Leadership in Digital Technology
The Challenge of Decision Making

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A thesis submitted in partial fulfilment of the requirements for the degree of Master of Educational Leadership and Management 2012
Declaration

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This thesis project entitled, Leadership in digital technology: The challenge of decision-making is submitted in partial fulfilment for the requirements for the Unitec degree of Master of Educational Leadership and Management.

CANDIDATES DECLARATION

I confirm that:

This Thesis Project represents my own work;
Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2011.1198 , 29 July 2011.

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Abstract

This research investigated the perceptions of decision-making in the use of digital technologies by three secondary schools, leaders and teachers. In the use of digital technology teachers in these schools understood it to mean how data was captured, stored, manipulated, produced and distributed digitally as mass media. In the context of education digital technological devices offered a host of opportunities in the teachers’ repertoire of instructional tools. With so many innovative web-based ICT resources and DT devices being used in secondary schools, subject specific departments were literally free to pick and choose from a range of digital resources they saw fit for class instruction that enabled students to be captivated and engaged in their learning. For leaders charged with sanctioning budget requests for both ICT and digital technology resources a level of expertise, knowledge and jurisdiction in how these resources supported classroom instruction needed to be examined.

Through the use of a qualitative multiple site case study research method the aim in addressing how digital technology decision-making was undertaken and the challenges school Principals and digital leaders were faced with in supporting digital technology presented recommendations that gave evidence to support these issues.

The importance for digital leaders to be placed strategically within a schools senior decision-making structure was a major recommendation when viewed against the bond of a mutual trust relationship with the digital leader and senior school management. The digital leaders’ position was surmised to hold a level of distributed leadership where the digital leader held expertise and knowledge in all things pertaining to the school’s digital infrastructure, teaching devices along with the array of software and programmes used by digitally competent staff. Having knowledge of how students learn, the diversity of curricula content, comprehending the needs of competent teachers in digital technology and maintaining communication with IT support personnel was integral to leading digital technology systems within schools.
Professional development was essentially the envelope needed to surround the concept of sustained support and development of skills in the use of digital technology. The importance of providing leadership to the digital leader was paramount for schools wishing to utilise having such a leader in this field. Ultimately the mutual trust relationship between the Principal and digital leader was dependant on the recognition of expertise and knowledge the digital leader had, and the confidence by the Principal that the direction and support of digital technology was for the benefit of improved student engagement and learning in the classroom. What had yet to be fully realised from this investigation was the pedagogy behind the use of digital technology for improved student engagement and learning. The link to pedagogy and digital technology was tenuous at best, and remained to be an area for further deliberations.
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Glossary of Acronyms

DT Digital technology
HOD Head of department
ICT Information communication technology
SMS Student management system
LMS Learning management system
WBLO Web-based learning objects
HDT Head of digital technology
ELC E-learning coordinator
SIT Specialist information technology teacher
NZC New Zealand curriculum
IWB Interactive white board
PAT Progressive achievement test
AP Assistant Principal
Apps Applications

List of figures and tables

Figure 2.1: ICT leadership relationship .................................................... 27
Figure 2.2: ICT leader membership ......................................................... 28
Figure 3.1: Case study methodological triangulation using multiple
sources .................................................................................................. 35
Figure 5.1: Method of cross-case sources and analysis to extract
themes and surmise leadership issues ................................................. 90
Figure 5.2: Trust relationship for DT within schools ............................... 115
Figure 6.1: Strategic placement of digital leader .................................... 133
Table 4.1: Case study context for participating schools ....................... 52
# Table of Contents

Declaration .......................................................................................................................... i
Abstract .............................................................................................................................. ii
Acknowledgements .......................................................................................................... iv
Glossary of Acronyms ...................................................................................................... v
List of figures and tables .................................................................................................. v
Table of Contents ............................................................................................................. i

Chapter One ....................................................................................................................... 1
Introduction......................................................................................................................... 1
Rationale............................................................................................................................. 2
Aim...................................................................................................................................... 3
Research Questions .......................................................................................................... 4
Research content .............................................................................................................. 4
Thesis structure ................................................................................................................ 4

Chapter Two - Literature Review ..................................................................................... 6
Introduction......................................................................................................................... 6
Effective School leadership ............................................................................................. 8
The Principal and Instructional Leadership .................................................................. 10
Teachers and educational leadership ............................................................................. 12
Distributive leadership forms ......................................................................................... 13
Teamwork ......................................................................................................................... 15
Team leadership ............................................................................................................... 17
Teacher leadership and expertise .................................................................................. 18
Digital technology and schools ...................................................................................... 19
Principles of decision-making ......................................................................................... 21
Benefits of participation in decision-making process .................................................. 24
Decision-making and digital technology ....................................................................... 25
Role of ICT leadership .................................................................................................... 27
Conclusion ........................................................................................................................ 29

Chapter Three - Methodology .......................................................................................... 31
Introduction......................................................................................................................... 31
Research methodology .................................................................................................... 31
Research design ............................................................................................................... 32
Limitations of research ........................................................................................................ 130
Final concluding statement ............................................................................................... 131
References ....................................................................................................................... 133
Appendices ...................................................................................................................... 139
Appendix 1 - INFORMATION SHEET .................................................................................. 139
Appendix 2 CONSENT FORM – FOCUS GROUP PARTICIPANT ........................................ 140
Appendix 3 CONSENT FORM - PRINCIPAL .................................................................... 141
Appendix 4 INFORMATION SHEET - PRINCIPAL ........................................................... 142
Appendix 5 Documentary Analysis Framework ................................................................. 143
Appendix 6 – Cross Case Analysis Framework Table ......................................................... 144
Appendix 7 – UREC ethical steps ....................................................................................... 146
Chapter One

Introduction

There is no argument that the personal computer has been revolutionary in almost every way imaginable and its impact over 25 years has been enormous, but when viewed against the act of teaching – its impact is still relatively minimal... one could argue that the act of teaching has been largely immune to such technological advances. (Betcher & Lee, 2009, p.3)

During the late 1980s and early 1990s secondary schools in New Zealand considered the prospect of introducing computers to their classrooms, mainly in the form of replacing type-writers and changing from the subject known as typing to the term word-processing. Under the umbrella of the Technology Curriculum in 1995 (Te Kete Ipurangi) a subject known as Information Communication Technology (ICT) was born out of this emerging curriculum area. Computers were and perhaps still are positioned as a teacher’s best tool for preparing lessons, keeping records and the storage of documents as the term ICT became more popular. Today there are two lexicons that refer to computer based activities in schools, that of ICT and the recent emergence of digital technology (DT) with academic literature supporting the adoption of both these lexicons (Schrum, Galizio, English, & Ledesma, 2011; Wilber, 2010).

ICT is recognised in academic literature as the use of computers and all the technologies that are accessible through the use of this device. DT is the means by which data is captured, stored, manipulated, produced and distributed digitally as mass media. DT also supports the use of virtual technologies to distribute digital data through the Internet and World Wide Web (www) as a seamless digital mediascape (Gere, 2002).
Rationale

In the context of education DT offers a host of opportunities in the teachers’ repertoire of instructional tools. Within the realm of the internet, web-based learning objects (WBLOs) offer software to teachers at any level of expertise although Hadjerrouit (2011) argues that teachers need to be cautious of WBLOs as this domain is very much led by the software developers with an indifference towards their material meeting any pedagogical needs of the teachers, educators or learners.

The market is flooded with subject specific software and teachers recognise the need to display their teaching material onto whiteboards for better viewing clarity by their students. In this arena interactive white boards (IWBs) have been heralded as the next revolutionary teaching tool since the introduction of the first blackboard in 1801 (Betcher & Lee, 2009; Jones, Kervin, & McIntosh, 2011). In considering how to engage students in class through DT teachers have started to recognise the impact interactive programmes have as a valuable feature of ICT resources (Jones, et al., 2011)

With the introduction of the TELA ‘laptops for teachers’ initiative by the New Zealand Ministry of Education in 2004 (Ministry of Education, 2009) just prior to their E-learning Action Plan for Schools from 2006-2010 (Ministry of Education, 2010) secondary teachers made the transition from stand-alone type computer hardware to laptops. This portable type of technology made it possible for teachers to prepare their work independently from their place of work and schools had an affordable means to provide laptops to the majority of their teaching staff.

With DT being accessible to most teaching staff the demand for an infra-structure to support the increased use of laptops prompted schools to provide greater support systems and DT structures to cope with this demand. Student and learning management systems (SMS and LMS) allow staff to record and track student progress both academically and pastorally. Because some teachers have become
‘savvy’ with using digital imagery to supplement their instructional learning tools and have utilised the accessibility of using computer programmes supporting learning in the class, this has meant that schools have needed to increase their on-site servers and data storage capability in order to cope with the increased demand to store large quantities of digital data.

