 2007). Students had fun using Information Communication Technologies (ICT) which contributed to increased motivation and contribution (Lai & Pratt, 2007; Mello, 2006). Fun was defined by students in a study by Wright (2010) as engaging with their peers in “meaningful ways about what they were learning” (p. 28). It is these positive impacts of motivation and engagement on the learning environment which Wright (2010) states may be critical factors leading to improved educational outcomes. Digital technology by itself is not enough to

promote improvement (21st Century Learning Reference Group, 2014), teachers must actively engage in their facilitation “Thus, teachers’ pedagogic actions may be a prime indicator of successful integration of technological tools into learning opportunities” (Wright, 2010, p. 38). Positive effects on students’ engagement and concentration when e-learning is integrated into learning, create the urge to want to repeat such opportunities (Wright, 2010).

According to the Ministry of Education’s *Statement of Intent 2013-2018*, the link between technology and education is that it has “the potential to accelerate changes to how children and young people learn, how teachers and educators interact and share knowledge, skills and information, and how education providers engage with communities” (p. 27). E-learning was originally defined as consisting of both online and blended learning which includes collaborative activities and modes of communication (Garrison, 2011). Teachers reported that the use of ICT has resulted in better communication between their colleagues as well as in the sharing of resources (Lai & Pratt, 2007). Collaborative learning opportunities appear to suit many New Zealand students, including Maori and Pasifika learners and so including social networking practices in classrooms may support their learning by providing connections with their wider lives and engaging the support of families, whānau, and communities (Lai & Pratt, 2007; Ministry of Education, 2007).

Students, teachers and schools opt into Bring Your Own Device (BYOD) initiatives because of the individual and organisational benefits it can provide both in a school setting and outside of a school setting. For students BYOD can form a seamless bridge between formal school learning and informal learning, the learning happening at home (Alberta Education, 2012). This is because students are able to use the same device in both situations. Familiarity, transparency and facility with the device are beneficial to students and teachers alike because they use the device, they understand it and have customised the applications, software and organisational tools which can reduce the amount of training on the device (Alberta Education, 2012). Due to this familiarity, students find it more convenient for the “social creation of knowledge” when they can use their personally owned device to work online collaboratively (Alberta Education, 2012, p. 8). Many students have devices that are more current, powerful and flexible than the schools and this ‘currency and transparency’ can be used by teachers to leverage these technologies, allowing those without devices to participate through sharing of devices, thus learning has ‘immediate current traction’ (Alberta Education, 2012). Although the introduction of BYOD initiatives shifts the costs of technology from

schools onto parents making BYOD cost effective and sustainable for schools (Stavert, 2013; Sweeny, 2012), schools have discovered that for the same investment, they can increase infrastructure and bandwidth creating greater access (Alberta Education, 2012). The concern is that BYOD is not to be considered a financial panacea (Sweeny, 2012). The laptop and BYOD focus is on changes to teaching and learning rather than just equipment use and this has implications for practice (Boyd, 2002).

BYOD changes teaching from “management to service delivery” since there may no longer be a focus on tools, or a standardised learning environment (Sweeny, 2012, p. 8). The challenge for school leaders, managers or coordinators is to ensure that increased accessibility, availability and reliability of new technologies over time, are paralleled by opportunities for professional development that allows teachers to learn how to redesign lessons, instruction and assessment to integrate collaboration, communication and social creation of knowledge as well as staff time for increased technical support which capitalises on the affordances of any ‘new’ technologies (Alberta Education, 2012; Bolstad et al., 2012). Sweeny (2012) warns of two hidden assumptions concerning teachers and learners. The first assumption is “that all teachers can cope with the change and the variability of technology in a BYOD environment” (p. 9). The second assumption is students “do not need to be taught about technology” (p. 9), and that students know how to use them in purposeful and educationally oriented ways (Wright, 2010). Sweeny (2012) comments, the more standardisation that occurs both within an institution and across educational systems, the greater negotiating power education has, not only with procurement of hardware and software, but also the sustainability of maintenance contracts, and value added support services. Alberta Education (2012) suggest that formal support is offered by support teams and dedicated technical training on devices, while informal support which may be the timeliest, is often offered by classmates.

Technology equity and access

Equity

For students to be able to bring their own technology devices into New Zealand secondary schools, it is crucial for educators to understand how to manage equitable technology access and use, in any future vision for education (Culp, Hawkins, & Honey 1999). Although Fullan and Miles (1992) state that “wishful thinking and legislation have poor records as tools for social betterment” (p. 4), Stavert (2013) writes that there is evidence that equity issues can be improved.

From a New Zealand perspective there are two sides to equity as defined in the NZC “equity, through fairness and social justice” (Ministry of Education, 2007, p. 9). In the first instance, fairness means providing resources to help disadvantaged groups. The Computers in Homes scheme (CIH), funded through partnerships with business, national and local government agencies, is set up by the 2020 Communications Trust to enable low decile communities to “take up opportunities for education and advancement, not only through the provision of ICT hardware but also based on the understanding that the social setting is an important component of successful community internet implementation” (Craig & Williams, 2011, p. 1). Schemes like CIH as part of their package, include six months free broadband internet, relevant training and technical support (Craig & Williams, 2011). Equity recognizes that the playing field for some groups is uneven and aims to take extra measures by giving to those who are in need more than others who are not (Cowie, Jones & Harlow, 2011).

The second perspective is the recognition of inclusivity where equity is defined as the type, quality and frequency of learning opportunity made available. Underpinning this aspect of social justice “is the recognition that certain major social groups have not been well served by the education system in the past” creating current social inequalities (Bolstad et al., 2012, p. 25). The Laptops for Teachers scheme (TELA) has created what some teachers would categorise as exclusivity. Leaders at eligible state and state integrated schools have discretion over whether or not teachers are required to pay for laptop leases. Teachers viewed this as an equity issue as students were denied learning opportunities if their teachers did not have a laptop. Teachers considered that they should not have to pay for a tool that was central to their work (Cowie et al., 2011). Equity encompasses everyone’s variations and differences and means everyone has pathways and opportunities to succeed (Bolstad et al., 2012).

From a New Zealand perspective, Kaye (2012) mentioned inequities “resulting from the variable digital literacy of individuals” (p. 12). Alberta Education (2012) in Canada links the variable digital literacy to teacher pedagogy, and the need for increased professional development, to ensure that all teachers are ‘au fait’ with the integration of technology into teaching and learning. It also suggests support structures be in place to ensure integration of personally owned devices into the curriculum, instruction and assessment (Alberta Education, 2012).

Access

If technology is considered an asset in the teaching and learning of the curriculum, then all students will need to have equitable access to devices (Alberta Education, 2012; Kaye, 2012). LaMaster and Stager (2012) write that “BYOD diminishes the otherwise enormous potential of educational computing to the weakest device in the room” since BYOD models that allow choice of device, is “not about what is best for the student but what families can afford” (p. 7). In comparison, literature produced in the same and following year, focuses less on choice of a specific device, but rather on specifying the capability of the device to be brought by students (Kaye, 2012; Stavert, 2013). If capability allows equitable access to online learning opportunities, then the real issue may be acquiring equitable access to a device with specified capabilities. In February 2014, as schools embark on BYOD programmes, the 2020 Communications Trust which runs Computers in Homes, has launched a pilot BYOD equity programme to assist families to access digital devices from a selected range that specifies capabilities (2020 Communications Trust, 2014).

To maximise successful learning opportunities the biggest challenge is that every school uses digital devices to access internet content and services (Kaye, 2012; Sweeny, 2012). This is problematic in a society with economic disparity. Software licences are not cheap and may also affect students who wish to continue learning outside school as it is often only licenced for school computers. Submitters to the Kaye (2012) report, recommended use of open-source software so students could also access this on home computers, as both the home and the school environment affect students’ ability to continue their learning outside of the classroom.

Different schools have various device policies, including funding of devices by parents, school funding, and allowing students to bring their own devices. Schools can acquire the latest technology for students who are unable to provide their own by offering such devices for periodic checkout, lease to own, or co-ownership schemes (Alberta Education, 2012; Kaye, 2012; LaMaster & Stager, 2012; Sweeny, 2012). Kaye (2012) noted that one of the schools in her study recognised that leasing-to-own arrangements were substantially reduced when students were allowed to bring their own devices. Barseghian (2012) found that “students bringing their own devices freed up school devices for students who could not afford them” (as cited in Stavert, 2013, p. 18). Schools make choices on how to provide equitable access to devices and even the type of device for their BYOD initiative based on what best suits their particular setting (Kaye, 2012; Sweeny, 2012).

BYOD models have the potential to introduce new inequities. For example, the lack of internet access beyond the school day might put some students at a disadvantage compared to their peers which directly affects the learning of students. Alberta Education (2012) suggests providing opportunities for students to access the internet through disseminating information on community centres and libraries where access is available. In contrast, Kaye (2012) who writes from a New Zealand perspective, says that access may be difficult at public libraries as unrestricted access to the internet is not provided free of charge to users and the cost of getting to the library along with the time limits on library computers may be inhibitive to some users. In addition the Alberta Education (2012) report recommends seeking support for community-based access points to the internet and partnerships with community-based internet service providers to support high-speed home access to the internet. In a report to the Education and Science committee of New Zealand it was noted that a “few schools are seeking to provide free Wi-Fi within school clusters extending into the homes of local students” (Kaye, 2012, p. 30). An example of this are the Tuhoe Iwi who formed a partnership with CIH and the 2020 Communications Trust to install wireless internet across its community, put access into homes, establish videoconferencing into its schools and set up a “digital gateway to communicate with dispersed tribal members” (Craig & Williams, 2011, p. 2). CIH emphasis on partnership with communities is seen as facilitating social inclusion.

Implementation

Successful implementation of a BYOD initiative requires mindful planning and consideration of processes involved, giving relevancy to this topic within the research. Implementation and planning processes start before an initiative is instigated, and involve the weighing up of benefits and disadvantages, combined with short and long term integration strategies that combine with consultation.

Before implementing an initiative, a decision on a vision, and a plan are necessary (Fullan & Miles, 1992; Kotter, 1996; Sweeny, 2012). Clearly articulated goals for opening up schools and classrooms to personally owned devices, that align with the purpose and needs of education within specific institutions is a key strategic step that all schools are recommended to take (Alberta Education, 2012; Stavert, 2013; Sweeny, 2012). Stating goals can also mean that schools can establish indicators of success for BYOD implementation (Alberta Education, 2012). Realisation of visions and goals can be recognised by planning collaboratively through consultation with communities regarding priorities for using technology in learning (Alberta Education, 2012; Stavert, 2013). Consideration of price points, hidden costs, ownership models, existing devices in the home, funding of devices in the short and long term as well as addressing equity issues, can help improve sustainability by identifying family and community needs and promoting support (Stavert, 2013).

Because “schools carry the responsibility for determining the priorities for development in their own settings” (p. 6) it is a good idea to know which BYOD model best suits your school (Ministry of Education, 2003). BYOD models range from high standardisation to high flexibility and this is a major decision for schools to weigh up as each has advantages and disadvantages (Alberta Education, 2012; Stavert, 2013; Sweeny, 2012). For example, if a device is not standardised it may become a status symbol. However flexibility may encourage more compliance of bringing a personally owned device and students may gain digital literacy across a range of platforms (Alberta Education, 2012; Stavert, 2013).

Decisions regarding which model to choose are based on pedagogy, user benefits and drawbacks (Sweeny, 2012). There are four common models outlined in the literature of Alberta Education (2012); Stavert (2013); Sweeny (2012). The first model involving standardisation and familiarity makes it easier for teachers to plan, troubleshoot and share practices as they know the devices and software that will be used in the classroom. It also

allows seamless use of loan devices and the major advantage is the ability to bulk buy. The second model involves devices that meet technical specifications. An advantage and disadvantage is that teachers may need to, and can check, that software tools run on the chosen platform. Although this offers flexibility, due to the variety of devices there may be technical challenges. In the third model, devices are limited to specific functionality; students may be required to be able to connect and interact with school management systems, create text documents and run online software. Most devices are hand held, and there is no certainty that software will work. The last model embraces flexibility and is open-ended, encouraging students to bring any device to school. The focus is on learning and that each device has advantages and disadvantages. Because teachers cannot know every device, the technological challenges belong to the student. There may be equity issues and some students may have difficulty participating due to device capability and some may not meet pedagogical requirements. All these BYOD models with the exception of the last, list the difficulty of controlling, monitoring and /or enforcing BYOD policy as well as the challenge of annual updates of brands or models.

Once a BYOD model has been decided, the next step is to consider integration strategies of whether to implement the initiative incrementally or school wide. The incremental approach allows problems to be recognised, strategized, managed, and for capacity to be built. Sweeny (2012) writes “The secret to successful BYOD is to do it incrementally: start small, prove the technology works in practice, then move to more full-featured BYOD” (p. 11). In contrast Boyd (2002) writes that one of the success factors for initiatives seemed to be that the programme was part of school-wide changes in approaches to teaching and learning rather than an isolated project. In a whole school approach resources and skills could be pooled by multiple stakeholders meaning commitment from all teachers rather than a select few (Hayes, 2007). Alberta Education (2012) states that successful implementation is determined by the school’s “commitment to 21st Century learning, the BYOD model and the preplanning and readiness of the school to implement” (Alberta Education, 2012, p. 22). Whichever implementation strategy is chosen the school needs to be ready technologically (network growth and processes of support and services), pedagogically (professional development aligned to goals, mentors), and have good policies available (behaviour management, duty of care, content and citizenship) (Alberta Education, 2012; Stavert, 2013; Sweeny, 2012).

In any implementation it is important to have follow up that continually communicates and updates information regarding the BYOD initiative “Parents and community should always know what you are doing and where you are going next” (Alberta Education, 2012, p. 58).

Public awareness sessions can be used to involve the community in the rollout ranging from educating parents about the value technology adds to the learning process, to the pedagogical and practical uses of BYOD (Alberta Education, 2012). A common thread amongst several New Zealand initiatives and groups such as School Wide Positive Behaviour Support (SWPBS) (Colless, Lewis, & Savage, 2011) currently being implemented as part of the Positive Behaviour for Learning (PB4L), and New Zealand’s Internet Safety Group (Net Safe), is the need for a whole school approach that highlights the responsibility for “everyone in the school community, including parents and caregivers, to understand and address harassment” (Fenaughty & Harré, 2013, pp. 809-810). Orientation meetings could include joint sessions on digital citizenship and internet safety issues, and parent education regarding the basic computer skills needed for monitoring device use at home (Alberta Education, 2012; Butterfield, 2003). Frequently Asked Questions posted on the schools website can help ease tension by providing quick answers to community questions. Schools in New Zealand are legally obliged to provide a safe learning environment, which includes the internet environment (Butterfield, 2003; Fenaughty & Harré, 2013). Colless et al. (2011) say that it is essential that behaviour is tracked by a data management system within schools to inform evidence based decisions and purposeful interventions. The Education Review Office (ERO) asks about policies and procedures when officials visit schools to evaluate compliance with national standards (Butterfield, 2003).

Schools are accountable to their stakeholders, “One of the critical messages will be connecting the BYOD implementation to improved student engagement, relevancy of learning and academic achievement” (Alberta Education, 2012, p. 58). Alberta Education (2012) indicates there should be an opportunity at the end of the first year for students and staff to voice their opinions. Therefore it is in everyone’s best interest for schools to collect descriptive and anecdotal evidence as well as quantitative data of results for discussion around the leading and lagging indicators of successful implementation (Alberta Education, 2012).

Leadership for change

Leadership that includes a vision for change and a plan for action is an essential element in how effectively schools integrate and embrace 21st Century learning in their implementation of school wide BYOD initiatives (Cowie et al., 2011; Hayes, 2007; Kaye, 2012; Ministry of Education, 2006). Leadership is about establishing conditions for school and teacher change and appreciating implementation dips that naturally occur throughout this process.

Leadership is about securing and allocating resources; human, intellectual, and material. What makes resourcing strategic, is that it is guided by already-established goals that are aligned to pedagogical and philosophical purposes (Alberta Education, 2012; Bolstad et al., 2012; Robinson, Hohepa & Lloyd, 2009). When expertise is not readily available, leaders develop this within the school or recruit expertise from outside the school by selecting individuals for important roles (Robinson et al., 2009). Timely availability is an aspect of resource alignment at the beginning of an initiative. Strategic schools organise and use resources to invest in continuously improving teaching quality through hiring, professional development, job structure, and common planning time (Miles & Frank, 2008; Robinson et al., 2009) “Time was the most commonly identified support needed to help teachers ... time in staff meetings and support for lunchtime and after school sessions” (Cowie et al., 2011, p. 56). Simply increasing resources and adopting ICT does not bring about changes to teachers’ pedagogical orientations (Wright, 2010), thus “leaders at all levels of the system play a vital role in working with teachers to identify and develop appropriate teaching resources and ensuring that these resources are readily available” (Robinson et al., 2009, p. 111). Strategic leadership is crucial to continued access to resources throughout an initiative, especially when these need to be funded from the regular school budget (Cowie et al., 2011; Robinson et al., 2009). Leaders need to look at what is happening at an individual school and consider the wider educational and political contexts that shape and constrain what happens in their school (Cowie et al., 2011).

Future-orientated leaders cultivate distributed leadership, lead leaders, and plan for succession, all key factors in maintaining stability in relation to digital technologies (Bolstad et al., 2012; Cowie et al., 2011; Hayes, 2007). One of the many reasons leaders leave, is due to burn out (Bolstad et al., 2012), so preparing a mentor training programme can be one way to help address this issue and plan for succession (Hayes, 2007). If a key instigator of an initiative departs a school, a vacuum is left in knowledge and expertise, often leaving the

school with integration problems (Cowie et al., 2011; Hayes, 2007). Therefore, there is a need to maintain momentum beyond the early stages by distributing leadership amongst people at all levels of the system, across policies, practices and material resources (Cowie et al., 2011). Because digital technology is multifaceted, it opens itself up to involvement from a variety of people and groups with different roles and responsibilities causing distributed leadership ‘across time’ (Cowie et al., 2011). This means leadership is situated and resides with multiple individuals, reducing the risk of substantial knowledge loss caused by any one departure (Cowie et al., 2011). Thus, making an initiative not dependent on one person enables it to continue into the future.

Establishing conditions for school change is the role of leaders (Cowie et al., 2011; Hayes, 2007; Kaye, 2012; Ministry of Education, 2006). The first part of reform requires focus on the development and interrelationships of all the main parts of the system simultaneously (curriculum, teaching, teacher development, student support and community) (Fullan & Miles, 1992). Skilled leaders need to understand how ICT can support learning, enable staff to explore innovative e-learning practice, and have the confidence and capability to lead and manage the change required to unbundle school practices to maximise the benefits of these technologies (Bolstad et al., 2012; Ministry of Education, 2006). The second part of reform requires focus on the deeper issues of the culture of the system, the idea that change is learning, thus conditions that support and encourage learning must be part and parcel of any change effort (Cardno, 2012; Fullan & Miles, 1992). A learning organisation has a strong practical focus on the learning capacity of individuals, teams and organisations that result in changes in behaviour (Holyoake, Sturko, Wood, & Wu, 2012; Sun & Scott, 2003). Sun and Scott (2003) argue, if learning does not translate into behaviour change, then “genuine transference has not taken place” (p. 204). According to Brundrett and Rhodes (2011) leadership for learning is central to enhancing the quality of teaching. Because change is implemented by everyday teachers, principals, parents, and students, leaders need to get these people aligned to their vision to achieve success (Cowie et al., 2011; Fullan & Miles, 1992). Therefore as well as establishing conditions for school change, it is also important to establish the conditions for teacher change.

Establishing conditions for teacher change is about leaders building understanding by communicating clearly the plans for change with those on the receiving end. To achieve change leaders should involve teachers in the change and provide professional development connected to pedagogy so that teachers can adjust more easily (Elkin, Jackson, & Inkson, 2008; Ministry of Education, 2006; Schwartz & Schmid, 2012). ICT requires frame-breaking change, looking at the world in a new environment in which the majority of teachers think in new ways, develop new skills and have new understandings of themselves as professionals (Elkin et al., 2008; Sweeny, 2012). Zhao and Cziko (2001) state three conditions are needed to ensure the use of technology by a teacher. The first is the teacher must believe that technology can more effectively maintain a higher level goal than what has been used. Secondly, the teacher must believe that using technology will not cause disturbances to other higher level goals that he or she thinks are more important. Thirdly, the teacher must believe he or she has, or will have, the ability and resources to use technology (as cited in Mello, 2006). When people learn something new, they gain a deep sense of ownership through this learning. Therefore this sense of ownership during reform is a process and state, where ownership is strongest at the end, weaker in the middle and weakest at the beginning of implementation (Fullan & Miles, 1992). Fullan and Miles (1992) point out that a shared and continuously shaped and reshaped vision is central to reform and ownership of it.

Effective leaders acknowledge and appreciate the implementation dip in performance and confidence, encountered during an innovation that requires new skills and understandings. They know that establishing conditions for change is a process, not an event and are empathetic to those bringing about a new order (Fullan, 2001; Mello, 2006). Bolstad et al. (2012) states that one of the reasons that teachers and school leaders may resist adapting current approaches is because teachers do not see how or why ICT can ‘fit’ into teaching practice due to the lack of clear links to the ‘big ideas’ about transformative education leading to better student outcomes. Sweeny (2012) writes that positive peer pressure has a role to play amongst teaching staff as “teachers will change if they see the successes of other teachers” (p. 10). A leader’s job is to get rid of obstacles, encourage activities and actions as well as risk taking and non-traditional ideas such as the teacher being no longer the expert in the classroom (Kotter, 1996; Mello, 2006; Schwartz & Schmid, 2012). The study of barriers and how to overcome them, holds the key to learning transfer (Argyris, 2010; Cardno, 2012; Sun & Scott, 2003). When leaders treat problems as a natural, expected part of an initiatives process, reform is much more likely (Fullan & Miles, 1992).

Innovation

Innovation is important to this research topic because it can be a means of understanding existing practices and enabling or creating conditions for future successful innovation that involve digital technologies and teaching and learning.

Leadbeater (2011) suggests that a key task for an educational innovation strategy is to create the demand for innovation and the conditions in which it can thrive. Opening up opportunities for innovation requires ‘enabling tools’ which both Bolstad et al. (2012) and Leadbeater (2011) describe as practices which transform outputs and outcomes, such support as curriculum and assessment approaches and resources, creative building policies, ICT approaches, resources and professional development. These enabling tools can help to build a culture that supports innovation and celebrates success (Ministry of Education, 2003).

To understand concepts of innovation educators first need to know how the innovation occurred (Cowie et al., 2011; Culp, Hawkins, & Honey, 1999). 20th Century knowledge was based on the idea of knowledge as ‘content’ (Bolstad et al., 2012). In contrast, the 21st Century idea of knowledge is to “equip people to do things with knowledge, to use knowledge in inventive ways, in new contexts and combinations” (Bolstad et al., 2012, p. 32). The important implication is that the real value-added is not simply course content, innovation must be the enhancement of the quality of learning (Garrison, 2011). According to Bolstad et al. (2012), a shift in ‘knowledge’ thinking was brought about by the introduction of the revised New Zealand curriculum in 2007. Because this curriculum was co-constructed by members of the education community and acted to support localised capacity for innovation, Bolstad et al. (2012) states that there is now substantial innovation capacity that exists in the New Zealand education sector to generate future orientated thinking and practice. BYOD is an innovative initiative that schools are implementing to achieve value-added educational contexts for students.

Collaborative ICT approaches are at the heart of successful innovation that encourages interactive processes within schools, between clusters and across communities (Leadbeater, 2011; Ministry of Education, 2006). Collaboration in a digital technology setting is the purposeful joining of people in an online environment that enables relevant problems to be tested and validated through constructed knowledge (Vaughan, Cleveland-Innes, & Garrison, 2013). In a study conducted in New Zealand it was discovered that an important impact of

ICT learning was the “increased sharing of resources between students and the opportunity to work together” (Lai & Pratt, 2007, p. 105). If the collaborative experience is good, the benefits can be both motivational and cognitive, as students learn to acknowledge other’s viewpoints and insights (Leadbeater, 2011).

Professional learning and development combined with resources are some other enabling tools. It is not enough to have the best current ‘practices’, rather it is to know ‘what to innovate’ and ‘how to innovate’ to develop the practices which education systems will need in the future (Leadbeater, 2011). The extent of innovation is reliant on how the innovation fits into current resources and practices both within and outside teacher’s control (Cowie et al., 2011). Offering support to teachers to implement innovative and creative ways to integrate ICT within the constraints of what is available will help to build new practices and sustain innovation over time (Bolstad et al., 2012). Innovation can be encouraged through reflective practice that informs emerging thinking about innovation (Leadbeater, 2011). Fullan (2001) cautions organisations to not only go with like-minded innovators but to deliberately build in points of difference to encourage learning.

For enabling tools to work, infrastructure that allows educators to do meaningful things with ICT is required (Bolstad et al., 2012; Mello, 2006). Innovation is hindered when teachers and students cannot actually do what they want to do with ICT because they are unable to access the types and quality of ICT tools they need to achieve their goals (Bolstad et al., 2012; Mello, 2006). Thus, as well as technical support, infrastructure that takes into account and plans for continual upgrading of tools in line with changing needs is essential for innovation (Bolstad et al., 2012). Culp et al. (1999) study draws links between technology, innovation and effectiveness as explained here:

To be effective, innovative and robust technological resources must be used to support systematic changes in educational environments that take into account simultaneous changes in administrative procedures, curricula, time and space constraints, school and community relationships, and a range of other logistical and social factors. (p. 3)

It is important that educators understand that technologies in and of themselves rarely bring about substantial change in teaching and learning and that the impact of technology on these aspects is context dependent (Culp et al., 1999).

Several recent authors discuss innovation as including an educational environment consisting of digital technologies (Garrison, 2011; Leadbeater, 2011; Vaughan et al., 2013). Innovation means “significantly rethinking and redesigning approaches to teaching and learning that fully engage learners” (Vaughan et al., 2013, p. 9). Leadbeater’s (2011) innovative education system includes a steady flow of new learning practices that promote collaborative team projects and peer to peer learning. He cautions that there may be the need for fewer but more skilled, creative, master teachers to lead this kind of learning. These master teachers will have to draw “on a mix of other skills and resources: online and distance learning; peer-to-peer learning and the skills of other adults, paraprofessionals and subject specialists” (pp. 4-5). Fundamental rethinking for Garrison (2011) is about considering what is important and reasonable from a time perspective which means restructuring class contact hours. Even Wright (2010) in a New Zealand study stated that “the compartmentalisation of subjects into timetables, may affect students’ ability to deeply engage in learning with and through technological tools” (p. 3). Creating the conditions for this kind of learning is much more demanding and difficult than traditional teaching “Unless the buildings blocks of traditional schools – lessons, years, timetables, classes, exams – are broken down it will be difficult to generate the kind of combined innovation needed to make a real impact” (Leadbeater, 2011, p. 8). Education systems that are innovative require more than just innovative practices; they also need innovative organisational models that work.

The biggest challenge facing innovation in public services according to Leadbeater (2011) is not developing new ideas but diffusing and disseminating them. One way of building knowledge at all levels of the system is to work with innovators rather than giving top down policies (Bolstad et al., 2012). Similarly Garrison (2011) writes:

Lasting innovation does not occur from the top down, nor does it grow from the bottom up. More often than not, effecting change is an iterative process where middle-level leaders (who have the expertise and commitment) with the sustained collaboration of both senior management and grass roots are in a position to provide realistic strategic input. (pp. 121-122)

Leadbeater (2011) states that innovation is best understood as a social movement due to the interdependence of mobilising many people both inside and outside the formal education system. He writes that successful innovation is really about alliance building.

Evaluation of quality

To understand why evaluation of quality is an issue or concern to this research topic, we first need to link evaluation to quality. Stake and Schwandt (2006) view evaluation studies as “fundamentally a search for and a claim about quality” (p. 404). Evaluation provides an insight into how well educational programs are working, detection of potential problems or impacts, and how they can be improved (Ministry of Education, 2006; Quinones & Kirshstein, 1998; Razik & Swanson, 2001).

In broad terms, quality encompasses notions of ‘merit , worth and significance’ (Schwartz & Schmid, 2012). The problem lies in the variances of difference between these notions. These range from educators “who wish to ensure that schools produce citizens who are happy, healthy and socially well-adjusted to those whose overriding focus is to produce the best qualified learners in terms of academic achievement” (Brundrett & Rhodes, 2011, p. 12). In an educational setting quality is often associated with meeting objectives and enhancing student outcomes (Stake & Schwandt, 2006). In one of the few empirical studies that links BYOD use to measurement of data, Babic (2012) writes that “It’s too soon to know the impact on test scores... but already teachers are seeing greater homework-completion rates and increased student participation” (p. 43). International literature suggests that devices have the potential to enhance pedagogies embracing co-constructive and socially oriented practices (Wright, 2010). In contrast in a New Zealand study the biggest improvement for teachers were improvements in the “efficiency of administration and management of teaching” (Lai & Pratt, 2007, p. 100). Because evidence is generally anecdotal when using ICT in the classroom, educators should question the type of evidence available (its merit), its ability to prove that student learning is better (its worth), and if value is added by using ICT (its significance) (Lai & Pratt, 2007; Schwartz & Schmid, 2012). At this stage, there is no conclusive evidence that ICT has universal benefits or that its use is appropriate in every learning situation (Lai & Pratt, 2007; Mello, 2006). The issue is the “inability or unwillingness to undertake evaluation or conduct evaluation exercises inevitably detracts from educational quality” (Razik & Swanson, 2001, p. 222). The educational problem is therefore how to link measurements of merit, worth and significance to a BYOD initiative.

The issue of evaluation of programs and projects is that it is “premised on the common idea that quality is discernible and capable of representation” (Stake & Schwandt, 2006, p. 404). This means that evaluators need to be able to distinguish between the absence and presence of quality. Stake and Schwandt (2006) state that when experiences, factors, principles, norms and conditions used in evaluation are clearly articulated as goals, they are treated as explicit standards or criteria and regarded as measurable. Stake and Schwandt (2006) label these measures ‘evaluands’. Evaluands refer to a set of targets associated with judgement of quality, for example “values, goal attainment, effectiveness, efficiency, productivity, functions, ... needs, performance outcomes, units, context, input, process, product, dependent and independent variables, ... program theory, program logic and so forth” (p. 407). Two issues that arise around evaluands are firstly, a strict devotion to measuring outcomes may mean that the evaluator moves too quickly past appropriate appraisal of the evaluand resulting in quality possibly being substituted for performance. Secondly, when the evaluand is complex, its functions may be unable to be sufficiently correlated to indicators and hence quality may never be fully realised. In these circumstances, quality becomes a matter of an evaluator’s judgement. As Schwartz and Schmid (2012) state “it is the teachers who are the ‘touch points’ through which quality learning environments will be realised for students” (p. 234) This is directly pertinent to this research as it aims to uncover the basis of educators’ quality judgements.

Educators face two main issues when evaluating quality of a BYOD initiative. The first is the measurement of BYOD as a school wide quality initiative and the second is the measurement of quality in individual teachers’ classrooms. Two frameworks that can be used to review a school’s technology initiative and focus on improvement is the e-Learning Planning Framework (eLPF) used in New Zealand (Ministry of Education, n.d) and the Self-Review Framework (SRF) which has been developed by educators, technologists and policy makers in the United Kingdom (National Association of Advisors for Computers in Education, 2006-2014). The eLPF is a self-review by a school to evaluate the effectiveness of e-learning programmes and build e-learning capability whereas the purpose of the SRF is to allow schools to measure and improve their provision against evidenced sets of criteria. Although the SRF complements the inspection framework and can be used to provide evidence to support the school’s inspection profile, the eLPF is not intended to provide a means for externally evaluating schools’ performance for the purpose of audit or review. Not

all evaluands of these frameworks measure quality and this may be due to quality being difficult to discern.

The challenge for individual teachers is to explore how various computer practices can enhance their subject lessons by adding or redefining quality, rather than trying to “simulate exercises that can be easily and efficiently done using a pen and paper” (Mello, 2006, p. 105). The ideal strategy is to use technology to venture into new areas taking advantage of all resources available (Mello, 2006). One example of when technology allows for the creation of new tasks that were previously inconceivable is Puentedura’s (2013) Substitution, Augmentation, Modification and Redefinition (SAMR) model, where the upper two levels, modification and redefinition are used to transform educational outcomes for students. Wright (2010) in a New Zealand study states that higher order practices suggest evaluative thinking “examining how they arrived at their decisions, and making judgements about quality – of the processes they used and the products they created” (p. 34). Likewise a second model based on Biggs and Collis’ (1982) Structure of the Observed Learning Outcome (SOLO Taxonomy) (as cited in Biggs, 2012) which has been modified to complement e-learning, at the highest stage aims for students to engage deeply with a task aiming to extract maximum meaning from the taught material (Hook, 2012). According to Schwartz and Schmid (2012) learning is high quality when it is “well integrated and deep, and capable of being transferred to new problems and applications beyond the original context in which learning takes place” (p. 228). Therefore, practices in which teachers and students engage can be a measure of evaluating quality.

It is common to read of quality in terms of signifying an appraisal or judgement with a view to action, and an evaluator’s role is to appraise or offer an informed opinion about quality (Quinones & Kirshstein, 1998; Razik & Swanson, 2001; Stake & Schwandt, 2006). According to Firestone and Riehl “leaders are increasingly being held accountable for the actual performance of those under their charge” (as cited in Sinemma & Robinson, 2007, p. 320). Therefore, educational leaders who wish to ensure more “instructional payoff from teacher evaluation systems need to formulate an account of effective teaching that they can use as a yardstick against which to judge the adequacy of teacher evaluation systems” (Sinemma & Robinson, 2007, p. 322). Kaye’s (2012) report makes recommendations requiring appropriate school leaders to demonstrate a defined standard of digital literacy and to undertake professional learning and development to maintain their digital literacy skills,

knowledge, and understanding. According to Stoll, Fink, and Earl (2003) the key to keeping learning at the forefront requires an understanding of how motivation works. When people believe they are able to succeed, they are willing to try new and challenging tasks, even when they are difficult. However, de-motivating factors and causes of stress are due to a variety of institutional and personal factors that contribute to underperformance for example, role ambiguity, skill deficit, value deficit, role overload or conflict, under stimulation, excessive routine (Oldroyd, 2005). Performance management in education can be perceived as a form of managerial control over professional work to encourage conformity (Forrester, 2011; O'Neill & Scrivens, 2005). In general, teachers favour appraisal for development rather than for accountability (Oldroyd, 2005). The issue is “In the minds of many teachers and administrators, there is little connection between scores on teacher evaluation reports and teaching quality” (Sinemma & Robinson, 2007, p. 322). The misalignment between the behavioural performance orientation to a more cognitive and robust inquiry stance is required in which teachers examine how their teaching-learning relationship is impacting on their students. Such evidence could comprise anything from “disaggregated standardised tests or exam results, to students’ assignments, to worksheets assessing a unit of work” (p. 326). Sinemma and Robinson’s (2007) framework judges teachers’ capacity and willingness to understand and use evidence from their own students to change their teaching in ways that help them to be more successful, something that Stoll et al. (2003) would class as “meta-learning – learning about your own learning” (p. 89). According to Cardno (2012) “An effective appraisal system gains staff commitment and is valued” (p. 102). It is the pivot for mounting a professional development programme that enables more effective and equitable teaching and learning that can meet the needs of every aspect of the school organisation (Cardno, 2012; Sinemma & Robinson, 2007). Both coaching and mentoring can be used to combat under-performance because they provide constructive feedback and assist under performers (Oldroyd, 2005). As stated by Razik and Swanson (2001), evaluation activities that are “sensibly conceived and carried out competently can only add to the quality and viability of schools, curricula, personnel, facilities and institutional support systems” (p. 222). Appraisal has the ability to signal quality through robust inquiry into teaching and learning.

Summary

This study aims to establish why schools are committing to BYOD initiatives, how well these initiatives are succeeding and their challenges and successes. The exploration of this current literature covers a range of technology activities and initiatives and refers to international (Australian, Canadian, American, English, and Brazilian settings) and New Zealand reports, documents and studies.

Literature in this chapter regarding digital technology confirms that devices have the potential to support individuals to experience success in ways that matter to them and their communities. However it does indicate gaps in the New Zealand setting regarding common characteristics of success. Because no examples or models exist to show exactly what future-orientated learning should look like, this research is pertinent to advancing BYOD in a New Zealand setting to improve teaching and learning outcomes.

The literature makes it very clear that the purpose of these initiatives and their effectiveness should be studied. Research points out that more useful evaluation that links to quality and models of school change are key to applying technology practices that impact on outcomes. The emergence of a more critical understanding of the pitfalls and challenges of BYOD and how they fit into a schooling system is essential to organisational learning – this perspective is currently missing from the New Zealand literature.

This review of the literature has confirmed the relevance of the research questions, which will hopefully provide useful answers in a New Zealand context.

The following chapter outlines the methodology, selection of schools, data gathering methods, data analysis processes, and ethical considerations that will be undertaken to complete this research regarding ‘Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools’.

Chapter Three: Methodology

Introduction

This chapter presents a justification and a rationale for adopting a qualitative interpretive approach to methodology, data collection and analysis. An explanation of sampling decisions is also provided, together with descriptions of the two data collection methods, semi structured interviews and focus group discussions. Finally the procedure of inductive analysis that was used to manage the data and issues regarding trustworthiness, rigour and ethics related to the study is explained.

Research methodology

Epistemology is the philosophical theory of how knowledge is constructed (Davidson & Tolich, 2003; Willig, 2001). Because the same phenomenon, in this case Bring Your Own Device (BYOD), can be described in different ways, giving rise to different perceptions and understanding, the research should be understood as a specific reading of these conditions, “suggesting that there are ‘knowledge’s’ rather than ‘knowledge’”(Willig, 2001, p. 7). This research therefore fits into the social constructionism epistemology as participants (leaders, managers, co-ordinators, teachers, home-room teachers, deans and counsellors) are describing the various ways they have socially constructed their reality.

The central endeavour in the context of qualitative research **is to understand the subjective world of human lived experience, to enhance understanding of particular phenomena** (Cohen, Manion, & Morrison, 2007; Denzin & Lincoln, 2005; Galletta, 2013). This approach was adopted because the researcher intended to get people to talk about their world of digital devices, thereby accessing the knowledge residing in the subjects of the study, through collecting qualitative data and hence using qualitative methodology.