With so many ICT resources and DT capability being readily available to schools, subject specific departments are literally free to pick and choose any style of digital delivery as they please. Requests for ICT resources and the nature and content of the DT are questionably *ad hoc* depending on the level of digital expertise of department members. For leaders charged with sanctioning budget requests for ICT resources a level of digital expertise, knowledge and jurisdiction in how these resources support classroom instruction needs to be prevalent (Owens, 2004). Depending on the hierarchical structure of ICT decision-making within a school, if such a structure in fact does exist, and the task of how DT is utilised throughout the school, the question as to whether this may be left to just one individual expert or committees empowered to undertake this responsibility remains to be seen. Because of the nature of the expanding evolution of DT can such committees or individuals remain abreast of this task of school-wide decision-making or is an emergence of social distributed leadership being realised? (Scribner, Sawyer, Watson, & Myers, 2007). Teachers in secondary schools often work in self-managing teams in developing their own goals, curriculum content, instructional strategies, budget requests and pedagogical development in DT. It stands to reason that control over how DT is addressed could lie with each department.

**Aim**

This research investigates perceptions of how leaders in secondary schools make decisions about the use of digital technologies. The study aims to identify where the leadership for DT exists within the organisational structure of a secondary school and what jurisdiction this leadership has in decisions on DT. It seeks to clarify what type of information is used to aid in the decision-making process and how important
this process is in supporting teachers within the classroom. Finally this investigation hopes to identify the types of challenges leaders in DT are faced with and the impact these challenges have in regard to DT teaching practices. The following research questions have been designed to draw out this information and provide a basis of study for this research.

**Research Questions**

The research questions underpinning this research are:

1. **Why are secondary school leaders expected to play a significant role in decision-making processes related to digital technology?**

2. **What knowledge or information is used by secondary school leaders to inform digital technology decision-making to support classroom practice?**

3. **What challenges do these leaders face in relation to digital technology decision-making?**

**Research content**

Three data-collecting methods were selected for undertaking this research; that of interviews with Principals and digital leaders, focus groups and secondary documentation sources. The secondary schools chosen for this research were from a selection of higher decile schools and from the greater Auckland metropolitan area. The makeup of the schools was of similar size, two of which were co-educational secondary schools and the third was from an integrated secondary boy’s school.

**Thesis structure**

This Thesis is made up of six chapters, all of which contribute to the identification, justification and understanding to the topic of this research.
Following this chapter, chapter two is comprised of the literature review on relevant topics that support the main theme of this research. The three areas of literature review have been defined as leadership, teacher leadership and DT decision-making within schools. Within each section a definition of each topic provides clarity and support in establishing significant links to the three key topics.

In chapter three, the explanation why this research took on a social science method of qualitative research using three methods of data collection is provided. The chapter explains the purpose of the interviews, focus groups and secondary documentation sources along with the importance of case and cross-case analysis. The chapter concludes with explanations of research validity, reliability and ethical issues faced by researchers undertaking study such as this.

Chapter four presents the findings of the data collected from the three schools starting with the secondary documentation source, interviews and finally the focus group conversations. Each school is presented as a single case entity.

Chapter five maps out a cross-case analysis technique in order to draw out themes that make important links, and provide discussions that help to contextualise and define the issues pertaining to the research questions.

Finally, chapter six summarizes the relationship with the research questions and the conclusions derived from this research. Within the four recommendations there are a number of issues that other schools may wish to consider in the area of leadership, decision-making and DT. The limitations help to realise how the research could have been improved and the final concluding statement encapsulates the essence of this research and the importance DT plays within a secondary school context.
Chapter Two - Literature Review

Introduction

There are many types and styles of leadership that have been researched through social means and many that offer profound benefits for schools with particular requirements and leadership direction. Within the New Zealand context the style that seems to best describe the type of leadership witnessed by New Zealand educational research authors is that of educational leadership (Cardno & Collett, 2004; Robinson, 2006) where leadership is focussed on both the pedagogy of instruction and the curriculum that best provides for students in schools. Within this chapter there will be a number of leadership styles reviewed with an emphasis on those that support the evolution of technology and the implications leaders are faced with by the impending instructional use of digital technology.

The next part of this chapter looks at how the distributive forms of leadership and teachers are seen to be more in a position of leadership through the recognised and accepted practice of teacher teams. Teachers, through the very act of being in the classroom and experiencing what it takes to be instructional practitioners, are the intermediary between a school’s leadership vision and the student academic outcomes. With school principals leaning more toward the distributive method by a division of labour or shared leadership (Gronn, 2003; Spillane, 2006; Youngs, 2009) due to the nature and comprehensiveness of digital technology, teachers in secondary schools are seen to be working in self-managing teams developing their own goals, curriculum content, instructional strategies, budget requests and pedagogical development in DT. They are also called upon in their role as experts within a particular curriculum field and decisions that impact on their domains. Therefore school leadership teams need to ensure collaborative decision-making is used with teachers, particularly in the area of DT.

The final part of this chapter looks at the decision-making process, and what processes leaders and teachers take in decision-making with specific relevance toward DT. What influences, expertise and jurisdiction do leaders or teachers take into consideration in deciding who to consult when thinking about what DT
practices impact on the instructional practices in the classroom? Some recent literature on the topic of leadership implications (Robertson, 2007; Williams, 2008) has highlighted a few initial themes of interest; namely complexity, trust, supportive cultures and potential issues that may emerge for leaders as Web 2.0 technologies develop.

There are emerging theories on a conceptual type of e-leadership based around theories of distributed and dispersed leadership (Gurr, 2004). Emerging evidence shows that effective leadership in ICT-mediated environments requires different skills. Adapting traditional leadership skills to a technology mediated environment adds a layer of complexity that has not existed before (Gurr, 2004). In education there is an increasing emphasis to have practices of distributed or dispersed leadership (Gurr, 2004) related to ICT due to rapid advancements in this specialised domain. The question as to whether a new leadership concept will emerge, possibly known as e-leadership is being considered by social researchers but at present e-leadership research remains inconclusive.

Organisational trust in the transformation from traditional instructional teaching methods to emerging ICT related instructional assisted methods relies on strong, stable and contemporary leadership (Robertson, 2007). In considering the transformation from traditional instructional methods to emerging contemporary instructional learning, school-wide leadership needs to be stable in order to contribute to the development of organisational trust (Robertson, 2007). The context in which Robertson (2007) researches trust within a school environment is in her pilot case study collaborations with secondary schools undertaken in the state of Victoria, Australia in the period of 2006-2008. With the use of handheld devices with wireless capabilities (palm-held computer assistive technological devices) one of her findings suggested that schools needed to be accepting of and trusting in the use of new commercial type classroom devices to enable student responsibility to use these devices for their intended use. An emerging theory from Robertson’s (2007) case study stated that the ‘right’ kind of school leadership and school culture was essential for transformative practices to occur. Suggestions of
strong, stable and contemporary leadership were implied but as of yet, not fully conclusive.

Web 2.0 digital technologies support the emerging concept of transformative change from mass instructional, teacher-centred learning environments to individual instructional, learned-centred schooling. Current research continues to support the view of an emerging gulf between the digital youth culture and institutional cultures of schools (Williams, 2008). Current school leaders need to promote through sustained professional development what Web 2.0 technologies have on offer, train teachers to be less didactic and be more inquisitive, work more flexibly and to understand the benefits Web 2.0 interactive technologies have to offer.

Although it appears that new DT may bring about change within certain aspects of leadership in schools the core business of any educational establishment is one of teaching and learning through sound and proven pedagogical practices (Robinson, Lloyd, & Rowe, 2008). Leadership within schools therefore needs to remain stable (Robertson, 2007) and provide clear indications that the leadership is focussed on this core business.

**Effective School leadership**

Waters, Marzano and McNulty (2004) have stated that their “research data shows that effective school leadership can substantially boost student achievement” (p.48). Their research has provided evidence that effective leadership can be defined by 21 distinct leadership responsibilities in relation to student achievement but more importantly, under the umbrella of change management, they state that “effective leaders not only know what to do, but how, when and why to do it” (p.49). Regardless of having these traits which aid them in making decisions on effective leadership practices leaders could be standing alone if it weren’t for their staff to convey these traits to and with.
This brings about an important skill that effective leaders must all possess and practice, that of dialogue. In fostering and valuing the importance of dialogue effective leaders use this to encourage teachers to critically reflect on their own learning and professional practice (Blase & Blase, 2000). In having a two-way open and honest dialogue the trust relationship between teachers and principals allows for the opportunity for teachers to be actively reflecting on what works within a class lesson and what can be improved upon. The dialogue generated by teachers and principals contributes to the professional growth within an organisation in their vision for learning (Murphy, Elliott, Goldring, & Porter, 2007).

Another recognised factor that contributes to effective leadership is that of having a school vision (Murphy, et al., 2007; Robinson, Hohepa, & Lloyd, 2009). Murphy et al., (2007) advocate for a model of leadership for learning where they identify eight major dimensions of leadership that contribute to factors leaders use to influence outcomes. They argue it is the vision for learning that is a strong influential driving force. From their research in high performing schools Murphy et al., (2007) agree that these leaders “devote considerable energy to the development, articulation, implementation and stewardship of a vision of learning that is shared and supported by the school community” (Council of Chief State School Officers, 1996 as cited in Murphy et al., 2007, p.181).

This vision for learning is continually being revisited so that any new knowledge or information that can contribute to increasing a school’s performance, can be utilised by its leaders. Murphy et al., (2007) recognise within effective leadership the skills and ability these leaders must have. Being knowledgeable in pedagogy is essential, along with having the utmost interest in the application and practices of a teacher’s instructional programme. Effective leaders recognise that “teachers are the keystone of quality education” (Murphy, et al., 2007, p.184) and devote a large amount of time to the support of teachers with their efforts to strengthen their own teaching and learning practices in and across the classroom.