Qualitative research is about somebody describing their world, in their own language and is therefore essentially subjective “rather than an absolutist, external reality” (Cohen et al., 2007, p. 8). A subjectivist conception of reality aims to discover how individuals interpret the world in which they live and what meaning they place upon their actions (Bryman, 2012; Cohen et al., 2007). The researcher’s aim was to get participants to talk about processes within their world of digital devices, regarding the implementation, effectiveness, successes and challenges of a BYOD initiative (Willig, 2001). Once these experiences had been shared,

the intent then, was **to make** sense of the meanings participants had **about the world**, “Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible” (Denzin & Lincoln, 2005, p. 3). The researcher’s job was to access these experiences and then interpret them.

Interpretive, inductive research refers to open-ended research methodologies “that are concerned with theory generation and the exploration of meanings” (Willig, 2001, p. 11). Therefore, acknowledging that data gathered from visitations to schools of interest would be from personal interactions with participants, the choice of using semi structured interviews and focus group discussions supported this method of investigation (Bryman, 2012; Cohen et al., 2007; Davidson & Tolich, 2003).

Selection of schools

Both convenience and purposive sampling (Bryman, 2012) was used in this study to select secondary schools from New Zealand cities. ‘Informants’ such as the researcher’s deputy principals, and fellow research students were approached, who suggested secondary schools for research in the first New Zealand city. Schools were purposively contacted and two were secured from amongst these suggestions. As time progressed, concern mounted regarding meeting the initial target of three secondary schools and therefore, due to the convenience of the location for the researcher, the scope was broadened to include a second New Zealand city. This built diversity into the study design through expanding the location of the research to two main cities in New Zealand (Hennink, 2013). School contact details were sought through the ‘schools’ search function in Te Kete Ipurangi (TKI) website. Schools online websites were searched for tabs or information containing key words such as e-learning and BYOD, emails regarding the thesis were sent if these key words were listed. If BYOD was not mentioned schools were phoned for information. Two schools were sourced from the second New Zealand city using this technique. Meanwhile, relevant authors of articles published in the Interface magazine - a technology magazine for New Zealand educators to learn about using Information and Communications Technology (ICT) were contacted, and one more school was secured from these interactions from the first New Zealand city.

Contact in this context means phone and email. Schools were phoned, the researcher introduced herself and either office staff were asked the following questions, or the researcher was put in contact with a person who could answer these initial questions.

- 1) Is your school BYOD or do students use their own digital devices to learn?
- 2) Does your school have targeted digital learning classes or use digital technology across a range of subjects not just technology classes?
- 3) When did your school implement BYOD or how long has your school been BYOD? (The ideal range was a school which was in the second year or more of BYOD)

Of the twenty seven schools initially contacted, nineteen schools had BYOD in various forms.

One issue in this study was the conflict between using a school as an institution, versus using knowledgeable people. Institution in this context included leaders, managers or co-ordinators of the initiative as well as teachers, deans, counsellors and home room teachers within the same school. Although a couple of leaders, managers or co-ordinators of schools were interested in this topic and had years of expertise, they were not considered in this study as they had moved to lead schools in which the teachers had less than one year experience. Approximately half, nine out of nineteen schools were excluded from this study as they were in their first year or less of BYOD. Due to the small pool of schools remaining, the researcher did not limit this study further by adding criteria such as student population, decile rating, gender, state, private or integrated schools.

It proved difficult to source schools which were in their second year or more of BYOD. Of the ten remaining schools an inhibiting factor for some, was they were already being researched due to the limited number of schools with this depth of experience in using BYOD. Two schools contacted, were outright in their lack of interest in being researched. It was also difficult for leaders and managers to convince staff to give up their time for the research despite the leaders or managers personal interest. On the other hand, three non BYOD schools requested the thesis results as this was something they were moving towards in the near future.

A total of five schools agreed to participate in this research. Three were from the first New Zealand city and two were from the second New Zealand city. A mix of medium to large, co-educational, single sex, state / state integrated and private secondary schools were researched. Four out of five schools in the study were compulsory BYOD schools although this definition of compulsory also varied. In one of these schools, if students opted into a digital device class, it was compulsory to bring a device. In this school, classes at the same level were

offered that were not targeted digital learning classes. However, students were able to voluntarily bring devices to school if they wished to use them. The other three schools had chosen to introduce BYOD across a specified year level. These four compulsory digital device schools had incrementally introduced this initiative, beginning at the juniors and either beginning, or currently progressing through to the seniors. Two schools prescribed specific devices and two schools highly recommended devices with specific capabilities. As a comparison, the fifth school had initially introduced BYOD voluntarily for the seniors, and is currently voluntary BYOD irrespective of year levels, with the intent of becoming a compulsory device agnostic (not tied to a particular device) BYOD school-wide in 2015.

Four preliminary interviews were organised between the researcher and a senior leader, manager or coordinator of the school so purposive sampling could take into consideration the suitability of the schools and the research questions. One school accepted the research proposal based on responses to questions posed about the research. A total of eight semi structured interviews were completed across the five schools. A maximum of up to two interviews were conducted in each school, with some schools only having one person interviewed. Interviewee job titles included senior and middle management such as the Principal, Deputy Principal, Director of digital learning, Director of ICT, Director of ICT projects, Head of Computing, Head of e-learning, e-learning Mentor. Five focus group discussions were held, one from each school. The number in each group ranged from four to seven participants and totalled twenty eight across the five schools. Participants were teachers, homeroom teachers, deans, counsellors and in some case leaders, managers or coordinators.

Semi structured interviews

Semi structured interviews are consistent with the ‘qualitative interpretivist paradigm’ due to the fact they generate new knowledge. The researcher had a fairly clear focus, rather than a general notion of a topic and decided that the issues under examination would benefit from development or clarification (Hinds, 2000). The semi structured interview benefited this research as it scoped the understanding of the individual, by providing in-depth information on organisational variables that supported or impeded impact (Brinkerhoff, 2002; Fontana & Frey, 2005; Hinds, 2000). In this way, the semi structured interview allowed the researcher to focus on the topic of ‘Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools’, yet at the same time allowed some flexibility

to discover different strategies that schools may have used. See Appendix A for the Semi Structured Interview Question Schedule.

Data were collected from the people in charge of the BYOD initiative, or from those who had been involved in the decision making, using a semi structured interview schedule. Leaders, managers or co-ordinators introduce, lead, and sustain initiatives, and as such, the results of this study may influence their decisions about how their program achieves ‘effectiveness’. Interviewees included leaders (either middle or senior management level) or managers who were responsible such as the Principal, Deputy Principal, or co-ordinators of the initiative such as Directors, Heads of Learning and Mentors within the school.

A total sample size of eight semi-structured interviews took place over a period of a month across the five purposively and conveniently selected schools. This meant some schools only had one interview while others had two. The length of interview varied between forty minutes and slightly over one hour. All, with the exception of one, were digitally recorded. Seven interviews were conducted onsite within offices provided by the schools during school timetabled hours. One interview was conducted in a classroom.

The format of the semi structured interview was loosely made up of three segments (Galletta, 2013). Segment one: the opening, was aimed at building rapport, establishing purpose and motivation, providing a time frame and information for interviewees, signing a consent form and transitioning to segment two. Segment two was the body of the interview. This was divided into research question headings of:

1. Implementing a technological initiative
2. Effectiveness of BYOD implementation
3. BYOD effectiveness
4. Successes and challenges of BYOD.

Questions moved from fully open questions, towards more theoretically driven questions as the interview progressed with the opportunity to loop back into previous material (Galletta, 2013). The data narrated by the interviewee provided the context for exploring their understanding of BYOD. A mixture of fact, opinion and behavioural questions was used to help explore the research questions in more depth. The final segment was the closing, where further action to be taken was discussed and the interviewee was thanked for their time.

In practice, the responses of the interviewees confirmed that the choice of the semi-structured interview was the most suitable for the purpose, because it allowed the more specific issues to be addressed and queried, while also allowing them enough flexibility to describe their opinion and behaviour, and offer new meanings to the topic of study (Bryman, 2012; Galletta, 2013). Some of the semi structured interview questions were aligned with those used in the focus groups discussions. The main purpose of including similar questions was the researchers interest in the extent of ‘fit’ and its impact and consequences, between the data elicited in the interview and the data elicited in the focus group discussions. For example ‘was there a shared understanding school-wide amongst leaders, managers, co-ordinators and teachers, deans, counsellors, home room teachers of the schools BYOD vision and goals and how that was measured and its effectiveness gauged?’ (Galletta, 2013). The semi structured interview questions did differ from the focus group discussion questions with respect to leading the initiative and ‘big picture accounts’, for example of implementation, which teachers may not have been privy to.

Focus group discussions

A focus group discussion is a qualitative research method involving an interactive discussion on a specific theme or topic that is explored in-depth (Bryman, 2012; Hennink, 2013). Focus groups are more than the sum of an individual interview, as data from a focus group discussion is the product of interaction, sparking new ideas or connections and unlocking perceptions which influence individual contributions and may therefore not fully represent individual perspectives in the same way as an individual interview (Hennink, 2013; Krueger, 1994). This was particularly relevant in this research despite questions being checked by the researcher’s peers, as participants challenged definitions of words and whether questions were value laden. For example question 4 ‘How is technology used innovatively?’ The meaning of innovation was defined to mean ‘newness of an idea’. This then progressed into ‘newness of an idea’ for one person may not mean ‘newness’ for another. Therefore innovativeness may not mean the same thing to everyone. In question 5 the word ‘acceptable’ was challenged, as this indicated ‘bottom line’ to a participant when they really wanted to explore the ‘full potential’ and was therefore replaced by the researcher with the word ‘ultimate’. Such challenging interaction offers valuable data on the extent of consensus and the diversity among participants (Bryman, 2012; Krueger, 1994). If a completely structured focus group discussion schedule had been used, the opportunity to query questions may have

been limited, and if a completely unstructured focus group discussion had been used, the opportunity to create specific shared meaning may have remained unrealised.

Focus group discussions have wide research applications, they can be used to explain and evaluate a program and “understand reasons for its success or failure” (Hennink, 2013, p. 16). They can uncover the strengths and weaknesses of an initiative and identify how it can be delivered more effectively. Focus group discussions in evaluation research “enable the researcher to not only identify the drawbacks of a service or program, but perhaps more importantly, to understand why these deficiencies exist and how to improve specific components of a service” (Hennink, 2013, p. 22). This information is invaluable for program evaluation and planning. The Focus Group Discussion Question Schedule is attached as Appendix B.

One of the benefits of diversifying the methods of this research, was it allowed a saving in time (Bryman, 2012). Generally, there are more followers than leaders of an initiative and a quick way to access a reasonable number of people, yet still gather quality information, was to use focus group discussions (Bryman, 2012; Quinones & Kirshstein, 1998). Instead of six individual interviews of one hour each, a focus group discussion was conducted totalling one hour. Time was a relevant factor in this study as the researcher did not live in either of the two localities of the study.

A point of contact within each school was established, being a leader, manager, or co-ordinator of the BYOD initiative. The researcher asked the point of contact to address the whole staff to request volunteers to avoid any potential selection bias. At one school the researcher presented information to staff in the morning about the research and asked for participants for the afternoon session. At other schools, the point of contact presented this research at staff meetings and disseminated a focus group information sheet; a one page question schedule and a consent form (Refer to the numbered appendices at the end of the thesis). Volunteers participated in this study and it was hoped they would represent a cross-curricula selection of subjects. This proved to be the case for each focus group. These focus groups contained a mixture of participants who had current, direct, or indirect contact with e-learning classes. A dean, a counsellor and a homeroom teacher also requested involvement in the discussion to share the pastoral impacts of BYOD. Thus, the voluntary element allowed valuable insight and perspective from previously unanticipated sources as originally the focus

was solely on teachers. Two focus group discussions included teachers who were leaders or whose role had progressed into one of leadership, or were part of an e-learning decision making group, so there was cross over in roles. One school arranged for a focus group discussion off site with the ICT committee, on a scheduled professional development day; all other discussions were onsite. In three schools, time was provided during school for the researcher to meet with focus group participants. Whereas the two remaining focus group discussions were held after school. All schools requested findings of the thesis.

The researcher notes that having participants from all levels of hierarchy within a group may affect the amount and quality of contributions of some participants (Hennink, 2013). Whether or not contributions in some of these focus group discussions were limited is unknown. On the one hand, in a group which did not have a manager, leader or co-ordinator present, a participant mentioned that they would have been truthful regardless of their presence, as they felt these topics were things that needed to be discussed. On the other hand, in a group where a senior manager and leader were present, one participant contributed very little, although this could be for many reasons such as the personality of that particular participant, lack of knowledge in the specific area under discussion, or the fact that what they wanted to say had already been stated.

Comment was made by focus group participants that they expected staff that were enthusiastic about the initiative to volunteer, and therefore they expressed concern that only positive viewpoints would be voiced in this study. However, as this study progressed it was discovered that this research did allow a forum for people who felt they lacked opportunities to voice concern, to be able to do this in a range of questions. However, this opportunity to voice concern was most notable under the heading of ‘challenges’, which had three times the number of pages of raw data, compared to questions asking about ‘successes’ and ‘tipping points’. This however, does not mean that the ‘successes’ are any less important than ‘challenges’. In fact the findings do not indicate that schools will be abolishing digital devices in their ‘next steps’.

Focus group questions are more than just asking questions in a group; it involves “asking well-thought-out questions in a focused environment” (Krueger, 1994, p. 65). In focus group discussions the aim is to create discussion where ideas are ‘bounced off’ other participants (Cohen et al., 2007). Therefore, knowledge is no longer subjective knowledge but also inter-

subjective knowledge. As Kitzinger (1994) writes, “patterns of interaction within focus groups allows the researcher to determine how group participants view the issues with which they are confronted in their own terms” (as cited in Bryman, 2012, p. 515). For example, in focus group discussions participants originally began to discuss the issues relating to management of devices and by the end of that section of the discussion, the participants came to the conclusion that classroom management was not a device issue, it was simply an issue of the teachers ability to manage their classroom “So she is quite right, it is a classroom management problem”. Guba and Lincoln (2005) label the informed and sophisticated individual and collective reconstructions as ‘constructivism’ because of the sharing amongst the group, new knowledge and original ideas may have developed. The basis of knowledge corresponding to the social reality of schools is one that is co-created by their social world, in this case possible perceptions of the staff regarding BYOD (Davidson & Tolich, 2003).

A total of five focus group discussions were held, each group had between four to seven participants, accumulating a total sample size of twenty eight participants. In a focus group situation the ideal group size ranges from four to twelve participants as under this number the response from the participants would only offer a small pool of ideas for analysis, with over twelve participants focus group discussions could see a fragmentation of ideas or the possibility that the researcher might not get to hear the opinions of all participants (Bryman, 2012; Hennink, 2013; Hinds, 2000; Quinones & Kirshstein, 1998). In these focus group discussions the number of participants was small enough for everyone to share their opinions and large enough to provide a diversity of perceptions. All participants were asked to sign a consent form before the focus group discussion began.

Schools asked for a preview of questions prior to the scheduled focus group discussions so participants could prepare. This made the researcher very aware of the need to structure questions so discussion could take place, rather than questions which allowed one answer to be the absolute, thus stopping further talk. ‘Why’ questions were removed from the schedule as their directness could be considered interrogatory, and replaced with ‘How’ and ‘What’ (Krueger, 1994). A permissive, non-threatening group environment was essential so that participants felt comfortable to share their views without the fear of judgment from others (Hennink, 2013).

The opening of the focus group discussion only differed from the interview in terms of the conventions of the focus group participation, such as one person speaking at a time and keeping what was said in confidence (Hinds, 2000). The body of the discussion revolved around un-cued and cued research questions with an in and out of classroom focus (Krueger, 1994). At the beginning of the focus group discussion, participants were asked for their first name and subject area taught. This was intended as a warm up exercise to relax the group and prepare them to talk. At the end, the researcher asked participants if they had anything further to add, summarised the discussion, thanked the group members for participating, explained what would happen with the data (see confidentiality) and confirmed contact details for checking accuracy of summaries (see Appendices) and for forwarding of the thesis (Krueger, 1994).

Data analysis

The literature for analysing focus group discussions is generally the same for interviews (Bryman, 2012; Galletta, 2013; Hennink, 2013). Although the nature of the descriptive response by the interviewee was technically different to the collective response and attitudes of the focus group participants, for consistency, the same interpretive qualitative data analysis methods were chosen. A general inductive approach was the most suitable for this study because it provided a transparent and structured method for dealing with large amounts of qualitative data collected using these two methods (Bryman, 2012; Hennink, 2013).

Computer based data analysis was undertaken using Microsoft Word 2010 and was completed in four stages.

Stage One: Transcripts for semi structured interviews and focus group discussions were placed within a two column matrix where the transcribed data was on the left and a blank space was made available for codes on the right (Lofland, Snow, Anderson, & Lofland, 2006). The proposed research questions were merged across the top of these columns as appropriate. Both methods were transcribed, because some of what the participants said was recognised as being 'rich' in detail, and the researcher did not know which information would prove to be relevant or irrelevant to the study. Tone and mood were indicated by emphasised words being capitalised.

Stage Two: Once all semi structured interviews and focus group discussions had been transcribed, an identical matrix was set up in a new Microsoft Word 2010 document and synthesised data was entered. Research questions were used as a guide, so that the researcher could make sense of the information gathered (Bryman, 2012; Hennink, 2013; Lofland et al., 2006). In other words, chunks of data were linked as representative of the same phenomena. This synthesised data from across the five schools was placed in the left hand column of the matrix under their allocated pseudonyms. Initial line by line coding of the transcripts was made, based on re-emerging key words and ideas. Overall, the purpose of this process was to allow thorough and systematic analysis of the data, not only making sense of individual quotes, but also allowing the researcher to see the relationship between quotes and links between school data (Krueger, 1994). The right hand column was used to retrieve, code, and file data separately as well as thematically (Bryman, 2012; Lofland et al., 2006).

Software like Microsoft Word 2010 does not analyse data, but provides a tool for researchers to manipulate textual data (Hennink, 2013). Likewise, coding, according to Bryman (2012), although it is a mechanism for thinking about and reducing data, is not analysis, as interpretation of findings, significance of coding for respondents, interconnectedness between codes and reflection on importance of findings has yet to be completed. Therefore, alongside the coding, memos were used from stage two onwards, which are the ideas about the codes, categories and their interconnectedness (Galletta, 2013; Lofland et al., 2006). Memos also highlighted instances within the data that generated a new direction in the analysis.

Stage Three: A copy of the Stage two data was made. The matrix was then split into the main segments relating to the research questions as outlined in Chapter One.

1. Why have secondary schools implemented a technological initiative called Bring Your Own Device (BYOD)?
2. a) How have schools implemented this initiative?
b) How have schools measured the effectiveness of this initiative?
3. What successes and challenges are these schools experiencing in relation to this technological initiative of Bring Your Own Device (BYOD)?

Data from the right hand column was copied and pasted into a single cell placed at the base of each segment. Each of these base rows was then compiled into a separate document so data comparisons could be made easily across multiple questions. Within this single row, focused

coding was used to select the earlier initial codes for categorising the data for more thorough analytical elaboration (Lofland et al., 2006). Focused coding included analysis of listed code names, meanings, page number of the exemplar, other instances, and relationship to other codes (if any). The on-going status of code in analysis was kept, as the number of codes and sub codes increased (Galletta, 2013). Codes were reviewed, repetitious or similar codes were eliminated (Bryman, 2012).

Stage Four: The purpose of this stage was twofold. Firstly it was used as a means of confirming subheadings within the data analysis and secondly it was used as preparation for Chapter Five: Discussion. The researcher re-read Chapter Two: Literature review and jotted down the literature headings and the key themes within this. Codes that shared connections were used to create thematic categories (Galletta, 2013) “that [made] sense in terms of relevant interests, commitments, literatures, and/or perspectives” (Lofland et al., 2006, p. 201). Because codes emerged in vivo, produced from the interviews or focus group discussions, they offered insights grounded in the lived experiences of the participants (Galletta, 2013). Inductive analysis is data based analysis and is said to be ‘grounded’ as it emerges from ‘the ground up’ rather than being initially derived from theory (Lofland et al., 2006). It is an iterative approach by researchers where data collection and analysis proceed in tandem, repeatedly referring back to each other (Bryman, 2012). In order to look back at the more general context of the semi structured interview or focus group discussions, a chronological set of files was maintained so it was easy to locate information, as well as being useful for stimulating thinking about larger emerging patterns.

Trustworthiness and rigour

Validity is an important key to effective research because “if a piece of research is invalid then it is worthless” (Cohen et al., 2007, p. 133). The concept of validity assumes that there exists a single ‘truth’. However, the underlying assumption of the interpretive paradigm is that there is “not one truth but multiple perspectives on reality when examining social phenomenon” (Hennink, 2013, p. 176). When interviewing many people and facilitating numerous group discussions, multiple accounts of the same phenomenon are possible and it is this range of different perspectives that are valued in an interpretive study. Quotations can enable summations to be verified in the direct words of a participant, rather than relying only on researcher’s interpretation of the issue (Hennink, 2013).

Providing structure in research procedures facilitated internal validity and comparison as “With no structure one cannot make claims that any differences observed are due to actual differences between groups, since all or most of the variability could just as easily be due to differences in the way questions were asked” (Hennink, 2013, p. 189). Using semi-structured discussion guides and interview schedules, provided some level of question standardisation across schools and methods, as participants were asked the same set of questions, while still allowing the researcher to explore issues raised in the discussion and interview (Bryman, 2012; Hennink, 2013). Variation in replies was more likely due to true or real variation, rather than interviewer error.

External validity in qualitative research refers to the extent to which study findings are transferable “qualitative research does not seek to generalise to the whole population but to provide a precise (or valid) description of what people said or did in a particular research location” (Davidson & Tolich, 2003, p. 34). Delineating the boundaries, or scope, of an explanation or interpretation provides specificity on when an explanation is valid and the conditions under which this interpretation holds true, thereby increasing the validity of interpretation (Hennink, 2013). Therefore, these findings are applicable in contexts that are similar to the one in which this study was undertaken. This information provides others who may be interested in transferring the findings to different contexts with adequate information to make this transfer possible (Bryman, 2012).

Reliability in qualitative research is regarded as “‘consistency’ of fit between what researchers record as data and what actually occurs in the setting” (Cohen et al., 2007, p. 148). Data was generated based on schedules designed for focus group discussions and semi structured interviews. A small number of leaders, managers, co-ordinators and teachers was selected from the researcher’s school, who were similar to the intended audience and asked to peer review the questioning routes sequence, logic, probes, ambiguity, clarity and understanding (Brinkerhoff, 2002; Hennink, 2013; Hinds, 2000; Quinones & Kirshstein, 1998). They were asked to take into consideration the nature and purpose of the study and the characteristics of the audience, providing valuable clues on fine tuning the questions and a sense of the type of comments that might be expected (Krueger, 1994). None of the data gathered from these sources were entered into the research results. Semi structured interviews were recorded and transcribed verbatim (Hennink, 2013) while focus group discussions were summarised. Participants were emailed the transcripts and summaries and given the

opportunity to verify the accuracy, or make further clarifications of meaning or intent, before qualitative data analysis proceeded (Bryman, 2012; Hinds, 2000). This member check provided a way for the researcher to test the ‘fit’ of the interpretation in relation to that of the participants’ understanding of the narratives (Galletta, 2013; Hennink, 2013). This also helped to strengthen the report data by avoiding subjective interpretation of interview data by the researcher.

Inter method triangulation allowed the researcher to look for consistency of data within each separate method (Bryman, 2012; Quinones & Kirshstein, 1998). For example data provided by individuals from the semi structured interview was compared and contrasted across schools in regards to emerging categories and themes. Cross method triangulation, the use of two different methods, the semi structured interview and focus group discussion, and similar questions in these methods, was a way of triangulating the results and examining contradictions and inconsistencies, across the various schools, consequently strengthening the reliability and validity of the findings (Bryman, 2012). This also provided multiple perspectives and combined level triangulation; the individual level and the interactive level, as data was gathered from different groups within the school such as leaders, managers or coordinators, a dean, a counsellor, a home room teacher and teachers (Cohen et al., 2007; Hennink, 2013). Guba and Lincoln (1985) suggest that triangulation is intended as “a check on data, while member checking, and elements of credibility, are to be used as a check on members’ construction of data” (as cited in Cohen et al., 2007, p. 142). Triangulation adds rigor to the research by exploring phenomenon from within and across research strategies (Bryman, 2012; Hennink, 2013).

Describing what was done (research tasks), how it was done (methodological procedures), and why it was done this way (scientific reasoning) demonstrates rigor in the research process (Hennink, 2013). An effective audit trail and the ability to trace analysis, highlights the steps that led to assertions made in the findings, so that there are no seemingly unsupported leaps of logic in the final results presented (Galletta, 2013; Hennink, 2013). Validity is generally defined as the extent to which a measure or variable, accurately reflects the quality of the concept the researcher is examining (Cohen et al., 2007; Davidson & Tolich, 2003; Keeves, 1997). Accordingly, in this study, throughout chapters three, four and five I have strengthened validity and reliability by clearly outlining all stages of the research process.

Ethical issues

Bryman (2012) writes that “Ethical issues cannot be ignored as they relate directly to the integrity of a piece of research and of the disciplines that are involved” (p. 130). Ethical concerns revolve around the topics of harm, informed voluntary consent and confidentiality (Bryman, 2012; Fontana & Frey, 2005). This thesis was submitted to and approved by the Unitec Research Ethics Committee based on the headings and responses listed below.

Harm

A core ethical issue is not to cause harm physically or emotionally; such as offence, loss of self-esteem or stress, invade a person’s privacy or harm participants development (Bryman, 2012; Fontana & Frey, 2005; Wilkinson, 2001). The decision over which method (questionnaire or focus group discussion) to use in gathering data was made in consultation with schools to help minimise conflicts of interest participants may have had. The first school was offered the choice of a focus group discussion or questionnaire. If the questionnaire was to be used, high response rates and quality answers were required due to only six participants being requested to complete the questionnaire. With this criterion outlined, a decision was made to progress with focus group discussions using a questioning route schedule (Krueger, 1994).

In order to avoid researcher conflict of interest, the researcher’s school was not used in this study. With respect to all participants, none worked or had worked in the same school as the researcher. They were neither friends, whanau/family, nor had any other existing or past relationship link. Thus, any researcher conflict of interest was avoided.

Informed voluntary consent

As Wilkinson (2001) very simply states “The basic idea behind informed consent is that, if you want to do research on people, you should ask their permission first” (p. 16). Informed consent requires participants receive enough truthful and relevant information to know and understand the nature of the research, such as likely benefits or burdens, and how much and what is asked of them, so they can make a decision whether or not to participate (Brinkerhoff, 2002; Bryman, 2012; Fontana & Frey, 2005; Wilkinson, 2001). Any information that could affect a decision should not be withheld (Bryman, 2012). By providing participants with as much information as possible regarding the study, the researcher reduced the possibility of deception and minimised the harm of the research.

Participants were given Information Sheets (see Appendix C) and Consent Forms (see Appendix D) stating that participation was voluntary and informed (Bryman, 2012). All participants received Information Sheets (see Appendix C) that explained the purpose and breadth of the research, potential benefits to them, methods of data collection such as semi-structured interviews and focus group discussions, and requested their voluntary participation. Consent Forms (see Appendix D) outlined the responsibilities and obligations of both the researcher and the participant. By signing the consent form participants were confirming their understanding of explanations provided and their acknowledgement of the ability to withdraw from the study if they wished to do so. The researcher outlined in the consent form her obligations to keep information confidential and to provide transcripts or summaries of the information so participants could confirm accuracy of data.

Confidentiality

By not using the names of any school or participant involved in this research confidentiality of participants was protected. Pseudonyms were allocated in an attempt to protect participants' and schools' identity (Brinkerhoff, 2002). 'School' in this thesis is used generically to mean any secondary school, college or other institution that was part of this research. Also to further protect the identity of any single sex school(s) the researcher will not specify the gender but use the generic term 'student' as all encompassing.

Identifier codes were used on data files and the lists of participants and their identifier codes were stored separately (Bryman, 2012). In addition, during the focus group discussion one participant made the point that "we should never be judged by the product or brand name, rather the process" the result of this being, that in order to protect the identity of 'schools' further, the researcher will only specify devices within the limitations of 'smart phones', 'tablets', 'notebooks' or 'laptops' rather than the product or brand name being used. Any intellectual and cultural property was only shared with the consent of the owner. Access to data was restricted to the researcher and the researcher's supervisor. All data, participants' names, addresses or correspondence were not stored on a hard drive, but have been securely stored on a memory stick and will be held in a locked cabinet for five years after the completion of this research.

The following chapter presents the significant findings of the data collected from the five schools starting with the semi structured interviews and focus group discussions. Four sub headings represent key categories as outlined by the research questions. A summary will be provided at the end that compares school data.

Chapter Four: Findings

Introduction

This chapter presents the findings gathered from semi structured interviews and focus group discussions. It is divided into three findings headings.

1. Semi structured interview findings
2. Focus group discussion findings
3. Summary of key findings

Semi structured interview findings are presented first, as they provide ‘big picture’ viewpoints, followed by the focus group discussion data which focuses more on teaching practice and pastoral care. Each heading represents broad categories of implementation practices, measuring quality, overcoming adversities and striving to thrive which relate to the original research questions. The summary of key findings is a consolidation of key findings from both data collection methods.

Section 1: Semi structured interview findings

Eight semi structured interviews were conducted across five urban schools. In the semi structured interviews, data was collected from at least one or two people in each school in charge of the Bring Your Own Device (BYOD) initiative, or from those who had been involved in decision making processes. Table 4.1 below shows the pseudonyms used for the semi structured interviews as found in the following data analysis.

Table 4.1: Coding used for the semi structured interviews

| Schools | Interviewees |
|---------|--------------|
| A | Int 1 |
| B | Int 2 |
| C | Int 3 |
| | Int 4 |
| D | Int 5 |
| | Int 6 |
| E | Int 7 |
| | Int 8 |

Implementation practices

Implementation practices cover what schools felt they needed to do when they were deciding on becoming a BYOD school. The main themes that arose in this category were discussions around why schools implemented BYOD - motivators and drivers of BYOD, how schools built the confidence and capacity across all levels of the organisation, and what they expected the outcomes to be of their decision to go BYOD.

When leaders, managers or co-ordinators were asked why they implemented BYOD at their schools many leaders provided more than one answer. Five interviewees said to create a shift in learning, two interviewees stated engagement, and two interviewees that it was a natural progression of what was happening in schools with students already bringing in devices. None of these were separate from each other but were closely interwoven. As this interviewee said:

The reason, we could see the possibilities of using technology in the curriculum, not just let's visit the computer room sort of thing, but truly embedded, so that we can get a massive shift in what's going on in the class room and a massive shift in what the students are able to do in their learning and how they are able to drive their own learning. (Int 5)

The key competencies of managing self, relating to others, participating and contributing, thinking and using language symbols and texts, as mentioned in the New Zealand Curriculum (2007) (NZC) were a means of focussing learning as well as enabling learning (Ministry of Education, 2007) as this interviewee describes:

We are finding that kids that don't contribute in class will actually use the online discussions a lot more. And then, we have noticed that it has bought them out of their shells in class so that has been quite positive in that area. (Int 4)

Interviewee six said their school was monitoring behavioural interventions to measure how students were relating to others since the introduction of devices:

We have certainly looked at our own behavioural interventions – they have dropped significantly, now whether that is causal or not...hard to say. (Int 6)

To build individual capacity, most schools attempted to select individuals from each department across the school to act as agents of change within the organisation. Four of these schools spoke about shoulder tapping specific individuals. The advantage in one participants' view of selecting accepted teachers within the school was that it helped to gain commitment from others. As this interviewee describes:

... middle of the road people, not necessarily high flyers, as these people could be perceived as reaching unattainable levels by some staff and be unrealistic in their goals. So you need to have for want of a better phrase, acceptable teachers, middle of the road, known and understood teachers, that are passionate and keen and then you give them the capability. (Int 2)

However schools were divided on whether to select the above, or individuals who were able to combine expertise and pedagogy. There was a sense that leaders wanted to encourage the uptake of BYOD but needed to make it accessible to all teachers. One interviewee commented that it was a matter of achieving balance.

It's also about trying to harness that enthusiasm without scaring the masses. (Int 8)

The targeted individuals that these four schools discussed did professional readings, attended conferences, talked to others, visited schools (some overseas), joined professional networks such as the Virtual Learning Networks (VLN) and Professional Learning Networks (PLN) as well as social networks such as Twitter.

Individuals needed to be confident, and the types of people who would 'get out there and do it!' according to four out of five schools. Alongside this, these interviewees also acknowledged that it was important that individuals be supported and encouraged as well as being able to make mistakes. As these two interviewees stated:

We tried to keep a pretty open view of what they could use in their classroom so that staff themselves would come up with particular ways of doing things, using more visual, photography, more voice, whatever ... and so the use of those media in terms of assessment we were sort of actively encouraging. (Int 6)

I think leadership is actually saying look you've gotta try things, it might not work that well the first time, you might make a mistake, don't be afraid to make mistakes and make sure they are supported and encouraged to actually have a go at it. (Int 1)

Although three schools acknowledged that learning was continuous and may involve lots of mistakes, two of these schools discussed wanting individuals to try new things and be innovative.

The expected educational outcomes and how teaching and learning has changed because of BYOD prompted much philosophical discussion. Interviewee two linked non-compulsory BYOD to providing personalised learning, described as students bringing a device for their own use, to increase their learning capabilities, as distinct from transformative education. The comment below provides evidence of this thinking.

The second approach was to say students it's there, bring your own device, no compulsion at this point in time. Therefore, I don't see it as transformative, but I see it as personal learning. So it has enabled those students who wish to bring a device to extend their personal learning capabilities. (Int 2)

One interviewee discussed bring your own device with equity in mind:

We felt that if people already had a device it was unreasonable to say that you had to buy another one. So from an equity point of view we felt that it was unreasonable to mandate it but we strongly recommend and continue to do so. (Int 6)

Three interviewees linked the educational outcomes and changed learning to whether the initiative was compulsory or not. In interviewee five's words:

We couldn't promise a change in pedagogy until – in a practical sense – every student in the class had a device. (Int 5)

Transformative education according to interviewee two is achieved through making devices compulsory as this statement demonstrates:

A transformative classroom is when you say ok folks pull out your device and let's do X, Y and Z. So at that point you want to know that every student has a device, every device is functioning, and every device has the capability that you need. If you use a pure BYOD approach; bring whatever you have, that is not going to happen. But if you have compulsory BYOD you are getting closer to that, but you are still going to have differences between devices. But if you have compulsory prescribed devices,

then you have that scenario where every device should have the capabilities you want.
(Int 2)

The point of difference in regards to device use for interviewee eight is that transformative teaching is still achievable despite BYOD not being compulsory.

It's that idea of 'have you just replaced the old technology with a new technology' with your planning and teaching or are you doing something really different? ... There are all sorts of ways of doing a lesson, it's important to not just focus on using the technology and managing the technology. (Int 8)

Both interviewee two and interviewee eight acknowledge that it is what is done with a device that makes it transformative.

Measuring quality

The value judgements subheading outlines data indicating how it is difficult to measure the BYOD initiative, the tensions with its perceptions of how others would like it to be measured and initiative frameworks are discussed briefly. Evaluation as a subheading outlines, how BYOD is evaluated, indicators of evaluation and some best practice models to indicate quality.

Value Judgements

When schools were asked how they measured the outcomes of their BYOD initiative, the first responses were all aimed at quantitative measures. Replies were varied and ranged from one interviewee stating BYOD was not measured, three interviewees expressing their frustrations that it was difficult to measure, and one interviewee asking how do you measure? This interviewee contributed:

It is an interesting question because we are still not one hundred percent certain what we want to achieve. (Int 2)

Schools C and D mentioned that linking data to BYOD was difficult to measure because there could be differences in achievement within cohorts. School D mentioned that even if there was a control group the system is not static and the way devices are used changes internally within a school. Likewise school E mentioned that changed results could be the

result of changes in pedagogy and the collaborative nature within the classroom that caused improved outcomes.

How to measure learning was the biggest question facing all schools. This is summarised as:

The qualitative feel is all there, but then if you want to justify it with facts for numbers, quantifying it is really hard. That's why I said we struggle. (Int 5)

No school could definitively link the BYOD initiative to increased achievement in student learning. Although two schools were attempting to use The National Certificate of Educational Achievement (NCEA) results only school D could explain in detail how they were comparing year eleven data across differing years to measure impacts on achievement. Interviewees of school D said they were using NCEA data to compare achievement between cohorts of differing years for example the 2014 year eleven cohort which uses devices, was compared to a previous year eleven cohort which did not use devices. The same topic test that was used in the first term of the previous year was administered to the 2014 year eleven students who responded on paper. The results were compared to the previous years' results and the outcome was the 2014 year eleven students were achieving as well if not a little better than previous years.

There was tension between how interviewees would have liked the BYOD initiative to be evaluated and their perceptions of how the Board of Trustees (BOT) and parents expected it to be measured. Three schools mentioned that their BYOD initiatives success, would be measured by the BOT and parents based on the NCEA results. However interviewees from school D and E viewed NCEA as too narrow a definition to be used as a measure. In one interviewee's words:

We see our job as a school as a bit more than just getting our kids through NCEA. It's a fundamental thing of course, but we are about teaching the whole person rather than just teaching towards an exam. (Int 5)

Three schools commented that it was more to do with the skill sets the students are learning rather than being able to measure the impact BYOD has on learning. This is best summed up here:

I think personally it has a bigger impact on their key competencies and their learning skills rather than the actual content that they learn, which is what we really want to

build - their key competencies and their capabilities for going out into the real world.
(Int 7)

Two schools mentioned using frameworks to formally measure the BYOD initiative. School E used the e-Learning Planning Framework (eLPF) as a tool to measure how far the school had come with capability building, and to inform their next steps strategically, while School C used the National Association of Advisors for Computers in Education (NAACE) framework to formulate questions for student surveys. However, only school C had completed school wide surveys of students, teachers and parents, although school E discussed this as a next step for Term Four.