In their recent qualitative research into understanding teachers’ perspectives regarding strategies used by effective principals in positively influencing teachers Blase and Kirby (2009) point out that effective leaders use two main means of
influence, that of praise and expectation. Backed up by Maslow’s (1970) five levels of hierarchy of human needs, the fourth tier being self-esteem and recognition by peers, Blase and Kirby’s (2009) findings show that praise by leaders helps to boost teachers’ esteem, confidence, and pride. Positive reinforcement of professional accomplishments often left teachers feeling encouraged, appreciated and recognised. Influence by expectation was the second highest factor that teachers mentioned in Blase and Kirby’s (2009) qualitative research. If principals constantly express the need for having and holding onto high expectations in both staff performance and student performance, then there is a strong likelihood that this expectation will filter down to the students and be seen as affects that positively relate to student academic performance (Blase & Kirby, 2009). When parents, teachers and principals hold high expectations for students, Blase and Kirby (2009) argue that students themselves are likely to expect more from themselves.

**The Principal and Instructional Leadership**

In its most simplistic form the role of the principal within a school setting serves two functions, that of an educational administrator and that of an educational leader (Starratt, 2003). Practitioners, policy makers and scholars of education have a sense of optimism for the principal in that they desire the tasks of the principal to be occupied by shaping and directing the essential task of learning (Starratt, 2003). Within this optimism Starratt (2003) urges principals to remain focussed on the task of education by exploring with teachers and students alike “how the learning in school can become meaningful, deep, lasting and reflective” (p.10). This needs to remain the core focus for any principal.

Most authors on instructional leadership agree that this type of leadership can also be distributive (Cardno & Collett, 2004; Robinson, et al., 2008; Weber, 1996). This is so the principal can focus on ‘big picture’ issues (Cardno & Collett, 2004) or spend time in increasing their knowledge in specific curriculum areas (Robinson, 2006) to develop strategies of support, or promote professional growth (Blase & Blase, 2000). Instructional leadership is also seen as a coaching and mentoring role (Blase & Blase, 2000; Weber, 1996) where leaders attempt to foster teacher
reflective behaviour through role modelling, coaching and mentoring (Blase & Blase, 2000).

Transformational leadership has been well documented and recognised for its focus on the social psychology of leader-follower relationships (Robinson, et al., 2009). The introduction of the reform of Tomorrow's Schools (Parliament of New Zealand, 1988) saw the introduction of the school being the basic unit of the education administration and the principal the professional leader of the school. The introduction of charters, mission and vision statements gave meaning and purpose to principals where they could focus on a firm commitment to an ideal, where they could be architects in a climate for change, which required from them deep convictions, strong commitments and a clear belief in their directions for change. Robinson, Hohepa and Lloyd (2009) in recognising the social psychological leader-follower relationship of transformational leadership also stated that less of a focus was on teaching and learning by these leaders. Although transformational leadership gave rise to principals whose traits were seen to be charismatic, had an idealised influence on staff, inspired motivation, provided intellectual stimulation and were seen to support staff with individual considerations (Starratt, 2003), Robinson, Lloyd and Rowe (2008) have suggested that empirical data has not shown that transformational leadership had any substantial impact on student academic outcomes.

The main difference between transformational and instructional leadership then is in their core philosophy. Where transformational leadership strives to change the organisation using visionary means, instructional leadership has pedagogy as its core focus. Instructional leaders in schools are seen to be knowledgeable in educational pedagogy and are very interested in and involved with instructional programmes (Murphy, et al., 2007). Effective instructional leaders pay very close attention to what happens within the classroom and recognise that teachers are the key to successful student learning outcomes. Murphy et al., (2007) suggest that “teachers are the keystone of quality education” (p.184). They argue that leaders who “devote abundant time to supporting colleagues in their efforts to strengthen
teaching and learning in and across the classroom” (p.184) lead the way in being effective in their leadership.

When considering styles of leadership styles, and making comparisons with transformational and instructional, Robinson, et al., (2008) suggest that “the more leaders focus on their relationships, their work, and their learning on the core business of teaching and learning, the greater their influence on student outcomes” (p.636). The majority of Robinson, et al., (2008) meta-analysis of other’s quantitative research indicates that school leaders have little and ineffective direct influence on student outcomes. However Robinson, et al., (2008) qualitative analysis of quantitative studies also indicated that effective leadership can have a positive influence on student learning outcomes. Without solid empirical evidence from qualitative methods to suggest otherwise the core task of leadership still needs to be identified and perhaps even justified.

**Teachers and educational leadership**

An argument exists for the necessity of principals to be moving from the more traditional constructs of leadership, those based on bureaucratic requirements and democratic trends to a new form of meta-strategic leadership where they can recognise and be sensitive to emerging developments in their leadership practice (Crowther, Ferguson, & Hann, 2009). The demand for Principals to be cognitive around issues and influences that support progress within their schools supports the recognition of an emerging meta-strategic leadership where they actively engage in meta-cognition of their role within the bureaucratic confines and democratic traditions of their schools (Crowther, et al., 2009; Kirsh, 2005).

To be actively cognitive with strategic planning requires time and clarity so the task of shared leadership is essentially a strategic move by the principal (Copland & Knapp, 2006) in order for them to create time for meta-cognitive processes. In setting aside time for meta-strategic leadership the practice of imparting leadership to teachers is carried out in part through teacher team practices with nominated or
designated leaders. However the ideal of individual teacher leadership within schools is an area of research undertaken by few social researchers. Crowther, et al., (2009) add weight to the argument that “teacher leadership is an idea whose time has come” (p.92) and Copland and Knapp (2006) offer advice on this identification of such teacher leaders. The process of identifying such individuals lends itself very much from the process of collaborative decision-making by the principal, but Crowther, et al., (2009) caution that under a meta-strategic leadership style a risk exists where principals can become hands-off and distanced from the day-to-day management of the school.

Before fully realising the benefits and realities for teacher leadership consideration needs to be given to the history of shared leadership through teamwork and why teacher teams and team leadership provide a platform to launch the basis of support for teacher leadership. Ultimately, schools essentially desire to have both collective (Cardno, 2002) and distributive intelligence (Swaffield & Macbeath, 2009) within its staff so that meta-cognitive leadership can contribute to the development of greater strategic systems within their organisations.

**Distributive leadership forms**

*A Definition*

In a simplistic definition of distributed functions of leadership the concept of shared work seems to hold merit. It is conceivable that the school’s Principal can delegate activities to the next tier down to senior management level or invite staff with known expertise and experience to help organise particular events or projects. Cardno and Collett (2004) base their observations around instructional leadership where they discussed how a principal, particularly situated within a primary school context, may distribute their work load to the senior management team or heads of department in order to focus on big picture issues. This sharing of jobs can lead to empowering and developing staff in their current leadership positions.
There are two dimensions to understanding distributive leadership, that of division of labour (Gronn, 2003; Youngs, 2009) and the other of a more organisational construct being described as leadership having a distributive perspective (Spillane, 2006; Youngs, 2009). Rather than be a concept of delegation of duties, distributed leadership is first and foremost about leadership practice. Spillane (2006) describes leadership practice that stems from a distributed perspective as being framed in a very particular way, namely as a product of the joint interactions of school leaders, followers, and aspects of their situation such as tools and routines. Shared leadership as a team-level construct, on the other hand is seen as a practice of distributed leadership recognised in groups and teams (Gronn, 2003; Youngs, 2009).

In seeking a definition of distributed leadership, Dempster (2009) first of all advocates that all leadership should be based around the sense of moral purpose for the students. Rather than a true belief in an integrated concept of distributed leadership principals seek opportunities to distribute leadership in the human agency component of their role. By including teachers in the constructs of the school's organisational structure, the development of staff, the building of a vision and the core task of managing teaching and learning Dempster (2009) sees that shared or distributed leadership opportunities can influence teacher capacity. By addressing teacher capacity, their working conditions, motivation and commitment teachers are inspired to enhance student learning and achievement. Though not directly linked to student achievement, opportunities for distributed leadership can contribute to school's productivity and its own sense of moral purpose.

Swaffield and Macbeath (2009) take distributed leadership to another level by suggesting that distributed leadership together with distributed cognition can make a “school function best” (p. 45). However, distributed leadership is more than cognition and leadership. Rather the strength, resilience and capabilities that reside within their meanings lie within the school’s “distributed intelligence, its shared leadership and its communal learning” (Coleman, 1988 as cited by Swaffield & Macbeth, 2009, p.45). Distributed intelligence stems from the school’s norms such as trust and collaboration, and can vary depending on its teachers’ contributions.
The second issue raised around distributed leadership is taken up by Spillane (2006) where he argues that distributed leadership means more than shared leadership and does not use it in the group context as argued by Gronn (2003). In terms of collaboration Spillane (2006) states that shared leadership goes beyond collaboration and is centred on how principals practice their leadership. Spillane (2006) considers the practices of leadership that lend themselves to distributed actions involving a product of joint interactions between the school leader, their followers, and aspects of the situations being considered. Spillane (2006) states that leadership exists on many levels which not only include the senior management team but also teachers, departments, coaches, parental involvement and extra curricula activities. Rather than considering that a leader operates out of a style of distributed leadership, Spillane (2006) and Gronn (2003) see that leadership practice may include distributed perspectives of leadership opportunities stretched across two or more individuals.