Evaluation

When interviewees were asked how they knew their BYOD initiative was providing quality to their stakeholders all interviewees replied that one way of measuring this was to use surveys. Schools A, C and D were using school wide student surveys that ranged from a term by term basis, up to and including yearly or bi yearly surveys, to investigate and examine device use and impacts on student outcomes. School E was using class surveys and informal conversations. Generally the results from the student surveys were positive in classes where teachers were using devices well. The most clearly articulated evaluand was stated by interviewee four who said:

When students can articulate certain behaviours and we are sure they are using technology to assist them doing that, then we will know that our vision and goals are being met. (Int 4)

Four interviewees clearly stated that surveys were used because the feedback allowed teachers to be reflective in their practice and enabled leaders, managers or co-ordinators to use the information for professional development purposes as this interviewee outlines:

It gives us more of a steer for further professional development because we have got beyond saying it is about BYOD and technology to putting more emphasis on how is the teaching and learning benefitting from that. (Int 6)

School E was the only school where staff completed surveys at the end of each professional development rotation regarding the quality and value of the professional development being provided.

Six interviewees noted that teachers were at different ability levels which affected its use in classrooms. As this small sample demonstrates:

From the surveys and a number of comments from parents it would be helpful if staff knew how to use them. (Int 4)

They [students] don't find across the whole school that all teachers are at the same level in terms of using it to the best potential. (Int 6)

Quality as experienced in the classroom was measured by five interviewees as being linked to pedagogical shifts. This is summed up best by this interviewee:

I would say its part of that much bigger focus on quality teaching and learning and being able to access things. (Int 8)

Another common way of measuring quality was through engagement as specified by five interviewees across four schools. Engagement was measured informally as interviewee five comments:

You walk into a room and it hits you in the face. The kids are engaged. The teaching they are getting is not just coming from the teachers it's coming from their peers. There is a lot of collaboration going on, a lot of sharing of work, sharing of ideas, and synthesis of information. (Int 5)

However, two interviewees questioned how valid engagement was as a measure. This comment provides evidence of this thinking:

I guess student engagement is probably the biggest one. Then everybody might say they may be engaged but are they actually learning and are the results any different? (Int 7)

Enjoyment was another measure that four interviewees mentioned. One interviewee contributed the idea that:

We are looking particularly at how we are managing to give students more opportunity to learn in ways they wouldn't have been able to do before. How have we taken away the 'drudge' of learning and replaced it with the experience and joy of learning? (Int 2)

Three interviewees mentioned enjoyment could be measured by the number of students re-enrolling in subjects, however they did acknowledge there could be other limiting factors such as student ability, teacher dynamics etc.

Five interviewees discussed using best practice models as measurements of quality. Four interviewees discussed the last two letters of the Substitution Augmentation Modification Redefinition (SAMR) model as the point where students experienced quality. This is summarised by one interviewee saying:

Looking at the SAMR model we are wanting modification and redefinition, or a lot more of that, although there is always a place for substitution and augmentation of levels. (Int 5)

SAMR was used as a self-evaluation for teachers about how they were using technology.

Overcoming adversities

Under this section, challenges that schools face with the BYOD initiative such as infrastructure, maintaining change, skill sets, professional development, appraisal and performance management, student management and anti-social behaviour are described. Where possible, challenges have been described with solutions that interviewees have outlined.

Five out of eight interviewees said making sure infrastructure could meet demand was a challenge. One interviewee attributed this to the devices being disruptive and infrastructure being unable to handle the load, another that it was the synchronisation across applications and software that was problematic. Yet another described the issue as being:

Does the school have the capacity, is there sufficient bandwidth – these are things which we constantly look at in terms of have all the kids in my class got a device.
(Int 6)

However, this interviewee summed this all up by stating:

The challenge is technical systems responsive to human needs. (Int 5)

Although infrastructure was mentioned as a problem no one's described experience relating to infrastructure was exactly the same. However the difficulty of infrastructure that did not meet human needs was explained by interviewee two as resulting in student engagement dropping off because devices do not work.

School B and E describe their future as becoming device agnostic (not tied to a particular device) to enable equity of access as described here:

That is the whole point. So if you can bring in a standard browser it will do what you want it to do. (Int 2)

Device agnostic means all students and teachers can access data held on the school server irrespective of device. The first step for school B to becoming device agnostic, is to use a cloud based management system which manages all the students data and required functionalities. The second step for school B will be web based software which allows for storage within the cloud. The challenge is that staff and students will need opportunities to gain capability to be able to use cloud based systems.

Systems to sustain change during implementation that involved good planning, professional development and strong leadership from the top were important for three interviewees. Interviewee four described good practice as the following:

Good practice whenever implementing something, is to develop with a provider, establish a process and professional development, and then broadcast this to staff.
(Int 4)

One school had developed the process of a professional development day at the beginning of the term to create a sense of shared knowledge and experiences regarding BYOD amongst the staff. As this participant described:

At the beginning of the term we have a staff only day. This time they let staff show off some examples of best practice and teachers all did different workshops showing different things and apparently that was a great success. (Int 4)

In 2015 both school D and E are in the process of exploring a flexible supported study option for seniors. The aim is to provide timely support for students by including a study period within an option line, within the current timetable. The supported study option is a first step

for school D, towards a possible future vision where timetables are flexible and so is the curriculum. The link between the timetable and the curriculum in school D for the future is that students are able to learn at their own rate within the appropriate level. Project based learning, aided by technology, will be used to form stronger links between curriculum areas and across units in the junior curriculum in school E. In her words this was:

We are looking at more cross curricular units and links. We are looking at how we might eventually bring in modern learning environments in a traditional physical environment and how that might look. With that differentiation is going to be a greater focus on project based learning and for that obviously technology is going to be vital. All of those are quite integrated. (Int 8)

One interviewee in school D also talked about project based, cross curricular units, but this was a vision rather than a specific concrete plan. He also spoke about the difficulty of getting established schools to move towards his vision. This interviewee said:

In terms of where you go from here, we're talking about a school that like every other school has a hell of a lot of baggage and implementing that sort of change is the stuff of dreams to make it happen in any really quick time. (Int 5)

Three interviewees differed in their opinion regarding the types of skill sets they thought teachers should have. One interviewee said:

Make sure you have teachers with skill sets to begin with. You can't be learning as you go, you need to be on top of it. (Int 3)

While two other interviewees indicated an opposing viewpoint of:

If you wait until everyone has their head around technology, it's already too late as the technology has changed, so you have to have good change management strategies in the school and you have to have good time and money put aside to support the staff and expertise as well so that they feel supported. (Int 8)

Making sure that teachers are supported was described by three interviewees as a challenge. These comments add further to this idea:

Making sure the teachers are supported enough to feel comfortable with what they are doing. I think the main one, from my point of view in terms of what I have to work

with is the professional development side of things. You just have to maintain change.
(Int 5)

I guess it is the pedagogical underpinning of whatever we are doing technologically. You need to have a proper professional development programme in place for that.
(Int 4)

Professional expectations that link skill sets to appraisal was something that four interviewees discussed. As these statements demonstrate:

At our previous meeting, we had identified professional development as one of our biggest issues and also professional expectations. We need to have some way of ensuring that all staff meet certain levels or stages. That basically we can tick off that they have done the core competencies which we insist they all have. That has to be enforceable otherwise, as I said yesterday people will opt out quite easily and say I don't need to do this, it doesn't suit my subject... One of the things we are looking at is using the teacher registration criteria... I have seen it work quite well to facilitate this sort of thing they are doing because there is a technological component to them... they are both in agreement that we start introducing them so there is a requirement for staff to meet certain obligations. (Int 4)

I think if you are going to make changes that are sustainable you have to have the teeth behind it so it has to be linked to appraisals somehow but you also have to support it with time and professional learning support. (Int 8)

Three interviewees felt that appraisal was meant to mean something and for an initiative to be sustainable it needed to be enforceable. Three interviewees stated that their three schools were already linking appraisal to skill sets or blended learning approaches.

The management of devices by students was a challenge for half of the interviewees because it created behaviour that was 'off task'. This behaviour was presented when students played games, snapped photos, watched videos, and used social media, shopped online or text. What made this an issue for two interviewees was that the distractions were engaging as this quote demonstrates:

Some student might insist on playing games all the time whereas before they would have just stared out the window and not done their work. Now it's a bit more engaging with this distraction, so there's that challenge as well. (Int 5)

Two schools were using mobile management systems that could lock students into the screen that they were working on, as a technical way of managing student use. Whereas school E was using classroom management strategies that were not just individually based but part of a larger school process. One interviewee expanded this further by saying:

At the end of the day it's the classroom teacher's responsibility to manage their classroom and in the same way that you used to manage kids throwing notes to each other; now they text each other... It's mitigating those fears and giving them strategies to be able to deal with those. You have got to involve everybody in that process. (Int 7)

Rules and consequences were made transparent in documents such as student handbooks in school E.

Student management of devices is considered a weakness because devices have the potential to get broken according to three interviewees. Duty of care has the possibility of becoming a problem for schools if policies are not explicit, widely known, readily available or financially viable. This is summed up by this interviewee:

We have had problems with breakage essentially through carelessness. It has been quite important that we made it clear from the beginning, that if people own their own device, then it is their responsibility to look after the device, to insure the device etc. the school hasn't taken responsibility for that. (Int 6)

Although three interviewees discussed insurance, the pitfall, according to one interviewee, was relying on home insurance to cover repair or replacement, because the excess on the home insurance policy may be the equivalent of the replacement cost of the device. The way to combat breakage, according to interviewee two was to include a low excess insurance and warranty policy as part of the purchase price through a vendor. To address the primary issue of devices being broken, three schools are providing lockers rather than asking students to place bags in a certain area such as a classroom or storage cage.

Lack of physical activity such as students playing on the sports fields at breaks was particularly noticeable in three schools where sports are a big part of their culture. The first quote below refers to information passed on from teachers to an interviewee, the second quote, information gained from a student survey that an interviewee administered:

You get some really interesting thinking with students being attached to screens all the time, some people say that it is not a good look ... that there was a lack of kids running around on the fields – which may be true, it may not be the device. (Int 4)

Students will say devices are geeky and we should get rid of them. (Int 1)

In one of these schools where lack of physical behaviour has been noticed during breaks, rules have been implemented requiring students to store devices in classrooms or lockers as a means of encouraging play. Also social media use has been blocked during the day.

Anti-social behaviour such as inappropriate use of a device posed some challenges for three out of eight interviewees. As this interviewee noted:

How do we know that they are not bullying each other on the phone that they are not doing things that they are not meant to be doing... (Int 7)

If a device was noted as being misused, all three interviewees said that the issue was taken seriously. This is summed up in the following comment:

There are issues about things such as social media, cyber misuse / abuse – which occur everywhere across the world and we treat it seriously and we make sure that we proactively look at cyber wellness. We try to proactively say these are your devices this is what is available but you need to use it all sensibly and responsibly rather than limit things too much. (Int 6)

As a preventative measure School E stated that explicit rules and consequences were well documented in school policies. School E worked in conjunction with Net Safe and adapted Net Safe's template for responsible use agreement, moving from a policing model to more of a citizenship model that involves families. In her words:

It went home for parents to sign. They keep a copy and we keep a copy. It's the first time we have done it is this year... if you bring the families into the conversation they

know what sort of things are expected. We are finding that seems to work a bit better.
(Int 8)

Interviewees promoted the idea that citizenship is not a standalone issue disconnected from its context, and therefore school E does not have targeted digital citizenship classes, stating that regular conversations are the key to effectiveness.

Striving to thrive

Striving to thrive is about the successes schools have experienced in their BYOD initiative. The main successes and benefits all interviewees identified as receiving from BYOD were summed up as learning about learning and becoming better at doing what we do. Learning about learning was initially discussed as teacher and student learning. Success was noted as the ability to access learning anytime and anywhere, and varied types of teaching and learning such as collaboration. Throughout this section successes mentioned have been linked to the resulting benefit or advantage outlined by interviewees.

Six out of eight interviewees stated that success was learning about learning, although there were variations, and more than one single view from interviewees about the meaning of this statement. Learning about learning initially meant teacher learning. Three interviewees talked about shifts in pedagogy; the fact that pedagogy came first and was enhanced by technology. The comment below provides evidence regarding the idea of teacher learning:

I think the biggest benefit is that it's forced our teachers to up-skill with their pedagogical practice and I would like to say the benefit was for the students. (Int 8)

Three interviewees believed that the advantage of teacher's upskilling their pedagogy was that better teaching was happening. This was summed up by this interviewee as:

The advantages are to the teachers teaching and to the way students learn. (Int 2)

Learning about learning not only encompassed teacher learning but also student learning. Students being able to learn in ways that suited them were indicated by three interviewees as being a factor of success. The following quote sums up these ideas:

I think it also caters again for the whole idea of universal design for learning that students can access the internet, or their work, in a way that is comfortable for them and a way that they are happy and the way that they know. (Int 7)

A success for three interviewees was that courses were put online and students were able to access this anywhere, anytime. As one interviewee stated:

A significant benefit is that we have a lot of our curriculum online essentially and it can be, could be delivered, probably not as effectively, but certainly at home. (Int 1)

The benefit these three interviewees saw for their particular setting was if a student was absent for any reason, whether it was due to an outbreak of measles, involvement in sports or a school trip, or away on holiday, technology allowed students to access learning. As this interviewee explains:

Technology allows student to get on with their work, it creates interest through conversation. Students can do coursework or homework while on holidays. (Int 2)

Four interviewees mentioned that the varying types of teaching methods that include digital technology are a benefit. As two interviewees noted:

I think if you looked at how teaching is used in our classes now, I think it would stack up nicely against a lot of the other schools in terms of the varying types of teaching methods that were used and digital technology is included in that now – I think that is a significant benefit. (Int 1)

The BYOD advantage is that students can ...we have more people being able to access these blended learning opportunities. (Int 8)

Four interviewees explicitly stated the benefits of BYOD as being able to use collaborative tools. As affirmed in the following quote:

The benefits that are coming through from the survey are in the collaborative nature of learning. (Int 4)

Two of these four interviewees linked collaboration to life skills needed outside school. Two quotes which examine this in detail are listed below:

We are aware that we just can't do the same thing we have always done in the classroom and expect our students to be prepared for the jobs that they will be doing. (Int 1)

I said when you leave here, are people are going to ask you to go sit on your own somewhere and solve a problem, or will they put you in a team and get you to toss around ideas and come through with solutions? Of course it is the later, and so school is unusual in that respect and I think the BYOD will help that. (Int 4)

Collaboration as defined by two interviewees was something that is expected to be a useful life skill that students will need for the future.

Section 2: Focus group discussion findings

A total of five focus group discussions were held, one from each school researched with a total pool of twenty eight participants. The researcher was concerned about subject bias amongst participants, as during this study many comments were made that some subjects lent themselves more, or were better suited to technology. Therefore, introduction information which requested participants state the subject areas in which they were involved was analysed to gauge if all curriculum areas of the school were presented. The eight areas of the curriculum, according to The New Zealand Curriculum (2007) are English, arts, health and physical education, learning languages, mathematics and statistics, science, social sciences and technology (Ministry of Education, p. 16). It was pleasing for the researcher to note that all areas of the curriculum were represented as well as some areas of pastoral care (home room teachers, deans and counsellor) and management.

However, the number of pastoral and management participants, compared to curriculum participants was disproportionate, due to the fact that the researchers original target audience, through disseminated information (see Appendix B Focus Group Discussion – Question Schedule) was teachers. The researcher did not think closely about the crossover of roles and expected only leaders to be involved in interviews. As a result, two of the members of the ICT committee were involved in both the semi structured interview and the focus group discussion. Due to researcher bias, the pastoral element was excluded, because the researcher expected teachers to be the main recipients of change. However, because the pastoral side of the school also experiences impacts of initiatives and the effects of decision maker's choices, their request to be involved in this study was welcomed.

Table 4.2 below shows the coding used for the five focus group discussions as found in the following data analysis. Focus Groups are listed in columns and the total number of participants are listed in rows. For example a participant from school A may be described as A1.

Table 4.2: Coding for focus group discussions

| Total Number of Participants | Focus Groups | | | | |
|------------------------------------|--------------|---|---|---|---|
| | A | B | C | D | E |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | | | 5 | 5 | 5 |
| 6 | | | 6 | 6 | |
| | | | 7 | | |

Data analysis has only been included in the findings if two or more focus groups contributed the same or similar information, or contradictory information.

Implementation practices

Implementation practices include the drivers and motivators of BYOD, the philosophy behind it, innovative use, and the people or things that have helped teachers to use technology.

Four out of five focus groups stated that BYOD was initially about learning. There was general agreement amongst the participants in focus group A that the purpose of BYOD was to supplement the learning rather than use it for its own sake. Half of the participants of focus group A also stated that devices were used to enhance leaning rather than as a replacement as these two participants explain:

That’s why the idea of using apps specifically for your subjects, it’s what we were talking about before, it’s better to use the basic stuff, and using it to ah... enhance I suppose, the learning, rather than ooh let’s find something for this. (A4)

So when teachers come to me and say I have a good e-learning PowerPoint for today – I'm like really.... Because you have this amazing tool you can video call, skype people from the other side of the world, but you're only using it with simple tools which need to be extended. So it is about educating the teacher and allowing us to go to PD's and things like that to share our ideas. (B4)

One participant also stated that technology by itself was not going to enhance learning as he contributed here:

Some think that we can get students on a computer and give them a website and everything is going to be AMAZING and ask all these great inquiry based questions and this certainly can happen, but it is not to do with just a computer it's part of it. (B2)

In focus group E, the reason two out of five participants explained they have BYOD is to achieve their school goal:

From a school point of view, because blended learning was the real pedagogical approach we started on the journey with last year and continued this year, the use of devices in the classroom is one way to achieve blended learning, so the school is encouraging the use of devices in the classroom. (E1)

BYOD was encouraged to achieve blended learning. Half of the participants of focus group A discussed the innovative use of a device as allowing higher order thinking.

Two focus groups discussed BYOD as being a student centred model. This was discussed deeply by half of the participants of focus group C. As stated by this participant:

Well I think it comes down to the students have ownership of their own learning and they can dictate for themselves how that learning progresses. (C1)

However, it was also deeply investigated amongst participants in focus group B and two participants of focus group D, that some students did not want to learn using technology. As this participant contributes:

The reason she was there was because of her mum who wanted her to do this. I asked the student if her mother had asked her about technology use in class and the girl said

she preferred writing... Sometimes the student voice is drowned out because all these other kids think having technology is awesome! (B4)

Two out of five participants of focus group E saw the next steps of BYOD leading to a flexible timetable and curriculum. As one participant summarised:

[As a student] I would totally envisage that not far away would be, I'll choose which standards I want to do, and I will access the learning material, in ways in which I would want to do it, and I will choose when I do the assessment, what I do and how I learn. (E2)

And if I envisage myself, having been a student 3 years ago, I can go WOW that would be awesome! On the opposite end of the scale as a teacher I go Wow SCARY! Where is my job going, what will I be doing in 10 years' time if I am still teaching. (E2)

This last quote demonstrates the participants' feelings surrounding both the positive and negative impacts of a flexible timetable and curriculum for students and teachers.

There was general agreement in focus group E that BYOD created independence. Nearly all participants of focus group E linked collaboration as being innovative. The comment below provides evidence of this thinking:

I think that the student being innovative is about them being collaborative, leading the learning and taking the direction that they get to along the path that they are doing, not necessarily where you start them off from. (E1)

Collaboration was also portrayed by three out of four participants in focus group B as enabling student voice. One participant contributed the idea that:

The collaborative aspect is big when it is appropriate, you can do projects that extend beyond the classroom, or give students voice in ways you wouldn't normally see or pick up in a discussion. You can use programmes which you can have open and type thoughts in and can see results as they come in. I can say oh here is a great comment from Johnny who never talks in class and he says (B2)

According to focus group B participants student voice meant allowing students to have a say in a global forum as well as allowing communication between the student and the teacher.