**Teamwork**

Wallace (2001) expressed a normative argument that “leadership should be ideally and extensively shared” (p.153). Because of a perceived notion of entitlement any decisions that relate to and affect their work should be offering teachers empowerment opportunities in collaborating in these decisions. Teachers also have a right, through jurisdiction, to be on teams that are making decisions which directly affect what happens within the classroom. Wallace (2001) argues that “shared leadership is morally just” (p.154). However, empowerment of teachers who attend teacher team meetings does not necessarily guarantee that team members will contribute to decisions in a manner acceptable by the team leaders. Within an accountability context shared leadership can backfire if colleagues act in ways that generate poor standards and results. Therefore Wallace (2001) cautions that empowerment of teachers has to be controlled and boundaries set in place. It is through having collaborative dialogues between individuals, in making decisions on mutually dependant activities that schools witness a key component of the social distribution of leadership (Scribner, et al., 2007). Discerning Principals therefore
need to be aware of this distributive cognitive process so that when new initiatives or objectives are being considered the human resource factor can be tapped into through distributed leadership means.

Teacher teams are usually made up of members who have skills, experience and knowledge pertaining to the team’s purpose. Successful teams depend not on any one individual, but how well each member supports and works with each other (Bell, 1997). Chrispeels, Brown and Castillo (2000) show that the factors that attribute to effective team teacher models are the skills teachers have in meetings, the ability to make sound decisions, successful team dynamics and teacher interpersonal relations. Team dynamics require proper professional training in the knowledge and skills needed to acknowledge how teams function well. Brundett (2010) reiterates this and adds that each member can play a different but important part within teacher teams, and that there needs to be a balance of these types of team players, based on Belbin’s work (2010) on team players. Rather than stipulating that all teams need implementers, co-ordinators, shapers, innovators, resource investigators, monitor evaluators, team workers and completer-finishers, he offers new research in the form of categories of team members, those that have technical or functional expertise, problem-solving and decision-making skills and those with interpersonal skills.

The one overriding aspect of a teacher team’s purpose, regardless of how members are invited or selected to attend, is the necessity for teams to make decisions through a membership of cooperating colleagues (Bell, 1997). Another aspect often not fully considered or granted via the hierarchical and political levels of power is the permission for teams to be able to act upon their decision-making process. Bell (1997) states that “successful teams can only take place when the team has the facilities required to gather relevant information, to make sound, informal decisions and to implement those decisions” (p.121). In other words, without acknowledgement of the team’s authority to make and implement their findings and make worthwhile contributions to the schools operating systems, their purpose as a team is superfluous.
Team leadership

The success of teacher teams does not lie in their ability to be experts in team dynamics and functionality; rather all teacher teams are dependent on team leadership. At a curriculum team level Weber (1996) advocates for faculty curriculum teams as decision-making teams if led by competent leaders. Swaffield and Macbeath (2009) point out that head of department’s (HOD’s) take direct lead in the teaching and learning process as they possess expertise in fostering learning, have hands-on experience and have deep pedagogical understanding.

Beyond curriculum teacher teams where leadership of these teams could be seen as leadership by default, rather than teacher team leaders by design, any teacher team with strong supportive members still requires strong leadership (Bell, 1997). Wageman, Nunes, Burruss, and Hackman (1997) in their work on effective senior leadership teams have illustrated that team leadership is sandwiched between essential conditions that they must provide or contribute to in their teams and the role they play within these teams. Although the three essential conditions and the three enabling factors provide sound knowledge for leaders to be effective within these teams, Wageman, et al., (1997) state that it takes an innovative and seemingly unconventional kind of senior leader to put the essential conditions and enabling factors in place for them to be extraordinarily effective. In essence, teams can still only be facilitated and led by leadership that is skilled, knowledgeable and understands how teams work effectively.

The type of knowledge and skill team leaders need is that of particular expertise, specifically in a particular area of school in conjunction with staff of similar responsibilities (Bell, 1997). Team leaders can be anyone who have direct and relevant expertise, rather than those who hold senior roles within the school (Bell, 1997). One of the essential skills a team leader needs is the ability to create an open and honest atmosphere (Bell, 1997) and dialogue (Cardno, 2002) where all team member views can be aired, be they constructive, or not. Team leaders need to have and be trained in effective communication skills (Brundrett, 2010; Cardno, 2002), social skills, group processes, human relationships and have skills in
engaging in candid dialogue and have an ability to debate tough issues (Brundrett, 2010). Both Bell (1997) and Cardno (2002) reiterate the need for team leaders to be aware of the types of contributive slants teachers can offer as long as they also have strategies to manage these by effectively utilising team strengths.

**Teacher leadership and expertise**

It can be acknowledged that when speaking of teacher leadership within schools the type of leadership teachers can hold are those recognised more formally within the organisational structure of the school. Roles like lead teacher, head teacher, department head, staff representative on the school’s board, specialist classroom teacher and teacher coach are some of the forms of formal leadership positions that contribute to the distributive division of labour type leadership roles within the school. Leithwood (2003) defines this type of formal teacher leadership as “the exercise of influence over the beliefs, actions, and values of others” (p.104). But it can be envisaged that there is another type of teacher leader. Those teachers who are energised, enthused and willing staff members who are informal leaders. Leithwood (2003) mentions that these types of informal teacher leaders are always ready to;

...share their expertise, volunteering for new projects, bringing new ideas to school, helping colleagues with classroom duties, aiding in the improvement of classroom practice through the engagement of their colleagues in experimentation and the examination of more powerful instructional techniques. (p.104)

Informal teacher leaders are often recognised by their peers and are the ones teachers often go to for advice, inspiration and informal leadership.

Not all teachers aspire to be richly involved in the promotional leadership opportunities within school, especially in terms of decision-making (Hoy & Miskel, 2008). Jennings (2008) however does offer an argument for teachers to be both co-opted into dynamic decision-making teams and into being leaders of such teams.
Tapping into teachers with informal teacher leadership skills their contribution can aid with shared responsibility and accountability for the achievement of common organisational goals. Teachers with expertise should also be co-opted in order to facilitate necessary task completion. Brundrett (2010) supports the necessity for teachers to be given opportunities to learn how to be leaders within teacher teams as part of recognising and developing the potential of teachers who display leadership potential. Greater participation in leadership by teachers is needed so that effective leadership by the principal has the potential to indirectly impact positively on students and whole school performance. By giving teachers opportunities to learn how to be leaders within teacher teams, they effectively take on a leadership role as distributed by the principal.

The element of commonality that has been present in the discussion around leadership so far is the necessity for leaders or teacher team members to have a degree of expertise with a decision-making process. Those on decision-making teams who possess relevant expertise can offer unique, valuable and timely knowledge for a quick resolution to be achieved. However not all teams, which are most often allotted by the principal (Brundrett, 2010), possess the full complement of knowledge of all predisposed types of problems or issues so logically other, more experienced teachers may be invited or co-opted to attend these decision-making teams for the duration of a successful outcome or implementation for task completion (Jennings, 2008). More so, these expert teachers, through the very nature of their knowledge, skill and expertise should assume leadership of the decision-making team because of their implied jurisdiction on the subject content and position of expert responsibility within the organisation of the school.

**Digital technology and schools**

Once just having access to DT was considered to be the first digital divide (Sunkel & Trucco, 2011). A second digital divide is seen now between those with skills and competencies in DT and those without. From a student’s perspective a subsidiary digital divide is found with them leading high-tech digital lives at home and low-tech
digital lives at school (Lee & Winzenreid, 2009). The issue that students use a variety of DT at home which is more advanced than DT used at school (Sunkel & Trucco, 2011) has raised questions around whether schools themselves have addressed this second digital divide. Where students are naturally digital and teachers are more likely to be digitally nurtured (Harris, 2010) the nature of the fast changing digital world requires teachers to up skill in new DT’s (Wilber, 2010). Lee and Winzenried (2009) suggest that traditional teaching methods should be enhanced to include digital practices.

Although DT has spurred on a desire for teachers to use DT, not all teaching should adopt a technology-driven model of instruction. Rather Lee and Winzenried (2009) state that “good teachers have always been using a variety of approaches and tools in their teaching” (p.5). DT is an element that makes up the fabric of the current contemporary educational climate. “The digital can enrich the teaching, make learning more relevant, engage in all manner of students, individualise much of the teaching, enhance the efficiency of the teaching, open up new unexplored worlds and reduce teacher workloads” (Lee & Winzenried, 2009, p.5).