Professional development had three main strands according to three focus group discussions. The first strand was personal professional development, the second strand was external to the school and the third strand was professional development provided by the school.

Half of the participants of focus group D stated that there had been a lot of self-teaching which meant in this participants words:

Playing and spending hours on it. (D4)

For focus group A and C teachers were given a device and they considered this helped teachers to use them in the classroom. As this participant states:

First of all the thing that has helped us use technology in the classroom is the fact that the school thinks that it is important. So the school has provided the technology. (C5)

In focus group C four out of seven participants said that social media and observations of other teachers within and outside of the school helped them to use technology. Social media examples given were twitter feeds, hash tags on twitter, podcasts and blogs. This was interpreted as personal professional development.

We do subscribe to twitter feeds which bring likeminded people from all over the world, so much of what I have used has been gained from listening to podcasts or reading about other people's experiences, suggestions they made, the successes they've had, the failures they've had. (C4)

School E had implemented a time slot of half an hour professional development into the school week which could be used for personal or departmental aims, and school D and E had also scheduled one day of the week for departmental or school wide professional development. School professional development was discussed by three out of seven participants in focus group C as a way to create 'buy in' because teachers see some of the good things that others had done on professional development days and may decide to use these ideas themselves in class. Attending e-learning professional learning groups was also described by two participants to promote learning development. In focus group E there was a

general consensus that professional development over a sustained period of time helped teachers use technology in the classroom.

To equip teachers, half of focus group B indicated that their schools next steps involved professional development. As this participant explains:

We are going to have a learner group, more advanced, advancing to proficient users. So we want the proficient to teach the advanced and the advanced to teach the merging, and then the merging to teach the basic levels. So once advanced through every level, each teacher will be moving through so they can teach the ones that come in. The aim is to enable teachers to use this technology. The school wants every student to have a device by 2018 which is not far off... We want teachers to feel secure going into the class and teaching with devices, rather than being behind on the first day. We want to transition the teachers first before the students. (B4)

Professional development would involve departments sitting down and discussing what could be done across technology, overt collaboration with other schools regarding innovative use of technology and teachers with higher skill levels training others.

Measuring quality

Measuring quality has been divided into two sub headings. The first is value judgements which are about the values used when measuring quality. The second sub heading is evaluation which encompasses ideas of how technology use is effectively measured and how quality is experienced by stakeholders.

Value Judgements

The value judgements subheading outlines data that initially discusses the expected user experience. It also includes concepts of quantitative measuring, data and links to appraisal.

An acceptable user experience as described by two out of seven participants focus group C and all participants of E was that teachers and students would want to use digital technology again. As these participants state:

I think acceptable would be enjoyable, and ultimate would be I am desperate to do that again! (E2)

If you are positive about using it again, then that is an acceptable user experience.
(C6)

The kind of experience teachers and students had dictated future use according to two participants:

If it is not instant we lose the kids nowadays, because something like the tablets and phones are instant and our technology has so many steps to get through before they can begin. At some point they go ‘I’d rather be back in my classroom sir’ The teacher goes ‘ok it is easier for me’ Then we have lost two markets – the teacher and the students. (C2)

The exception for a lot of us is that the tool works as it is supposed to. (C2)

This indicates that often technology does not work the way it was intended and if students and teachers have a bad experience it can cause disengagement.

Three focus groups referred to measuring the effectiveness of BYOD quantitatively. Half of the participants of focus group A articulated that BYOD was difficult to measure quantitatively. One participant from focus group A questioned what was being measured:

They haven’t ever really measured whether it has enhanced learning. (A4)

How the effectiveness of technology use was measured caused robust debate in focus group C between three participants. The soft stuff according to participant C2 measured things such as pastoral roles, digital footprint, reports of bullying and teaching ability. The hard stuff according to participant C1 was the measurement use of data.

Although our community demands success through results, we also want to provide students with a meaningful and enjoyable educational experience and something like that is very difficult to measure. (C1)

Even though two focus groups used success indicators in their annual plans regarding ICT, effectiveness and quality was not included in any of these statements. This could be a result of the difficulty of measuring quantitatively. As this participant indicates:

This is the problem with technology – how can you measure that it is enhancing the learning of a student. You can look at outcomes but can you retrieve them. (C1)

All participants of focus group E agreed that BYOD effectiveness was measured anecdotally. One participant stated that she liked that it was not measured as it gave her the confidence to experiment. In her words this was:

I quite like that we are not measuring it too though. Because the whole point is to give people the confidence to use it and to be experimenting and if you had to meet a whole lot of ‘you have to do this by this date, it wouldn’t work’. (E4)

However, four out of five participants from focus group E made the distinction that appraisal could measure effectiveness and quality due to the in-depth conversations held with the appraiser. This participant remarked:

So it’s not measurement. I guess you could say that we work in a very high trust model in that we say this is the academic goal for the year is to embed blended learning approaches, and then the measurement would be in people’s appraisal conversations with their appraiser, where you reflect on how you achieved that goal. (E1)

Appraisal was also discussed in focus group A where two out of six participants stated that it had been raised that BYOD effectiveness should be linked to appraisal or recorded as part of a critique lesson for teacher registration.

Evaluation

Evaluation as a subheading outlines who the evaluators are and how they make and measure judgements, how BYOD effectiveness is evaluated and discussion of how technology contributes to quality education.

Four out of five focus groups mentioned who they believed were evaluators but only three discussed what they measured or their impact. In terms of judging misuse of devices, half of the participants of focus group B testified that the Director of ICT and the senior management team were involved in this decision making, and matching devices to purposes of teaching were specified as including the Line Manager of IT, the Director of ICT and senior management by three out of four participants.

There is a consultative collaborative process but with bigger decisions we are informed. Top down what is good for us unless we are naive about the consultation that goes on because we are not the key people. (B1)

In focus group C three out of seven participants discussed the impacts of students making judgements. As this participant contributes:

Now they will make that judgement instantaneously based around an experience. You can earn that trust back, but those judgements aren't now considered judgements and through technology they can be instantaneous. (C1)

There was a feeling by two participants of focus group C, that teachers had lost the benefit of doubt from students as judgements were instantaneous. Three out of five participants in focus group E also thought students were the main evaluators. As this participant contributes:

I think those students are making those judgements too, cause if a student sees that it is of value ... and then they see that actually I need it, or its better or its different, and then more students are bringing their devices. (E2)

Students were seen to base their judgements on the value of a devices use, or the potential learning improvements it may provide according to these participants.

Surveys were used by schools to measure a variety of outcomes. According to focus group discussion participants of School B (two participants) and C (two participants) staff surveys measured capability and capacity. One school B participant said:

There have been staff surveys – where we tick off boxes and so forth. One of these was the Professional Learning Group (PLG) and it indicated that staff were moving from the least proficient and basic to the more proficient. This is proof that staff are generally improving on the use of IT. (B1)

In school A (four participants) and school C (two participants), surveys of students were used extensively to investigate and examine device use and impacts on student outcomes. Only school C had surveyed students, parents and their community.

Across two focus groups the quality educational outcome was deliberated as students being critical users of technology. Interpreting information came out as a very clear element in

focus group A because the following participants' comment was supported by everybody else in the discussion:

Umm, like all the assessments are written, so we acknowledge that we can get the answer because of technology but it is how you interpret it, and a lot of students are still not coping yet, because they feel, you know, they still want to learn by rote. (A6)

As the discussion progressed, four out of six participants of focus group A described students as critical users meant they were able to discern information.

Even in focus group C, two out of seven participants discussed interpreting information as being important. This is best summed up in the following quote:

I think quality information is mistaken for content information. People talk about us being in the information age – that is incorrect; we are in a concept age. We have to understand what the information means. (C1)

This hints that people; which could be students or teachers, mistake content as quality information when the important thing that needs to be understood are concepts according to participant C1.

Digital technology contributes to quality education because it promotes reflection and quality conversations between colleagues as well as teachers and students, according to two out of four participants of focus group B. As these statements by one participant articulate:

Technology has promoted more reflection amongst teachers and this is quality. (B1)

The quality is the sense of more reflection and more dialogue with the student. (B1)

Success can be measured in greater reflection of the use of information technology (IT) at the school. (B1)

Reflection was also agreed as an evaluative tool of quality by two out of six participants in focus group D. Virtual reflection was used by students as part of a learning log. According to these participants reflection can be personal, peer reviewed or even globally reviewed.

Overcoming adversities

This section is about challenges that schools have faced with the BYOD initiative and in some instances recommendations or solutions are provided by participants for these problems.

Antisocial behaviour was noted in three focus groups, ranging from lack of playing outside, to requiring social maturity when using devices and lack of students relating to one another. Three out of seven participants of focus group C observed a change since introducing devices was that students were not going out and playing anymore and re-education of appropriate times to use a device was recommended. As this participant states:

I think that is a negative change that is happening in schools recently and that has happened since devices and that is students aren't going out and playing anymore. I don't think that is a reason not to use a device, I think that is an education for students of when it is appropriate to use a device and when it is not. (C5)

In focus group E there was general agreement that social maturity was needed to know when it was appropriate to use your device. This group also added that they did not want students to lose human interaction and social skills. Although using social media was classed as interaction they made the distinction that the ability to read emotion and connect to people was important. As these two statements illustrate:

Just face timing people all the time is not interaction. There is the front of the curriculum that can't always be done. It can be enabled through devices but that is not necessarily done exclusively. (E3)

It's the ability to read emotion, and to connect to people. (E2)

Relating to others was an important aspect according to half of focus group D especially in situations of homerooms. Two participants stated that apathy had developed due to devices being used for entertainment and relationships were now being formed between devices rather than peers. In this participants words:

It is difficult to enrich homeroom time because they are not relating to each other in any way they are 'virtual strangers to each other' (D5)

Participant D3 hoped that teachers would be encouraged to maintain a balance in homerooms.

Focus groups stated they were tracking behavioural interventions since the introduction of BYOD to measure the effectiveness of digital citizenship. In one focus group there was genuine inquiry into the reasons why the digital citizenship policy within the school was considered ineffective. As these participants contribute:

There is a programme on paper, but the technology teachers are busy implementing BYOD, so it's not being implemented. (D6)

So our policy on educating students on these devices is failing. (D5)

Yeah and this is because policy can only do so much and is only as good as the person reading it... There is no resource on KAMAR at the moment. We do have inappropriate use of a device, but we need within that sub categories, the level of them, and what types of behaviours we are seeing. This would be very informative as we can see the data changing through the guidance access to KAMAR. (D6)

In focus group D (two out of six participants) and E (general agreement) frustration was expressed at student's sense of entitlement to access and use devices when they wanted, how they wanted.

The devices belong to the students so there is a 'sense of entitlement' to use them in their own ways. You have to be very clear through our device contract, which parents, students and teachers sign that students don't use them in ways that are in conflict with the devices. (D3)

According to participant D3 this could be countered by being selective in cues on where and when to use devices.

Three focus groups specified resistance (or a lack of acceptance) as a challenge amongst staff. All focus group A participants asserted that this gap in usage was due to staff being new to digital technology as a result of a staggered implementation. Alongside of this was a real fear from teachers, expectant that they needed to be able to use devices effectively before utilising them in class. Half of focus group B expressed frustration at getting staff to accept technology as this participant describes:

The challenge for me is acceptance – some teachers don't accept this technology and how it is going to help students learn. They are thinking more about themselves and how they can't learn how to use this technology in time to teach the students, and they refuse to learn from the students ... I don't know what to do because we're wasting so

much time persuading them to use it and losing valuable time on developing the tool.
(B4)

Time was a challenge for focus groups A, B and D. As this participant describes:

Slow down! I am ready to move forward with this, but I just need a bit more time and support and have the basics that I do acknowledged first before I extend what I do.
(D3)

Half of focus group B stated that the challenge was having time to absorb processes and consolidate new information.

Five out of six participants from focus group A claimed they were time poor in creating resources and units on a new and different platform. Participants would have liked allocated one off time, as well as time throughout the year to tweak programmes that could be shared amongst the department. One participant also articulated:

And the problem with technology is its changing so quickly so it would almost need to be a continuous time allowance. (A4)

Accordingly, participants requested a continuous time allowance to keep on top of technology in acknowledgement that as certain programmes are phased out and devices and assessment change, resources already produced may no longer be able to be used as stated by participant A5.

Half of focus group E stated they were focussed on preparing juniors for diverse styles of work in preparation for New Zealand Qualifications Authority (NZQA) online exams. As this participant explains:

Online, on demand assessment from New Zealand Qualifications Authority (NZQA). Stage two of their *Future State* ... I think they have definitely said by the end of five years everything will be online on demand. I think they will go electronic Mathematics Common Assessment Task (eMCAT) this year as a trial for schools, eMCAT next year for any schools that are interested. (E1)

This focus group felt the time pressure of preparing students for future assessments.

Have and have not was a reoccurring element amongst two focus groups. In focus group E, the topic of have and have not as described by three out of five participants included students as well as teachers. In regards to students this meant students who did not have devices or even the same device. There was general agreement also, that teachers could not assume that students would have devices charged, have access to internet at home or have access to broadband internet. The result of student have and have not was that it created have and have not amongst staff who chose to pay for a device out of their own money to cater for a range of student needs. In this participants words:

There is also not only the have and have not amongst our students, but there is have and have not amongst staff. We are all provided with a laptop, but someone making the choice to buy their own devices almost again creates a division, because someone who chooses to pay for that out of their own money, even though it is not required, because they feel the need for it, to stay up to date, to understand what the students are doing, again creates a division. (E2)

Have and have not was also discussed as an issue amongst departments in focus group A. As this participant contributed:

This is 16GB and this is in no way big enough for what I need. It doesn't even come close! But the school doesn't differentiate between your department and what you need. (A3)

Half of the participants of focus group B also experienced the challenge of student devices being different from teacher devices. Not having the same device caused lesson preparation issues as Participant B2 expressed:

If I had this device and sussed everything out prior it wouldn't have been an issue. Because I didn't have the specific device it was touch and go. (B2)

One participant each from focus group B and D stated the need to have back-up lessons available.

Professional development was an important element raised by three out of five focus group discussions. Four out of six participants in focus group A declared that approaches to professional development were inconsistent owing to incremental implementation practices, resulting in differing levels of use of devices amongst teachers. Three quarters of focus group

B expressed frustration at the lack of specific professional development linking IT. As this statement demonstrates:

There is frustration that there has not been enough Professional Development (PD) surrounding IT. Lack of specific PD linking IT. The PD we have is different cohorts, and one has a learning focus but still the same curriculum that everyone is doing, which is pedagogy and teaching which is good stuff but it's not like we should use the devices more. (B2)

This participant also expressed frustration about non acceptable professional development such as whole staff because it did not cater to individual needs. A solution offered by this participant was small groups. In his words:

We need smaller models where people come with their computers and say here's the task that you are going to do today. You get to do it and I will help you. (B2)

Three out of five participants in focus group E specified that provision of professional development would become increasingly complicated due to the variety of stages that people are at and the variety of teaching that people are using devices for. However, this focus group interjected that a tipping point for them was the school's commitment to focus on professional development for two years.

Striving to thrive

Striving to thrive is about successes that focus groups have experienced as a result of BYOD. The successes discussed were a strong sense of student ownership of learning, enablement of student voice through engagement and the uniting of staff due to shared experiences.

Three out of five focus groups pointed out that BYOD helped student learning. Two out of five participants of focus group E said that a success was that students have a much stronger sense of ownership of their learning and that whole cross curricula learning was being enhanced. As this participant describes in the following quote:

The whole cross curricula learning as well. It is enhancing it incredibly, because everything that we do in French now is very topical, its online, its news reports; it is linked to things that are going on in the world politically or socially. So for cross curricula learning it is because it is so much more real world bringing it into the classroom. Making the classroom not antiquated or separate to what is going on

outside the school. I think it just makes it much more fun for everyone, doesn't it.
(E4)

Two out of six participants of focus group A expressed the opinion that BYOD was better because it enabled teachers to email notes which students can adapt and change presentations to suit themselves as well as share note with others. The benefit as outlined by one participant was:

Yeah, if somebody is behind, or can't do it... somebody else can help them straight away or send them stuff. (A5)

Half of focus group D supported the idea that devices allowed engagement from students who would not interact in front of the class to interact electronically. This was stated as removing barriers between students and teachers and therefore a success according to participant D5. Two participants also linked this idea to seamless education. As this participant describes:

The seamlessness of education is the loop between teacher and student, constant feedback on blogs etc. hoping that student outcomes will be positively influenced.
(D5)

According to focus group C, two out of seven participants asserted that technology was a means of engaging students. As one participant stated:

The problem is how do we use IT in the classroom – well we use it to engage the kid, but that engagement comes from us. If we engage the student through learning then we have the hook. Technology is the hook, but it is us that engages them. (C2)

Two focus groups testified that BYOD had united staff. In focus group A, two participants said the tipping point happened when sceptics of the initiative showed commitment. As one participant stated:

A lot of sceptics came on board didn't they! (A5)

And three participants said that it was about buy in:

Because it is all about buy in like anything that ever happens at a school. (A1)

The success for three out of six participants of focus group A was the sharing across departments:

I think one success is really that we've actually for once shared things across department's maybe ... (A6)

In focus group E this feeling of being united was also shared by the entire group.

I also think that amongst departments there is more collegiality perhaps and there are two opposite ends of the scales. Staff that might not be in like a particular leadership role can feel like they are leading themselves. (E2)

According to participant E4, BYOD gave staff a sense of being on a journey together and because of shared experiences, conversations regarding BYOD could take place.

Section 3: Summary of key findings

For data to be entered into Table 4.3 the criterion was that the findings were noted in both the semi structured interviews and the focus group discussions, hence it could be called a key finding. Elements have been listed under each of the headings of both of these sections and link to the original research aims. Implementation practices refer to the reasons for BYOD implementation and implementation issues. Measuring quality is about evaluation issues. Overcoming adversities discusses challenges, while striving to thrive refers to success.