For teachers to be on-board with DT a pedagogical shift is needed. The trap that teachers can fall into is the act of converting old paper-based tasks into an equivalent digital task, a process coined as “putting old wine into new bottles” (Betcher & Lee, 2009, p.2). By taking old material and doing a simple digital conversion is seen by Betcher and Lee (2009) as a false pedagogy. They argue that teachers need to realise that a new methodology is needed when up-dating old material into the digital environment. In terms of a pedagogical shift Betcher and Lee (2009) state that:

Teachers need to see and comprehend the potential that lies ahead, to master the tools and the mindset to begin claiming that potential, to collaborate with their colleagues and students to effectively use these tools for teaching in a digital world. (p.1)
Instead of contemplating a paradigm shift in pedagogy it is more reasonable to understand and comprehend how DT is supporting learning as a tool rather than an educational theory. This is summarised best by Spector (2008) in the theory and practice of instruction design. “The learning technology paradigm has appropriately shifted from structural learning to one better characterised as learning linked with instructional use of technology” (p.7).

An issue around the resistance of teachers in the use of DT has been linked to their pedagogical beliefs regarding the value of DT and attitudes in general toward technology (Lai & Pratt, 2004). Unless the instructional practice is advocated for and supported by the school leader in developing a culture of DT use, teachers’ adoption of the instructional use of DT is likely to fail. This asks questions around where teachers are expected to go for resources, up-skilling and professional development in DT pedagogical instruction (Lai & Pratt, 2004). Most secondary schools would have a staff member titled as the ICT coordinator who is predictably considered the ‘one stop - one shop’ DT resource expert. Without the DT support ICT coordinators provide, Lai and Pratt (2004) suggest that it is unlikely that DT would have any impact on class teaching and learning.

**Principles of decision-making**

From Owens (2004) previously stated point that leaders often do not consider decision-making models when having to deal with day-to-day type operational plan issues, but may consider the use of such a model when trying to bring about change that is separate to normal school practices, he presents three factors that need to be considered for participation. The first is recognising the need for an implicit decision-making process, the second is the nature of the problem to be solved, and the third is the criteria for including others in the process (p.306). Cardno (1998) rationally states it would be impractical to include everyone in every decision pertaining to a schools operation so leaders need to have some criteria in which to decide who should be involved in a particular decision-making process.
In recognizing the need for an explicit decision-making process leaders would choose a category or degree of involvement (Cardno, 1998) the process needs to take. There are five categories of collaboration due to the nature, problem or issue concerned. They are information, consultation, discussion, involvement and participation. This process of collaboration helps to identify just how much collaboration is appropriate in supporting a school wide decision-making process (Cardno, 1998).

When bearing in mind the nature of the problem or issue to be decided upon leaders need to take into account what style of leadership (Hoy & Miskel, 2008; Owens, 2004) they will operate from. Some decisions only require an autocratic style of leadership as issues can be solved through a unilateral process (Hoy & Miskel, 2008) in order to achieve decision-making efficiency. The next level of informed autocratic style may involve an individual enquiry approach in order to improve the quality of the decision proceeded by the third level of individual-consultative style where the leader consults more than one persons opinion in seeking acceptance of a decision. The last two types of participative leadership process are more time consuming and demanding, involving a lot more people in the process. A group consultative process seeks more input by groups with their opinions and contributions helping to formulate ways and means to solve issues. The outcome may vary and does not necessarily reflect the opinions of the group’s deliberation. The last style of leadership is group agreement where the outcome of the issue is determined by the consensus of the group’s deliberations. The last two styles of leadership undoubtedly require more scheduled time and may require more than one meeting.

The criteria for including others in a decision-making process is recognised by many research authors under the term – ‘tests of’, (Cardno, 1998; Hoy & Miskel, 2008; Owens, 2004). This can start with the test of jurisdiction (Cardno, 1998) mainly because the pool from which personnel are chosen for this test hold positions of responsibility within the organisation’s hierarchical structure and are the first group of staff the leader would consider to hold experience on many levels within the organisation. The next two tests, that of relevance and expertise, are
often recognised to be conjointly connected with each other (Cardno, 1998; Hoy & Miskel, 2008).

The test of relevance seeks to identify individuals or groups who may have high personal stakes in the outcome of the decision-making process. Groups like governing boards in helping to shape the organisation’s future through being involved in strategic planning, devising and revisions, or curriculum heads and team leaders in being required to contribute to goal achievement or meet targets within the organisation’s annual operational plan are specific type examples of such relevant groups.

The test of expertise is crucial to a process of decision-making. Cardno (1998) stresses that it is not enough to just have an interest in the outcome or decision. If the participants’ involvement is to be significant then their contribution will be more effective by the nature of their relevant expertise. The choice of teachers with expertise would therefore acknowledge those seen to be competent in contributing effectively due to their experience and knowledge of particular skills and areas of the school’s structure.

The last test discussed by Hoy and Miskel (2008) is that of trust, where subordinates are committed to the school’s mission and not their own agenda. These types of individuals become important and are best recognised by their presence in group consensus work as the leader knows that their contributions stem from their same desire to endorse the school’s mission and vision within larger decision-making processes that can have detrimental ramifications if not supported for the good of the school.

Not all potential participants are drawn from the four tests of possible inclusion. Others may be considered to be part of a decision-making process through a term known as ‘Zones of’, where Owens (2004) adds three more selection processes through these zones criteria. Much like the informal teacher leader who takes great interest and is seen to be involved throughout the whole school, the zone of sensitivity considers these types of personnel who are recognised as having great
personal interest or stake in a particular topic or issue. The second zone applies to staff who simply are indifferent to any decision-making processes and can potentially cause resistance toward making any forward process in decisions. This zone of indifference is thought to be a culturally developed issue where the leader often acts out of an autocratic style of leadership and limits participation of staff by only including them in low-level decisions (Owens, 2004). As Owens (2004) puts it, “there is little wonder that teachers are often indifferent to such participation” (p.314) and the implications of inclusion can definitely be crippling if staff were to act out their true frustrations within a decision-making process.

The final category of decision-making is that of the zone of ambivalence. In matters that require input by staff but outcomes that are frivolous to the normal operating procedures and management of day-to-day teaching practice it would be unwise to seek everyone’s opinion. Rather the selection of staff should be restricted to a small representative group who are known to have some interest but not fully passionate about such matters, thus avoiding a calamity of whole staff negative feelings. The type of representative staff would be those holding positions of responsibility as they see that their contribution is part of the duties required of them through their position.

**Benefits of participation in decision-making process**

In considering the potential benefits, leaders include staff so that the whole decision-making process can arrive at better informed decisions and that the method of inclusion enhances the growth and development of an organisation’s participants (Owens, 2004). From the teachers’ perspective, having leaders who include staff in the decision-making process for the purpose of empowerment offers teachers a sense of mental and emotional empowerment. This is similar to the concept of teacher ‘ownership’ or ‘buy-in’ where the leader seeks to develop a sense of collegial collaboration (Cardno, 1998) as part of developing a learning organisation through the teacher inclusion. This process of teacher participation makes the whole decision-making process worthwhile to them. Silins, Mulford, Zarins and Bishop (2000) state that the greater the participative nature of the decision-making process, the greater the increase in perceived accountability, the
more organisational learning opportunities exist for teachers, especially as a flow on effect into curriculum areas.

**Decision-making and digital technology**

As much as there is a need for teachers to undergo years of formal academic learning in their chosen specialist teaching areas of education so too there is a need for teachers in the ICT field. Teachers may not necessarily have been formally educated in ICT, required to undergo prolonged periods of focus and practice in the comprehension and use of these types of technologies. To be recognised as an expert in the field of ICT and knowledge of digital technologies would imply that these teachers have done just that; put in extra-ordinary hours of study into these technologies in order to become experts. These staff are often readily acknowledged by their peers and become in demand for their expertise in things of a technological nature (Ifenthaler, Isaias, Spector, Kinshuk, & Sampson, 2011; Lai & Pratt, 2004). A particular challenge that most ICT experts continuously face is the ever-changing nature of ICT and the ongoing demand of learning how to make effective use of these technologies in supporting educational teaching in an instructional way (Ifenthaler, et al., 2011; Schrum, et al., 2011). Within the New Zealand educational system with particular reference to the secondary sector, teachers who have exhibited both interest and expertise in ICT have invariably taken on a role of teacher ICT co-ordinator. They have acted in a shared leadership role as appointed by the Principal, taking on responsibility in tasks such as providing a ICT vision, the development of a school culture in the use of ICT and having to provide a plan for ICT professional development for staff (Lai & Pratt, 2004). The need for having an in-house expert (Wayman, 2005) can be justified when having to deal with the constant issues teachers face in the use of digital technologies. Problematic is the constant need to provide professional development and training to staff as without this the general populas of teachers ability to effectively use DT quickly suffers and the ICT coordinator fields constant inquires into the use of these technologies. Within New Zealand there is little empirical evidence that the ICT co-coordinator leads any decision-making in ICT (Lai & Pratt, 2004) however researchers do agree the ICT coordinator is inclined to
be a change agent through the provision of the professional development they supply teachers (Lai & Pratt, 2004).

To substantiate the need for teacher leadership in DT a few problematic issues need to be addressed from the perspective of school leadership. Although leaders of educational organisations may have learnt how to use and utilise DT that they personally embrace as part of their working duties, they are not generally involved with the ICT professional development support and training programmes offered to teachers in curriculum integration, software of digital content. Their understanding of the challenges they need to be aware of in supporting the effective use of educational teaching is compounded by not being in a position to fully comprehend, experience or appreciate the issues teachers face in delivering their curriculum when using digital technologies (Schrum, et al., 2011). Equally problematic is that without a principal's leadership, any professional development and training given to teachers has little influence on teachers in compelling them to use digital technology effectively (Schrum, et al., 2011).

Another problematic issue that has seen witness to a perceived diminished capacity of the formal authority of positional leadership is the increased ICT interaction by teachers through the silent and autonomous practice of communication throughout the organisation where knowledge sharing is prolific and teachers are no longer bound by physical proximity to their colleagues (Gurr, 2004). School leaders are no longer seen as an authority in ICT; hence the argument for experts in DT to be co-opted to teams in solving decisions of a DT nature. Leadership distributed to ICT experts by the Principal will be seen as a strategic move to share the responsibility of decision-making process in ICT areas (Lai & Pratt, 2004). These ICT experts can effectively claim jurisdiction by the nature of the classification of their known expertise. The role of ICT suggests that rapid developments in ICT support the need and indeed advocate for the practice of distributed leadership in ICT (Gurr, 2004).
Role of ICT leadership

The latest finding by Keane (2011), when undertaking research in the role of the ICT leader in New Zealand secondary schools, is that the role of ICT leadership is inconsistent as the definition of such a role varies from school to school. Keane (2011) states that in the current environment within secondary schools, no system wide or nationally recognised description exists for the role of a leader in ICT. However her conclusions and recommendations support for such an ICT leadership role definition to be included in their job descriptions. Keane (2011) recommends that ICT leaders need:

- Knowledge and skills – having a sound educational background as well as knowledge of hardware and software;
- Professional development – with regards to leading the technical team, having an ICT vision team and providing professional development to all staff;
- Leadership – with particular respect to having a vision and being apt at strategic leadership; and,
- Seniority – in particular, being a team member of the senior management team and having the means to communicate directly with the principal.

An example of the knowledge and skills an ICT leader needs is shown in Fig 2.1.

![Figure 2.1: ICT leadership relationships. Source: Keane, 2011, pg. 21](image)

Keanes’ (2011) finding spells out the disparity around professional development issues that hinder the progress that can be made in this area. They include issues of:

- Content needed to be delivered;
- The amount of time devoted to it;
The cost; and, 
Who leads it.

More importantly, Keane concludes that professional development needs to be sustained and continuous. “One-off professional development sessions or workshops do not translate to productivity in the classroom, especially when taught out of context” (Keane, 2011, p.21).

In the area of leadership, particularly with the importance of planning and the delivery of professional development, ICT leaders should be in a structural position within the school’s management and leadership team so that decisions made by the ICT leader are not in isolation of the senior management team. Therefore the ICT leader is part of the influential leadership structures within the school. Keane (2011) suggests that the definition, role and placement of an ICT leader is not easily identified within a school. “It can be argued that ICT does not belong in a single faculty at all, but in all faculties of a schools’ curriculum” (Keane, 2011, p.22). An example of how an ICT leader could be positioned within a school is seen in Fig 2.2.

![Fig 2.2: ICT Leader Team Membership](source: Keane, 2011, pg. 23)

In respect to seniority, the type of senior management team as nominated by the principal could include some of the following roles; Deputy and Assistant Principals, curriculum leaders, finance manager, school organiser and other key personnel. Keane states that, “this type of leadership model allows for leadership to be
distributed amongst senior personnel in the school and not solely with the principal” (p.23). Distributed, in this sense, means allocated, dispersed or shared leadership. The latest research findings by Keane (2011) indicate that due to the historical make-up of a school’s hierarchical aspect, an agreement by the principals and deputy principals as to the acceptance of an ICT leader into the senior manager team could not be reached. Keane’s (2011) research commonly stressed that, “a reoccurring theme that was raised by the participants is that the ICT leader’s position needs to be senior in ranks” (p.24).

Conclusion

For leaders and teachers in relation to DT

DT in the form of supporting programmes and software can now offer school leaders access to student and department academic progress by supporting Learning Management Systems (LMS) and specialised programs based on tried and proven use. This method of considering electronically stored results as computer data is one of the most direct and influential means at a leader’s disposal that can aid in charting annual progress as mapped out through the annual strategic management plan. Leaders that embrace such means at their disposal are seen to be change agents with a hand on the schools vision and direction of the schools mission, that of student improved academic progress and results.

For any change that supports the use of, and implications with DT, the leader needs to develop a strong culture that supports change through having strong, stable and contemporary leadership, especially in the area of trust relationships. Progressive changes that utilise and advocate for the use of DT can be presented by any effective leadership style as long as teachers can see and be persuaded to use digital type technologies through the inclusion of professional development that can substantiate such claims of progress. Knowing that leaders take a more holistic view of the implications of introducing and supporting any new initiatives that claim improvements to class instructional practices distributive leadership is readily seen as an acceptable practice of getting staff on-board, especially if the leader who has taken this leadership on board is recognised as an authority in the specific area of
improvement. This distributed leadership practice acts out of a trust relationship that has been established by the school's principal as a method of staff empowerment and recognition of expertise in the others’ special areas of interest.

In more recent years leaders have started to accept that ICT practices and DT processes have become an important and integral part of the standard operational practices throughout the school. With the eminent arrival of fibre-optic cabling of all schools in New Zealand, school leaders have also recognised that DT is going to have a large part to play throughout the school due to more improved, reliable and user friendly technologies.

Most ICT coordinators possess a wealth of knowledge and have earned the right to reside in decision-making teams through their acknowledged expertise, relevance and jurisdiction in understanding how ICT systems operate throughout the school. ICT coordinators also act out of a shared leadership position as school leaders do not have an enormous amount of time to remain abreast of ongoing developments in DT. Their knowledge on what constitutes proven improvements in instructional pedagogical methods stems from either witnessing their use in the occasional classroom visit or from the knowledge and expertise gained from dialogues with staff that use, and are seen to be competent users of DT. Astute school leaders also recognise that experts in ICT and DT practices do not reside with the ICT coordinator alone but with staff who have interest in, and have embraced available technologies and have progressed to integrating DT use in meaningful instructional ways.

The decision-making process within school wide issues requires leaders to acknowledge that leadership in the area of DT is to be seen as a purposeful distributed act of shared leadership and decisions pertaining to ICT and DT are best utilised at individual or group consultative level of participant involvement by staff, as well as through the process of selecting those who indicate strengths in both tests of relevance and expertise.
Chapter Three - Methodology

Introduction

This chapter sets out to explain the choice of methodology deemed appropriate for the undertaking of this research in leadership, decision-making and digital technology. The importance of a case study design and methodological triangulation is also clarified as this design provides the structure to support a multiple case study analysis to interpret findings across the separate schools in this research. For each data source an explanation of the data collection methods, sampling and analysis is provided along with a description. The importance of validity in a case study methodological triangulation design is explained along with reliability and ethical considerations related to this research.

Research methodology

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)

For the consideration of which research methodology might best support the design of this thesis it was helpful to understand which ontological orientation the design needed to align with. The preconception that visitations to schools of interest and acknowledging most data gathered would be from personal interactions with participants, the choice of a methodology of qualitative research supported a social science method of investigation (Bryman, 2008; Creswell, 2007; Davidson & Tolich, 2003). More importantly constructivism would be the ontological orientation where knowledge from participants is socially constructed through the understanding of their own worlds (Bryman, 2008; Creswell, 2007). This would also be recognised as a paradigm of social science but more importantly a paradigm of interpretivism in understanding how people create meaning in their social worlds (Davidson & Tolich, 2003). Through the use of broad, open-ended research questions this
research discloses what participants knew in terms of DT in their lives. Subjective nuances and meanings were formed through the interaction with the participants through their involvement; hence a social constructivism approach would was warranted. The intent of this research “is to make sense of (or interpret) the meaning others have about their lives” (Creswell, 2007, p.9).

Bryman (2008) explains that an epistemological issue will “question what is (or should be) regarded as acceptable knowledge in a discipline” (p.13). Davidson and Tolich (2003) make the point that this knowledge should count “as legitimate knowledge” (p.22). Knowledge about digital technology and its use in a class was gained from the social science method of interpretivism as the research questioned what leaders and teachers believed to be true about their understanding of effective, legitimate and worthwhile digital technology. Bryman (2008) states that qualitative research needs to engage in purposeful sampling, listening through narratives, observations, and needs to consider how data can be gathered for an inductive approach to be fully realised.

**Research design**

Initial thoughts into the design of this thesis considered a variety of research gathering methods but more importantly the issue of sources and entities needed to be fully realised before the design of the research could be implemented. The choice of study method of research opened up the possibility of considering the choice of selecting just one school or enlarging the parameters of the design to consider multiple site case studies. Merriam (1998) states that a case study should be contained within one unit /entity and not consider the relationship between two schools. Rather than a relationship, case studies can also look at other schools to draw upon discoveries of similarities, insight and interpretation. Using a multiple site case study would clarify the intent of case studies across three schools.

Case study is a common research method in social science research in contributing to the knowledge of individual, group or organisational situations. (Merriam, 1998;
Yin, 2009) “A case study method allows investigators to retain the holistic and meaningful characters of real-life events” (Yin, 2009, p.4). In consideration for a case study as the research design the weaknesses of the design needed to be taken into account. Yin (2009) offers four weaknesses or prejudices that can affect the choice for such a design method.