Table 4.3: Key Findings

| Headings | Key Findings |
|--------------------------|---|
| Implementation Practices | <p>Reasons for BYOD implementation</p> <p>a) BYOD is implemented to create a shift to student centred learning</p> <p>Implementation Issues</p> <p>b) It is important that teachers are supported through professional development while simultaneously introducing devices</p> <p>c) Professional development needs to cater for individual and organisational requirements centred on technology and pedagogy as well as being consistent and sustained over an extended period of time</p> <p>d) It is important that BYOD is considered a journey where educators</p> |

| | |
|------------------------|---|
| | <p>learn and make mistakes that are encouraged and supported</p> <p>e) Although BYOD is used to engage learners, if technology does not work the way it was intended, causing students and teachers to have a bad experience, it can cause disengagement</p> |
| Measuring Quality | <p>Evaluation issues</p> <p>f) Because BYOD was difficult to measure quantitatively schools could not unequivocally link use of devices to increased achievement in student learning</p> <p>g) Schools used a mixture of frameworks and surveys of students, teachers and parents to measure capability, capacity and device use and impacts.</p> <p>h) Quality of the BYOD initiative was measured using</p> <ul style="list-style-type: none"> - Surveys - Appraisal - Digital technology use models - The key competency of thinking <p>i) Key competencies such as participating and contributing (enjoyment, engagement, sharing) and managing self were a means of focusing and enabling learning</p> <p>j) Although BYOD impacts on skill sets that students learn such as key competencies, students were not yet coping with discerning or interpreting information and being critical users of technology</p> <p>k) Differing ability levels of teachers affect BYOD use in classrooms therefore linking BYOD effectiveness to appraisal was considered useful</p> <p>l) It is important to continue to promote reflective practice to promote quality and indicate areas of professional development needs</p> |
| Overcoming adversities | <p>Challenges</p> <p>m) Anti-social behaviour such as relating to others or using devices inappropriately were challenging. Establishing rules, systems and consequences as punitive measures and policies regarding citizenship combined with outside providers as preventative measures were useful</p> |

| | |
|---------------------------|--|
| | <p>n) Lack of devices, student devices that were different from teachers devices, and differences in access to devices and services hindered teaching and learning</p> <p>o) Overcoming resistance and encouraging acceptance can be supported through providing continual time as well as one off time allowances and combining this with professional development</p> |
| <p>Striving to thrive</p> | <p>Success</p> <p>Students:</p> <ul style="list-style-type: none"> p) Were able to learn in ways that suited them q) Were given a voice through collaboration r) Were engaged through communicating with teachers online and through having access to varied types of teaching s) Had access to varied types of learning <p>Teachers:</p> <ul style="list-style-type: none"> t) Learnt about learning creating pedagogical shifts in teaching u) Felt united through shared experiences and a sense of journey |

Chapter Five: Discussion, conclusions and recommendations

Introduction

This chapter discusses the findings reported in Chapter Four in relation to the literature presented in Chapter Two. The discussion is organised around the key issues of the research questions. The research questions are:

1. Why have secondary schools implemented a technological initiative called Bring Your Own Device (BYOD)?
2. a) How have schools implemented this initiative?
b) How have schools measured the effectiveness of this initiative?
3. What successes and challenges are these schools experiencing in relation to this technological initiative of Bring Your Own Device (BYOD)?

Conclusions have been drawn from the process of writing the discussion and by providing answers to these questions; recommendations for practice have been made.

Discussion

Reasons for BYOD implementation

The data collected from across the interviews and focus group discussions indicated that schools implemented BYOD to create a shift in learning to a focus on a student centred model. The result of a student centred model meant that students were able to learn in ways that suited them and access blended learning opportunities. Technology allowed students to be independent and access learning opportunities during and after school. Alberta Education (2012) concludes that when the devices that students use beyond the school day is the same one they use for school the students can seamlessly switch from personal use to learning anytime anywhere, a fact verified by interviewee one who stated that online curriculum could be delivered at home. Respondents described students as being able to self-manage their own learning as they were able to work at their own pace and have timely conversations with peers or teachers when it suited them. This also meant that students had the ability to be given a task and ownership of it. As participant E1 discussed, students could lead the learning and dictate the direction. Sweeny (2012) found that students in BYOD programs had become more self-directed learners. Participants commented that embedding technology in the curriculum created a shift in what students were able to do in their learning. The New

Zealand literature of Bolstad, Gilbert, McDowall, Bull, Boyd and Hipkins (2012) states structural unbundling of school practices can help to “loosen our grip on traditional ideas about teacher, school, or school system’ and explore how to deliver schooling in new and effective ways” (p. 9). Two of the emerging themes from Bolstad et al. (2012) literature are personalised learning and changing the script of rethinking learners and teachers roles to maximise the benefits of Information Communication Technologies (ICT). Data from this study confirms BYOD has created personalised learning such as students being able to work at their own pace, access learning anywhere anytime, and rethink learners and teachers role such as timely conversation with teachers when it suits students and during self-directed studies.

Leadbeater (2011) and Bolstad et al. (2012) write, student centeredness is about producing educational learning and success that is intimate to the person through engagement and motivation. The purpose of digital technology is to enable high interest and participation (Lai & Pratt, 2007; Ministry of Education, 2013). Respondents stated that the purpose of implementing BYOD was to engage students and allow access to varied learning opportunities. Good learning involves active engagement rather than spectator observation according to Bolstad et al. (2012) and the 21st Century Learning Reference Group (2014). The measurement of engagement and relevant current learning opportunities as described by participant E4, was achieved through surveys and informal observations and conversations between students and teachers. The consequence of technology infrastructure not working caused disengagement of learners and teachers and inability to access learning opportunities. This was contrary to the purpose of introducing BYOD into schools to engage and offer learners varied opportunities. Focus group participant C2 referred to technology as the hook of engagement. Therefore, to be able to use technology to engage learners and teachers, infrastructure must be able to be used for the purpose for which it is designed. This raises the importance outlined by interviewee five of planning infrastructure that meets human needs, and other interviewees’ needs of taking into account plans for continual upgrading of tools. According to Bolstad et al. (2012) although many schools now have, on the whole, better infrastructure and access than previously, schools still believe they are constrained by these issues (Bolstad et al., 2012).

To fulfil the aims of achieving student centeredness through engagement and varied learning opportunities, schools identified that throughout the BYOD initiative commitment of staff was required. To gain buy in and commitment from staff professional development that aligned to goals was necessary. From the findings it was deduced that all schools had three strands of professional development in common. Individual, school focused and external professional development were considered a necessity within a schooling system. All schools stated that individual professional development or development in small groups that was targeted at ability was considered advantageous for technical and skill development. While school wide professional development could be a show and tell situation of how technology was used in individual classes, the main focus was on pedagogy and cross curricular alignment to goals of the institution and big picture goals of the initiative. Professional development that is external to the school means the interlinking of schools through clusters, or professional learning groups that could be local or online to develop innovations and solutions to common issues as well as promote successful use of technology. An example of this is the Ministry of Education (2006) e-learning Action Plan for Schools that asserts understanding and connectivity to vision and pedagogy can be developed through professional development and interaction with cluster programmes. One school acknowledged they would have liked allocated staff time on one day of the week to focus on technical and pedagogical issues. School E and D implemented professional development at the same time as they initiated BYOD, but only one of these focus groups was more positive in their outlook of implementation than all of the others.

Although all schools implemented the three forms of professional development in various forms and varying degrees, the point of difference that may be the reason for the more positive outlook of school E could be the result of leaders, managers or co-ordinators catering to both the needs of the individual (allowing a half hour time slot during the week) and organisation (a mix of departmental and staff development) on a scheduled basis that was solely focused on blended learning. A key point considering this emphasis on professional development that was noted across interviewees and focus group participants was the consensus that professional development needed to be sustained throughout the initiative to help teachers use technology wisely in the classroom. This is a growing theme in New Zealand literature which discusses the need for a technology initiative introduction to be paralleled by opportunities for professional development over time that allows it to be used purposefully and in educationally orientated ways (Bolstad et al., 2012; Wright, 2010).

Two schools, O and D, used data from behavioural interventions to measure effectiveness of the implementation of programmes regarding personal safety and responsibility online. Interviewees of school D discussed a drop in behavioural interventions since the introduction of devices, whereas focus group discussion participants stated that policies were not being implemented. The gap between perceived effectiveness could be a result in the type and quality of data that is required to inform interventions as outlined by participant D6 who requested sub categories within a data management system on levels and types of behaviour device use is presenting. This highlights the fact that device use has both positive and negative potential. Within this environment schools are legally obliged to provide a safe learning environment for everyone in the school community (Butterfield, 2003; Fenaughty & Harré, 2013). Therefore policies need to be enacted to ensure devices are used for the purpose for which they were implemented, that is teaching and learning.

There was alignment between some interviewees and focus group participants that it is important that BYOD is considered a journey where it is acceptable for educators to make mistakes and learn from them. Those in leadership roles such as leaders, managers or co-ordinators within schools recognised that making of mistakes needed to be encouraged and supported during change in what Fullan (2001) would describe as a naturally occurring element of this process. As stated by Cardno (2012) from an organisational culture perspective the “leader has to model learning, support learning, encourage learning and facilitate learning so that the rightness of learning permeates the approach taken by all members of the organisation as they go about solving their problems” (p. 40). Participants of focus group discussions referred to this process as a journey. The impact of this alignment according to several authors is a result in changes of behaviour and an increase in the learning capacity of individuals, teams and organisations (Holyoake, Sturko, Wood & Wu, 2012; Sun & Scott, 2003). Schools were at different stages on a journey towards achieving their overall purpose of focussing on a student centred model and making available support structures such as infrastructure and professional development to encourage and facilitate a shift in learning.

Evaluation issues

Interviewees and participants alike described the struggle of linking effectiveness of a BYOD initiative to increased achievement in student learning. Having no control group made data use difficult for school D, because BYOD was introduced as compulsory across each consecutive year level they were unable to get a fixed difference in achievement data. As well as school E and D stating that achievement data across cohorts vary, interviewee six commented that using data may not be successful because the way technology is used is not static, the system is changing internally making it difficult to compare data. Babic (2012) wrote that it was too soon to know the impact on test scores and was unable to describe how to link the impact or effectiveness of BYOD to data results. In fact Lai and Pratt (2007) and Mello (2006) comment that there is no conclusive evidence that ICT has universal benefits. Despite the difficulty of being unable to determine beyond a doubt that differences in achievement were linked to devices, schools were attempting to use data to measure impacts. Two schools stated they used The National Certificate of Educational Achievement (NCEA) for measuring impacts of devices on learning, but only school D respondents were able to describe how they were doing this in detail in their first senior group since BYOD was implemented. The tentative results indicated that BYOD had a positive effect on student learning. The point being made is even though BYOD is in its infancy regarding measuring impacts on achievement it is important that quality is measured tentatively at first so schools can evolve evaluative measures alongside initiatives (Brinkerhoff, 2002; Stake & Schwandt, 2006). It is not important to have all the answers, rather to be seen as attempting sensibly conceived evaluation activities which may add to the quality of, and viability of schools (Razik & Swanson, 2001).

Alberta Education (2012) in its document about *Bring Your Own Device: A Guide for Schools* states that schools “must collect descriptive and anecdotal as well as quantitative data of the results” (p. 59). Schools used surveys to measure school wide effectiveness and quality. According to focus group discussion participants of School B, C and E, staff surveys measured capability and capacity. School E respondents said they used the e-Learning Planning Framework (eLPPF) (Ministry of Education, n.d) as a first step measure to gauge where the school is at regarding their e-learning capability. School C was using the National Association of Advisors for Computers in Education (2006-2014) (NAACE) framework to see how the school compared to others in tracking indicators of effective ICT use. Only school C stated staff surveys were completed at the end of each professional development

rotation regarding the quality and value of the professional development being provided. Surveys of students were used extensively to investigate and examine device use and impacts on student outcomes. The most clearly articulated evaluation was stated by interviewee four who said he was looking for specific articulation of behaviours that matched the schools vision and goals. Sinemma and Robinson (2007) state that it is important that teachers inquire or adapt strategies that will help their students succeed and this can be achieved through evidence of “how students talk about their understanding of what they are supposed to be learning” (p. 326). Surveys of parents and communities were poor with only one out of five schools having surveyed parents or communities with one more intending to complete this in Term Four. This is contrary to Alberta Education (2012) which strongly recommends an opportunity at the end of the first year for students and staff to voice their opinions. The focus of the initiative was on a shift to student centred learning and teaching and this may have been the reason that students and teachers were the most surveyed stakeholders. However, due to the interlinking components of an initiative, Stavert (2013) suggests the use of a holistic approach in evaluation.

Respondents mentioned that the initiative had wider goals to do with the skill sets that students were learning rather than being able to measure the impact of BYOD on student learning outcomes. This skill set was linked to the key competencies of the New Zealand Curriculum (NZC) such as managing self, relating to others, participating and contributing and thinking. Thinking was regarded as an indicator of quality amongst participants. According to the Ministry of Education (2007) this is defined as “analyse and consider a variety of possible approaches to the issue at hand” (p. 38). This fitted into interviewees’ and participants’ explanations of understanding concepts rather than information content, discernment, higher order thinking and being critical users of technology. This finding supports research conducted by Schwartz and Schmid (2012) which identifies high quality learning as being capable of transference to new problems and applications beyond original contexts. The purpose of digital technology is to scaffold this type of learning (Schwartz & Schmid, 2012). Respondents discussed quality as being measured through best practice models such as Substitution Augmentation Modification and Redefinition (SAMR) (Puentedura, 2013) and Structure of the Observed Learning Outcomes (SOLO) to extend learning (Biggs, 2012; Hook, 2012). However, an area for concern was the acknowledgement, more prominent in focus group discussions than interviews, of an existing gap in this expectation: that learners had not yet reached the stage of critical discernment.

Sweeny (2012) and Wright (2010) recognise the importance of teaching students how to use technology in purposeful and educationally oriented ways. Wright (2010) states that just having digital technology is not enough to cross this gap; teachers must actively facilitate the integration of devices to promote improvement. One school in this study was implementing project based learning at the junior level to embed digital technology to discern concepts.

Participants in this study mentioned that existing systems of staff appraisal could be used to evaluate the effectiveness of teachers' work in implementing the BYOD initiative. This research raises questions regarding how to link appraisal or performance management strategies to measuring the effectiveness of the BYOD initiative. Using appraisal as a response to gaining buy-in or commitment from staff was a high priority for interviewees. Interviewees wanted to be able to enforce the use of devices so that staff did not opt out of BYOD. An obvious purpose of performance appraisal is to make people accountable for their performance (Cardno, 2012). O'Neill and Scrivens (2005) write that performance management systems constitute an exercise of power where the purpose is to encourage conformity rather than to punish. The reasoning behind linking appraisal to buy-in was that teachers were at different ability levels which affected device use in class. Many authors cited in Sinemma and Robinson (2007) study explain variation of student achievement as being dependent on variations in teaching quality, therefore it makes sense to view evaluation as a context in which to investigate and improve the quality of teaching.

Sinemma and Robinson (2007) comment that the vast majority of indicators, designed to measure improved student learning in evaluation policies, actually support evaluation of specific teacher behaviours. To be able to use devices in a purposeful, educationally orientated way, interviewees expected some level of technical ability, which not all teachers had. This could be seen in the viewpoints expressed by three interviewees regarding skill sets required by teachers. One interviewee expected teachers to be already digitally competent and others expected to offer change management strategies that involved support and time. Even Sweeny (2012) acknowledges that not all teachers can cope with technology. In the case of one school in this study, the appraisal system incorporated an introductory step of technical expertise before educators could become pedagogically competent. In other words educators needed to know some basics on how to use the device before they could use it for teaching. Therefore interviewees were incorporating technical requirements of staff as a first line measure of effectiveness. The types of appraisal tools that some interviewees were

discussing were tick box criteria that were used to measure teachers technical competencies. But there are two elements that literature exposes, firstly teachers can be judged to be good if they model the desired practices irrespective of whether students learn. Secondly, an issue can be that a checklist presumes to know in advance of any context-specific inquiry how a particular teaching episode will affect students. For example educators in Sinemma & Robinson's study were convinced if they encouraged things such as participation then students would inevitably be learning. Interviewees were aware of this differentiation, which was demonstrated in a comment that just because students were engaged did not mean that they were learning. The danger with treating appraisal in this light as a checking mechanism is that it may become an administrative compliance task rather than being used for instructional improvement (Sinemma & Robinson, 2007).

The Ministry of Education (2006) wants the implementation of appropriate monitoring and evaluation that enables educators to modify and improve their current practice in order to know if investments in e-learning are making positive differences for students. Bolstad et al. (2012) state if people are genuinely engaged in unpacking and questioning current practice, they are likely to recognise that there is a need to do things differently, a fact that the interviewees support. On the one hand, some focus group participants liked the fact that BYOD was not linked to performance as it gave them opportunity to explore and use innovate teaching practices. Yet on the other hand, they also recognised that effectiveness of BYOD could be linked to appraisal due to the in-depth quality conversations and reflective dialogue that appraisal promoted in regards to achieving goals. This is supported by Cardno (2012) who writes that dialogue leads to learning and change. This is achieved through a valued appraisal system that generates information and insights to guide decision-making about professional development. Respondents discussed the generation of information as conversations between colleagues, teachers, and students and also in the collation and analysis of survey information. Sinemma and Robinson (2007) advocate that teacher evaluation is an ideal opportunity for educators to inquire, act and improve teaching and learning, but not to prescribe or checklist such qualities. They state that teachers would be much more motivated by a system that had a "strong developmental focus on assessing and growing teachers' capacity to continuously evaluate and strengthen the impact of their instructional strategies" (p. 338). This definition finds favour with Alberta Education (2012) who write with a BYOD focus, of the need for increased professional development alongside

of support structures to integrate personally owned devices into the curriculum and instruction.

Challenges

Technology devices come in many shapes and forms, for example laptops, netbooks and smartphones. This difference in devices was one of the on-going challenges identified throughout the research findings in focus groups as hindering teaching and learning. The impacts of this were threefold. Firstly, as described by participant B2, devices that were different from teaching devices meant that teachers faced challenges in lesson preparation. This created more work for teachers as they felt the need to have alternative paper lessons prepared in case a lesson did not work out as expected. One of the definitions provided within the New Zealand Curriculum (NZC) (2007) defines equity as inclusivity. Bolstad et al. (2012) refine this further to include learning opportunities that encompass everyone's variation and pathways to succeed. Secondly, the lack of differentiation in devices between departments as described by participant A3 meant that at times devices did not meet departmental needs. Participant E3 introduced the idea that although teachers stated the school provided devices some felt the need to purchase their own device in order to stay up to date and understand what students were doing. This reinforces Elkin, Jackson and Inkson's (2008) perspective that recommends leaders clearly communicate plans for change and involve and support those on the receiving end to adjust to change. Thirdly, differences in devices or lack of devices may result in pedagogical goals not being met as interviewees explained in their views regarding transformative versus personalised learning. These three issues impact on teaching practice and highlights Sweeny's (2012) advice which strongly recommends basing decisions on a BYOD model for the school based on pedagogy, user benefits and drawbacks.

Resistance to change was one of the issues that arose from the findings of interviews and focus group discussions. The issue with educators who do not embrace e-learning is they are unable to maximise learning opportunities for their students (Kaye, 2012). Although the respondents mentioned that the number of resisters was few, it still created problems within the schooling system. There was alignment between interviews and focus group discussions as to why schools implemented BYOD. However, resistance was described by participants as the gap between the vision and the practicality of achieving goals in a professional setting. These findings also mirror Bolstad et al. (2012) who state that one of the reasons that practice

does not change is because teachers do not see how or why ICT can ‘fit’ into teaching practice due to the lack of clear links to the ‘big ideas’ about transforming education. An example of this was participant B4 who stated that teachers were fearful of technology and they were unable to understand how to use technology purposefully in a classroom setting. Fear, as Mello (2006) describes, is the disruption of the teachers image of being competent and knowledgeable. Leadbeater (2011) suggests that collaborative internal cultures that confront and dislodge entrenched ideologies generate growth.

Time was a challenge for respondents. Focus group participants wanted time to absorb processes and consolidate new information. Participants claimed they were time poor in creating resources and units on a new and different platform and would have liked allocated one off time, as well as continuous time allowance throughout the year to tweak programmes and keep on top of technology developments. Literature states that the purpose of common planning time is to invest in improving teaching quality (Miles & Frank, 2008; Robinson, Hohepa & Lloyd, 2009). Cowie, Jones and Harlow (2011) identify that varied opportunities of time is the most common support need of teachers. Likewise Alberta Education (2012) and Bolstad et al. (2012) suggest that time focusing on professional development to redesign lessons, instruction and technical support should be provided and sustained over the initiative.