Firstly, some research investigators, in their disdain for this strategy, consider the lack of rigor within case study research is grounds to dismiss the use of case studies. Rather than consider case studies taking on a more scientific approach to research, the social nature of this research under a qualitative method allows this research to be subject and open to investigator design.

The second weakness is that case studies provide little basis for scientific generalisation. Understandably, because this research follows a social science method, the more scientific procedures have difficulty with this. In describing a single entity case study, Yin (2009) explains that the goal is to do a generalising analysis, not a particularising scientific analysis that is deemed to be transferable to a wider population.

A third complaint from researchers with a disdain for case studies is that these studies take too long and can result in massive, unreadable documents. This would, of course, depend on the design and choice of research questions, and the amount of data the researcher deems suitable for a case study analysis. Within this thesis, limits on the case study design and data sources of a thesis would counter the desire for the researcher to get carried away will collecting vast amounts of data.

The fourth objection to case studies is that good case studies are difficult to undertake and the ability of the researcher’s skills may be questionable prior to the research method. In response to the last objection, Yin (2009) argues that the researcher’s skills for the definition of a good case study have yet to be formally considered. So until the skills are formally defined, case study methodology is a plausible method for undertaking social science research.
Another limitation in the use of case studies is the unethical behaviour by researchers to obscure and embellish the findings (Merriam, 1998). As this thesis had been approved by the Unitec Research Ethics Committee (UREC) prior to data collection, the ethics behind the actions of the researcher have been assured to be respectful and observant of the requirements as laid down by the committee’s acceptance of the research undertaking.

Yin (2009) also provides two reasons of choice for undertaking case studies as a research method. Firstly, the use of a case study helps to understand real-life phenomenon in depth. Secondly, because phenomenon is not always distinguishable in real-life situations other technical characteristics, which include data collection and data analysis strategies, become the second part of the technical definition of case studies. An example of the second technical definition is provided by Yin (2009) in a case study enquiry that relies on multiple sources of evidence with data findings needing to converse in a triangular fashion.

All case study designs rely on a logic of design, where the first aspect of a case study deals with the scope of the study in distinguishing its difference to other research methods. The second aspect considers the technical aspects, which include sources, entities and a method to understand how the data will be analysed effectively. The scope of case studies can follow a single or multiple case design as well as a framework of qualitative and quantitative analysis within the study (Yin, 2009). The scope of the design needs to define its particular purpose and choice of studies prior to deciding the technical aspects of the research design. Within this thesis the choice of using a multiple site case study research method using a qualitative method offered the rationale of a multi-case design so that cross-case analysis would be used in the findings of this research. More importantly, a methodology of triangulation can draw upon the multiple sources to aid in extracting themes from the findings.

Cohen, Manion and Morrison (2007) define triangulation as, “the use of two or more methods of data collection in the study of some aspect of human behaviour”
The use of triangulation in a social science context attempts, “to map, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint” (Cohen, et al., 2007, p.141). A more definitive description of my case study research design would be known as a methodological triangulation (Cohen, et al., 2007; Keeves, 1997; Yin, 2009) where the types of design uses a similar design method on multiple sources.

In terms of validity, methodological triangulation is seen as a powerful way of demonstrating concurrent validity, particularly in qualitative research (Cohen, et al., 2007). By using four types of data source, that of school documentation, interviews with Principals, interviews with digital leaders and focus groups with digitally competent staff provided a form of methodological triangulation. This research design starts to take shape when viewed in diagrammatic form as seem in Fig 3.1.

![Figure 3.1: Case study methodological triangulation using multiple sources](image)

In summary, using a social science research method that solely used qualitative data from conversations using multiple sources, offered the promise of obtaining a rich source of data that could be viewed from a case study method where the opinions of people in the context of their working environments would help formulate themes and an idea of their own perceptions of DT. The design of methodological triangulation helped to sort out the complexity factor in
contextualising the design of using three schools, four data sources and a cross-case method of analysis.

**Introduction of schools**

For the selection of schools suitable for research within the field of DT, a sampling method was used to aid in the process of suitable school candidates and research participants. Bryman (2008) explains that the reason for the consideration of sampling is for researchers to gain access to a wide range of individuals relevant to the research question. The type or sampling method best suited to this case study research method was purposive sampling (Bryman, 2008) where sampling was carried out in a strategic fashion, so that the schools chosen were relevant to the research questions being asked. A definition of purposive sampling is offered by Bryman (2008) in saying; “Purposive sampling is essentially strategic and entails an attempt to establish a good correspondence between research questions and sampling” (p.458). In other words, the researcher sampled prospective schools on the basis of wanting to speak with people who had relevant information pertaining to the research questions.

An initial purposive sampling design considered an investigation into the selection of schools at extreme ends of the school socio-economic decile ratings. The choice of secondary schools was more of a convenience sampling technique, as the experiences of this research were only framed within a secondary school context due to the researcher of this Thesis having only ever taught within the secondary school sector (Bryman, 2008). Where an initial enquiry at the beginning of this research had previously indicated the possibility of a decile one school being involved, circumstances changed within the hierarchical structure of the school which deemed the school no longer available due to a change of management. This gave way to the researcher rethinking the sampling process altogether.

Rather than consider a national campaign of inviting secondary schools with DT experience and interest it was due to local convenience of the researcher that the greater Auckland metropolitan area was chosen. Through the available literature by
New Zealand authors there has been no evidence that such a national campaign has been undertaken within a DT context, but more rationally, the undertaking of such a campaign would exceed the parameters of this thesis in DT.

Within the purposive sampling design a set of criteria was created to provide feasible parameters to the research. By going through a directory of secondary schools in the greater Auckland metropolitan area 30 secondary schools were targeted by the nature of their Ministry of Educational decile rating, being decile seven or above. The rationale behind this was that the demographic make-up of the schools would be similar in their financial stature in the proviso of financial budgets provided by the Ministry of Education. Decile ratings for schools determine their allocation of Targeted Funding for Educational Achievement, Special Education Grant and Careers Information Grant (Ministry of Education, 2011).

The second criterion was considering schools with fairly large student populations. This also allowed the consideration of the financial management and make-up of the schools to be similar. 30 initial enquiries were emailed to schools with a decile rating of seven or higher and student numbers exceeding 750. There were eight responses that indicated an interest in the initial description of the research. Seven preliminary interviews were organised between the researcher and the Principals of the schools so purposive sampling could take into consideration the suitability of the schools and the research questions. Two schools were considered to be outliers by the nature of their advanced utilisation of DT. The Principals of these schools considered that their participation would skew the results to far from any sense of commonality with other secondary schools in Auckland.

The final selection of three schools considered the enthusiasm shown by the Principals, the similarity of classroom DT devices and the stage at which these schools were implementing DT holistically within their school environment. Letters M, N and P were used with the letter O being omitted for its resemblance to the number zero.
Data collecting methods, sampling and analysis

Documentation as a secondary source

Literature on documentation as a source for gathering data spells out the how and what issue in the use of this source but few authors offer information on why documentation should be used in research (Merriam, 1998). A description of what documentation is used for helps to understand its greater purpose and uses for data analysis, but as to why, documents compliment a research is left largely up to the individual researcher.

There are many types of document classifications (Bryman, 2008) but the one used for this research was chosen for its particular relevance to this research. The official documents from private source is a classification that Bryman (2008) uses in identifying documents used within organisations that are published and distributed for company use. An example of the type of documentation that schools would produce is information contained within a prospectus known as a public-domain type document (Bryman, 2008). Private documents is literature used within the organisation for employees to read but is not meant for general public distribution. Although School Charters and Mission statements are generally found in a prospectus, annual and strategic plans, department organisational documents and the multitude of curriculum and teaching unit plans are documents reserved for use within a school.

The benefit of using documents within a case study helps to provide further data that can be used in conjunction with other research sources. This adds another level of accuracy to methodological triangulation. The main benefit of using documents as a research source is to provide valuable information about the context and culture of organisations, providing another source of information to help the researcher in their interpretative process of discovery (Fitzgerald, 2007). Bryman (2008) points out that documents are socially situated products and need to be analysed with this in mind.
Sampling for documentation

In terms of sampling, the choice of which documents could be secured for research was mainly through the generosity of the Principals within the selected schools. Although a request for all types of school documentation was requested in the initial negotiation process of the schools agreeing to participate in the research, (Appendix 4; Information Sheet - Principal) the reality of such a request proved difficult to enforce as the task of obtaining departmental documents and school management type documents related to DT hinged on the generosity of the Principals and the time factor in organising this request. In securing a copy of each school’s Charter, Mission statement, long term and Annual Plans sampling was deemed a success in being provided with documentation which was similar in content and for the same purpose within the schools management system (School M Document, 2009-2011, 2011a, 2011c; School N Document, 2011 - 2013; School P Document, 2011-2013).

Analysis for documentation

The analysis of documents was an interpretative method looking for underlying meanings (Wellington, 2000) and finding connotations that provided information to support background and organisational planning of DT within these three schools. Analysis of the documents helped to triangulate the information from the Charter, Mission Statement, Strategic and Annual Plans with that of the findings from interviews and focus group meetings.