Future challenges for schools were to continue to embed technology into the 21st Century. Two schools stated that project based learning, aided by technology, will be used to form stronger links between curriculum areas and across units in the future. Wright (2010) and Cowie et al. (2011) state that devices have the potential to enhance co-constructed and socially orientated practices across systems. The challenge for schools is to move from a traditional environment to a future orientated environment in which BYOD enables a systems change where timetables and curriculum are flexible. Literature as far back as 1999 has stated that effective use of technology is to be used to support systemic changes (Culp, Hawkins & Honey, 1999). The key point is that technology by itself will not bring about change, educators are required to rethink and redesign approaches to facilitate change (Culp et al., 1999; Garrison, 2011; Vaughan, Cleveland-Innes & Garrison, 2013). It is therefore important that as well as a plan, and purpose to implement BYOD, educators should also include a vision.

Successes

This research reveals that there were a number of successes that the BYOD initiative enabled. The two that were most prominent and interlinked across both the interviews and focus group discussions were the ideas of collaboration and student voice. Interviewees discussed staff as encouraging student voice through coming up with particular ways of doing things. In one school this was through blogs. Literature suggests that collaboration in a digital setting is the purposeful joining of people in an online environment where people have opportunities to work together (Lai & Pratt, 2007; Vaughan et al., 2013). Research respondents expressed that using various online forums was a way for students who did not usually contribute in class to communicate. Student voice meant allowing communication between the student and the teacher as well as allowing students to have a say in a global forum. The benefits of positive acknowledgement of student contributions eventuated in them becoming more active participants in class. BYOD is about creating confident, connected and actively involved individuals which is the vision of the New Zealand Curriculum (Ministry of Education, 2007).

As a result of shifting to a student centred approach, the data collected from across the interviews and focus group discussions indicated that educators learnt about learning which meant a shift in pedagogy. This is in contrast to a study by Lai and Pratt (2007) which states “The most obvious effects did not include changes in teaching or philosophy or pedagogy but rather increased efficiency of management and administration of teaching, including lesson preparation and presentation” (p. 95), yet it is consistent with recent literature from several authors (Bolstad et al., 2012; Jonassen, Carr, & Hsiu-Ping, 1998; Schwartz & Schmid, 2012). This contradiction of perspectives may be explained by recent innovativeness in technology that has allowed a shift “from a model of task-anchored sets of skills, to skills where technology tools can lead to the invention of new and innovative products” (Schwartz & Schmid, 2012, p. 238). For example, a participant in one focus group discussed PowerPoint as using technology but not extending learning or making use of other resources that are available with the use of devices. Stavert (2013) refers to teachers asking students to deliver using PowerPoint as the teacher controlling the way students deliver knowledge and states that asking students to “demonstrate your knowledge of X” is the point where the teaching model changes to student centeredness (p. 9). However he notes few teachers or students are well versed in that type of education. Participants linked technology tools to changes in pedagogy such as the underpinning of pedagogical beliefs, the varied types of teaching and

learning such as online collaboration that were enabled, and upskilling practice to advantage teachers' teaching and the way students learn.

Respondents said that a success of the initiative was that staff felt united through shared experiences and a sense of journey. Uniting elements were that staff shared things within departments as well as across departments more often than in the past, creating a deeper sense of collegiality. It also created a sense of pride in those who were not in a leadership role but who were able to share skills with other staff members. Cowie et al. (2011) state that BYOD involves a variety of people and groups with different roles and responsibilities causing distributed leadership. Conversations regarding BYOD could take place because of shared experiences which created a sense of journey, as staff were able to help and learn from others. An example of this in one school was the process of a professional development day at the beginning of the term where staff presented to one another the things that they were doing in their classroom with BYOD. The tipping point of sceptics of the initiative showing commitment, gave staff justification for their reasons for implementing BYOD. This strongly aligns with Fullan and Miles (1992) perspective when they point out that a shared and continuously shaped and reshaped vision is central to reform and ownership of it.

Conclusions

While the issues of implementation practices, evaluation, challenges, and successes of a Bring Your Own Device (BYOD) initiative have been discussed as separate entities, the connected nature of these issues cannot be understated. In attempting to make sense of the research findings it is interesting to note that Fullan and Miles (1992) and Alberta Education (2012) confirm that the issues are essentially intertwined with multiple starting and turning points. Therefore, the drawing of conclusions is done so with acknowledgement of the complex nature of these issues across all levels of the schooling system.

The first conclusion is that before implementing an initiative leaders, managers, co-ordinators or educators in charge, need to decide on a vision (Fullan & Miles, 1992; Kotter, 1996; Sweeny, 2012). BYOD causes schools to face major changes across both people and systems. Many authors state that BYOD is important in regards to teaching and learning (Bolstad et al., 2012; Hayes, 2007; Stavert, 2013). The key point that respondents and literature acknowledge is technology by itself will not bring about change, educators need to facilitate

the vision and purpose for its implementation (Culp et al., 1999; Garrison, 2011; Vaughan et al., 2013).

Once a decision on a vision has been made, planning needs to begin that aligns the vision to the practicality of the implementation (Fullan & Miles, 1992; Kotter, 1996; Sweeny, 2012).

The implication for practice is that infrastructure and technology must allow educators to be able to do what they need it to do. A conclusion is therefore that educators need to make sure that they clearly communicate plans for change and involve and support those on the receiving end to adjust to change by providing appropriate technology and tailor made professional development that suits individual and school needs. For example these respondents stated that schools have provided teachers with a computer (TELA scheme), but teachers devices do not necessarily match student devices. Students are allowed in some schools to bring their own devices since schools believe that it is an equity issue to make them buy new ones if they already own devices. Teachers should also be able to use this reasoning and be allowed to bring their own devices and use school resources such as Laptops in schools (Cowie et al., 2011) to purchase devices that are the same or similar to students. As some literature states, the more standardised the device the easier it is for teacher practice in terms of lesson preparation and technical support (Alberta Education, 2012; Stavert, 2013; Sweeny, 2012).

BYOD is about creating confident, connected and actively involved individuals. This study has discussed the BYOD initiative as allowing students to collaborate online and enabling them to contribute and communicate in ways that traditionally they would not have been able. The implication for practice is for students to act in this way they need to feel safe and supported in an online environment. It can be concluded that practices of educators that support consequences for actions, preventative measures and evaluation of effectiveness of the measures in place are therefore required. This is an issue for teachers practice because staff need to be given strategies on how to deal with cyber misuse or abuse, as well as including a whole school approach that highlights everyone's responsibility for behaviour management and citizenship (Fenaughty & Harré, 2013). Respondents have pointed out it is not a standalone issue separate from context. It is not enough to simply have policies regarding citizenship, policies must be monitored and evaluated for them to be effective with verifiable data that informs practice (Colless, Lewis & Savage, 2011). A conclusion is therefore that data management systems be used to track behaviour to inform evidence based

decisions regarding effectiveness of policies that relate to BYOD and purposeful interventions that may be required (Colless et al., 2011).

Since one of the reasons educators say that they are implementing BYOD is to cause a shift from teacher centred to student centred practices, then the implication for practice is that they need to know how to create this shift and simultaneously support and evaluate it. The issue is these initiatives are so new we are currently unable to measure their impact on learning (Lai & Pratt, 2007; Mello, 2006; Ministry of Education, 2007). Therefore, schools need to take a holistic approach to evaluating the BYOD initiative (Stavert, 2013) that includes both qualitative and quantitative data analysis (Alberta Education, 2012). Anecdotal and descriptive information on effectiveness and quality can be sought through regular surveys of all stakeholders (students, parents and communities), especially at the end of the first year (Alberta Education, 2012). This information can then be used to steer professional development that scaffolds learning using devices to promote student centred practices (Jonassen et al., 1998; Schwartz & Schmid, 2012; Wright, 2010). Quality and effectiveness of a BYOD initiative will be realised when a combination of evidence and behaviours are articulated that match the school's vision and goals.

Respondents concluded that professional development that focused on how technology and pedagogy were linked was most effective in benefitting the transference of learning into a classroom situation. Schwartz and Schmid (2012) discuss teachers as the 'touch points' through which students experience quality learning. While the Ministry of Education (2006) e-learning Action Plan talks about understanding and connectivity to vision and pedagogy which can be developed through professional development and interaction with cluster programmes. If an initiative is considered important then it must be seen to be of value by being backed up and supported through sustained time (Alberta Education, 2012; Bolstad et al., 2012). Leaders need to allocate time for personal and professional development as one offs and continual time allowances throughout the initiative. Strategic schools use investment in common planning time to improve teaching quality (Miles & Frank, 2008).

Appraisal could be used as an opportunity for leaders to gain buy-in and commitment from staff if the focus is on inquiry into improving teaching and learning, without prescribing or check listing behaviour (Alberta Education, 2012; Sinemma & Robinson, 2007). It is important that appraisal facilitates dialogue that encourages learning and change and

decisions that arise from this are supported by professional development (Cardno, 2012; Stoll, Fink & Earl, 2003).

Recommendations

These recommendations are linked to the conclusions in relation to implications for the way schools might change their practices.

A recommendation of this study is when leaders, managers or co-ordinators set up a BYOD initiative they have to be absolutely clear as to the purposes and the reasons why they are doing this so that this can be continuously monitored as a way of evaluating quality. Boyd (2002) states “Successful implementation is not simply a technical issue. It requires a vision about education and about the specific educational goals that ICT is to support” (p. 54). When specific educational goals are stated then it is more likely that educators are able to discern and measure quality (Stake & Schwandt, 2006). Literature asserts that quality is an anchor to programme understanding (Stake & Schwandt, 2006).

The second recommendation is that a BYOD initiative requires a plan for its evaluation to be set up at the time it is introduced. This plan should include both regular monitoring of the initiative by those with responsibility for it and also periodic review involving all stakeholders. One aspect of monitoring the success of implementation could involve the use of an existing performance appraisal system. If appraisal is being used to evaluate an initiative then it is important that the focus is on teaching and learning and that prescribed technical standards be avoided (Sinemma & Robinson, 2007). Rather a focus on identifying the capabilities of best practice for schools to work with would be ideal (Cardno, 2012) as this would allow for flexibility and for the needs of individuals and schools to be individually addressed. Schools need to take notice of success and challenges as a means of informing practice.

A last recommendation would be that leaders, managers or co-ordinators commit to a professional development programme that is sustained throughout an initiative to enable tools to help overcome challenges and promote opportunities for success amongst individuals and the organisation (Bolstad et al., 2012; Wright, 2010). For BYOD initiatives to work effectively staff need to be supported, encouraged to make mistakes and be able to learn about what works and why based on evaluative evidence (Stoll et al., 2003).

Areas of further research

An area for further research could be an investigation into an effective appraisal system within a BYOD initiative that makes use of best practices encompassing technical aspects of scaffolding teaching and learning. Since one of the purposes of appraisal is to inform professional development, knowing and understanding this technical aspect would be useful for informing future development and practice.

This study has evaluated the implementation practices, evaluation of quality and successes and challenges of a BYOD initiative from the perspective of educators and teaching. However, students are also impacted by initiatives introduced into schooling systems. Therefore, another area of future research would be to listen to what students have to voice regarding the effectiveness of a BYOD initiative, as what students may consider successes or challenges may or may not match educator's perceptions. Lack of student voice as learners within this study of the effectiveness of a BYOD initiative could be considered one of the limitations of this study, as BYOD initiatives indicate shifts in teaching and learning

Limitations and strengths

Geographically this research was limited in order to make the study manageable for the researcher. Therefore, schools that were able to be conveniently accessed were used. Subsequently, findings were narrowed down to the geographic location of New Zealand cities. Research conducted outside of these areas may have resulted in different findings.

Another limitation of this research was that although five schools were used, all were of a similar high decile rating. Despite the researcher not limiting this study to specific deciles, only the higher decile schools accepted this study being conducted with their teachers, leaders, managers or co-ordinators. Thus, research conducted in schools of lower decile ratings may have produced differing results from the ones found in this research.

A strength of this study was that educators were able to volunteer to participate in focus group discussions. It allowed the researcher to recognise selection bias and include groups of people who were also impacted by the implementation of the BYOD initiative. This meant that pastoral carers, who were initially excluded, were able to be included. Consequently, it does mean there is restricted input regarding pastoral carers compared to teacher input in this study which may be considered a limitation.

A strength of this research is that it gained the perspectives of leaders, managers, coordinators and an ICT Committee through the use of interviews, and teachers, deans, and a guidance counsellor through the use of focus group discussions across five secondary schools. Obtaining multiple points of view provided a wide variety of perspectives, allowed data to be triangulated and therefore, provided findings which demonstrate trustworthiness and rigour, and may be transferable to other school settings.

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Appendices

Appendix A: Semi structured interview – Question schedule

EDUC9986 – Thesis

INVESTIGATING THE INITIATIVE OF STUDENTS BRINGING THEIR OWN TECHNOLOGY DEVICES INTO NEW ZEALAND SECONDARY SCHOOLS

MODEL (SEMI-STRUCTURED) INTERVIEW SCHEDULE

Leaders, managers and / or co-ordinators of the BYOD initiative are the target audience of the semi structured interview.

IMPLEMENTING A TECHNOLOGY INITIATIVE (Why /How?)

1. Why did this school implement the ‘Bring Your Own Device (BYOD)’ initiative?
2. Describe how you have implemented BYOD at your school?
3. How has teaching and learning changed because of BYOD?
4. What is the most important benefit your school got from implementing BYOD?

EFFECTIVENESS OF BYOD IMPLEMENTATION

1. What in your environment did you use or access that helped this implementation process?
2. Were there any special incentives, rewards, job objectives, work requirements, or so forth that contributed to your implementation process?
3. How do you co-ordinate BYOD development across the school / within subjects?
4. How do you sustain changes in your BYOD environment / administrative procedures?
5. How do you build confidence and capacity to lead and manage change to make use of the benefits of BYOD?

BYOD EFFECTIVENESS

1. What processes are used to evaluate your BYOD initiative?
2. How do you measure the outcomes of your BYOD initiative?
3. Who evaluates your BYOD initiative?
4. Does the evaluator make judgement calls on the outcomes?
5. How do you know that your BYOD initiative is providing quality to your stakeholders?

SUCCESSSES AND CHALLENGES OF BYOD

1. What parts of the BYOD initiative in your opinion did not work so well for this school?
2. How are potential problems / impacts detected?
3. How do you prevent these problems / impacts from reoccurring?
4. If you were able to advise other schools of some pitfalls of BYOD what would they be?
5. What advice would you give to avoid these pitfalls?
6. What parts of the BYOD initiative in your opinion worked well for this school? Why?
7. Was there a tipping point for success? If so what was it?
8. Where to next? What do you see as your next steps?

Karen Baker (Student ID: 1411961)
EDUC9986: Interview Protocol
Ethics reference number: 2014-1044
Start date: 26.6.14 Finish date: 26.6.15

Appendix B: Focus group discussion – Question schedule

EDUC9986 – Thesis

INVESTIGATING THE INITIATIVE OF STUDENTS BRINGING THEIR OWN TECHNOLOGY DEVICES INTO NEW ZEALAND SECONDARY SCHOOLS

MODEL FOCUS GROUP DISCUSSION SCHEDULE

I will be targeting teachers from within selected schools, who are involved in the Bring Your Own Device (BYOD) initiative. I will be using a focus group discussion with open ended questions that encourage interaction between participants in an attempt to answer research questions.

IMPLEMENTING A TECHNOLOGY INITIATIVE (Why /How?)

1. What is the schools current vision or goals in using technology?
2. Who or what helped you to use technology in the classroom?
3. What is your philosophy of the use of digital technology in the classroom?
4. How is technology used innovatively?

EFFECTIVENESS OF BYOD IMPLEMENTATION

5. What would you describe as an acceptable user experience?
6. How is the effectiveness of technology use measured in your school?
If not measured, how do you know the schools goals or vision are being met?
What could be used as measures?
7. How does your evaluation of digital technology link to the schools vision or goals?
8. How do these measures of digital technology contribute to quality education?
How do you know that these measures are not ‘tokenism’ but are providing quality?
9. Who makes these judgements? What are these judgements based on?

SUCCESSSES AND CHALLENGES OF BYOD

10. What challenges are your school experiencing in relation to this technological initiative?
11. What successes are your school experiencing in relation to this technological initiative?
12. Was there a tipping point for success? If so, what was it?
13. Where to next? What do you see as your next steps?

Karen Baker (Student ID: 1411961)
EDUC9986: Interview Protocol
Ethics reference number: 2014-1044
Start date: 26.6.14 Finish date: 26.6.15

Appendix C: Focus group discussion – Information sheet



INFORMATION SHEET FOCUS GROUP DISCUSSION

Title of Thesis:

Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools

My name is Karen Baker. I am currently enrolled in the Master of Educational Leadership and Management degree in the Department of Education at Unitec Institute of Technology 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

1. Examine why and how secondary schools are implementing a technology Bring Your Own Device (BYOD) initiative.
2. Investigate ways in which schools evaluate the effectiveness of the BYOD initiative.
3. Identify successes and challenges associated with a technological initiative of Bring Your Own Device (BYOD).

I request your participation in the following way.

I will be collecting data using a focus group discussion schedule. The focus group discussion will be approximately one hour in duration. It will be held in your school at a mutually suitable time that takes into consideration your needs. Your expertise is valued, therefore rules such as respecting what others say, keeping all matters discussed as confidential and remaining within the group are vital to the success of this focus group discussion.

I will ask you to sign a consent form regarding this event. Neither yourself nor your organisation will be identified in the thesis. You are entitled to refuse to participate at any stage, for whatever reason, and to withdraw data up to the stage when analysis of data has been completed. I will be recording the focus group discussion, and will provide a summary of findings for you to check before data analysis is undertaken.

I am able to provide a copy of the thesis to you upon completion and hope that this will be of use to you. I do hope that you will agree to take part and that you will find this participation of interest. If you have any queries about the project, you may contact my supervisor at Unitec Institute of Technology.

My supervisor is Professor Carol Cardno and may be contacted by email or phone.
Phone: (09) 815 4321 ext 8406 Email: ccardno@unitec.ac.nz

Yours sincerely

Karen Baker

UREC REGISTRATION NUMBER: 2014-1044

This study has been approved by the Unitec Research Ethics Committee from 26.6.14 to 26.6.15. 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 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix D: Consent form - Adult



CONSENT FORM - ADULT

DATE:

NAME OF PARTICIPANT:

FROM: Karen Baker

RE: Master of Educational Leadership and Management

THESIS TITLE: Investigating the initiative of students bringing their own technology devices into New Zealand secondary schools

I have been given and have understood an explanation of this research and I have had an opportunity to ask questions and have had them answered. I understand that neither my name nor the name of my organisation will be used in any public reports. I also understand that I will be provided with a transcript (or summary of findings if appropriate) for checking before data analysis is started and that I may withdraw myself or any information that has been provided for this project up to the stage when analysis of data has been completed.

I agree to take part in this project.

Signed: _____

Name: _____

Date: _____

Email Address: _____

UREC REGISTRATION NUMBER: 2014-1044

This study has been approved by the Unitec Research Ethics Committee from 26.6.14 to 26.6.15. 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 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.