Documents should be assessed against four criteria that of authenticity, credibility, representativeness and meaning (Bryman, 2008; Fitzgerald, 2007). In respect to the documentation provided by the three schools authenticity was never questioned. The credibility was seen as the schools’ response to the legislative requirements as dictated in the National Educational Guidelines (Ministry of Education, 2004). In ascertaining the representativeness of the documents, verification of how the documents were generated was confirmed by the school Principals. Generally, consultation by the Schools’ senior management team and stake holders in the school environment verified the representation of the strategic planning needs of the schools. In assisting with analysing documents, tabulated
frameworks aided in identifying sources and the process of coding this information (Fitzgerald, 2007; Wellington, 2000). The framework gave clarity to the information contained within the documentation, (Appendix 5; Documentation analysis framework).

As all three schools provided similar documentation under the same headings as Charter, Mission statement and Annual Strategic Plans the documentary analysis framework indicated few discrepancies or variations of content. The only variation with the documents was the chronological period when the Strategic Plans were written; all Principals confirmed that review of the Charter was an annual process.

**Interviews as a source**

Fontana and Frey (2005) explain that interviews are intrinsically and unavoidably historical, political and contextually bound. The development of an empathetic approach within these themes has helped the interview process to become more humanised. Interviews therefore have become a “methodology of friendship” (Fontana & Frey, 2005, p.696). With this inference in mind, interviews are not just a neutral data gathering process for scientific purposes, as rebutted by Fontana and Frey (2005), but a collaborative exchange between the two individuals involved in the process.

In the exchange between the interviewer and interviewee, neither is devoid of their own emotions, conscious and unconscious motives, feelings and bias. Neutrality of the interview process is not possible however. Being aware of this interview flaw of the survey method can bring about an active interaction of friendship through a collaborative exchange which can lead the interview process through to a negotiated and contextually based set of results.

One-on-one interviews are normally comprised of pre-determined questions; commonly known as structured research questions (Hinds, 2000) based on pre-determined themes around the area of discussion in order to elicit in-depth
information. The goal of the structured interview is for the interviewing of respondents to be standardised so that differences between interviews in the research process is minimised (Bryman, 2008).

In terms of reliability in interviews, the structured questions provide a consistency of measure which offers a guarantee of sorts that similar results could be obtained if the research procedure were repeated with other interviewees. The validity of the interview comes in the extent to which the interview tests what it set out to find. Therefore structured interviews aim to provide all participants exactly the same content and context of questioning material. The goal of this type of source survey is to provide validity to the process as well as reliability so that participant’s respond to the same pre-empted cues (Bryman, 2008).

**Sampling for interviews**

In the context of the research topic, the sampling process first considered the extraction of information from the Principal of the three case entities. The interviews offered a holistic view of the Principals’ operational and managerial procedures. Their rationale of decision-making regarding DT systems, processes, devices and the use of supporting software and online sources for teaching purposes within the classroom. In the initial visitation to prospectus schools the researcher had pre-empted the validity of the Principals’ worth via a brief but fact finding discussion. In providing the Principals with the intent of the research, and possible survey methods prior to the acceptance and scheduling of interviews, confirmed for the researcher that the Principals held knowledge relevant for the interviews.

The second choice of interviewing personnel with DT responsibilities was a manoeuvre to find an alternate opinion to the Principals within the school of the types of decisions being made in relation to DT. A slight inconsistency crept into this theoretical approach when a Deputy Principal was suggested to be the second interviewee in one of the schools through the person’s organisational responsibility for DT, or more specifically ICT in respect to curricula matters.
In the sampling choice of deciding to use both the Principal who held the position of organisational decision maker through their hierarchical authority and another staff member who had positional responsibility for DT within the organisation, triangulation was seen to support this sampling method. At the time of the research design, literature on DT leadership was dated by a few years (Lai & Pratt, 2004). It was not until late into this thesis that new literature was published (Keane, 2011) that supported the concept that there was a relationship of leadership responsibility with that of the person charged with leading DT. In considering the content of this literature the sampling method for interviews remained the same as the triangulation process had revealed similar findings to the new literature.

**Analysis for interviews**

In this thesis an inductive analytical method was considered due to the epistemology and methodology chosen for this study. The choice of an analytical technique conceptualised a cross-case synthesis approach as the use of multiple sites was the specific methodological approach chosen for this research (Yin, 2009). Yin (2009) suggests that this analytical technique is likely to be easier to use and the findings more likely to be robust. Although multiple site case study methodology supports such an approach the use of a thematic analytical method can empathise what will be spoken within the context of the interview. The basis for a thematic approach would then use a framework as a matrix based method to order and synthesise data (Bryman, 2008; Lofland, Snow, Anderson, & Lofland, 2006; Yin, 2009).

Analysis of interviews in this thesis was undertaken in a qualitative social science method based on an inductive interpretative epistemology. This primarily meant that the information gained through the interview method of data-gathering sought to find meaning and purpose to the response of the participants (Denzin & Lincoln, 2005). Creswell (1994) cautions that through the interview method of data gathering, voluminous information is obtained which needs to be reduced down through a framework which assists the researcher in finding categories or themes (Bryman, 2008; Creswell, 1994; Lofland, et al., 2006). The use of coding can reduce the data further through two methods known as initial coding and focussed
coding (Lofland, et al., 2006; Parker, 2010). “Coding is the process defining what the data is all about” (Lofland, et al., 2006, p.200). Initial coding helps to condense and organise data into categories that corresponds to the interests of the research. Discussed coding is a more explicit method of line-by-line coding that considers more selective and conceptual themes within the data. As this thesis design used multiple site case studies as a research methodology and a combination of synthesised and thematic analytical methods was used as the best means to analyse the interview data, a framework was used to matrix the data for synthesising the results (see Appendix 6; Cross case analysis framework table).

Although the reason for use of focus groups as a survey source method is explained in the next section of this charter, it was theorised that the framework which contained shortened responses of the interviewees should also contain the reduced and conceptualised responses of the focus group participants within this framework. This located each research question and the response by all surveyed participants into the framework where the data was subjected to a thematic scrutiny.

**Focus groups as a source**

An interview survey method is a one-to-one exchange where the interviewee can probably inform the researcher all they care to divulge within a few minutes. Within this process Bryman (2008) states that participants are rarely challenged in their opinions. This is more to do with the rules of interview engagement than the need to elicit broader feelings, attitudes or assumptions held by the interviewee.

The main difference between the interview method and focus group survey method is that focus group sessions work on the reactive response by the other participants when being asked prepared research questions. Krueger (1994) mentions that, “the responses spark new ideas or connections from the other participants. The answers provide mental cues that unlock perceptions of the participants; cues that are necessary in order to explore the range of perceptions” (p.54).
The focus group survey method offers the prospects of gaining a rich source of data (Bloor, Frankland, & Thomas, 2000; Bryman, 2008; Krueger, 1994). “Focus groups can yield data on the uncertainties, ambiguities and group processes that lead to and underlie assessments” (Krueger, 1994, p.4). The process of using survey focus group method provides a stimulus for opening up the collective knowledge and attitudes of the group but also aid them in articulating normally unarticulated assumptions. Depending on the environment of the focus group, participants in this socially legitimate situation, can engage in “retrospective introspection” (Bloor, et al., 2000, p.6) in an attempt to tease out precious taken-for-granted assumptions.

Focus groups offer participants the opportunity to probe each other’s reasons for holding certain views. Bryman (2008) mentions that, “individuals will often argue with each other and challenge each other’s views” (p. 475). The role of the researcher is to facilitate the session with prepared questions. The goal for focus groups is to elicit participants’ feelings, attitudes and perceptions about the research topic, and in doing so, unlock hidden assumptions not normally spoken about in normal conversations. The focus group survey method therefore is the stimulus and key to gaining data about the meaning of people’s lives, which supports a social science research design of interpretive constructivism.

**Sampling for focus groups**

The focus group survey method hoped to propagate a rich source of data from the participants as it was likely that they would respond to each other’s responses generating new ideas and making tangential connections to their digital practices in the classroom. In a focus group situation the ideal group size is from 5-10 participants as under this number the response from the participants would only offer a small pool of ideas for analysis and over ten participants would see a fragmentation of ideas (Bryman, 2008; Krueger & Casey, 2000). In choosing 5-7 participants the group was small enough for everyone to share their opinions and large enough to provide a diversity of perceptions.
The choice of teacher types as participants within this research considered that those with competency in DT would offer valuable experiences in the management and use of digital devices along with what techniques and supporting software programmes had proved beneficial to good teaching instruction. The definition of what constituted a digitally competent teacher within each school was left to the liaison person nominated by the Principal. It was hoped that there was a core of people within each school who were known for their innovative and expert use of technology and that a range of staff invited would represent a cross-curricula selection of subjects. This proved to be the case for each focus group.

**Analysis for focus groups**
The analysis in focus group survey methods should be systematic, sequential, verifiable and continuous (Krueger & Casey, 2000). The suggestion that analysis should be undertaken during the actual focus group sessions by Krueger and Casey (2000) as a process of working out whether a particular question needs further information by the researcher supports the nature and purpose of focus groups survey methods. The researcher needs to facilitate the session in order to gain the insights, feelings, attitudes and assumptions of the focus group participants.

The literature for analysing focus groups is generally the same for interviews (Bryman, 2008; Creswell, 1994; Parker, 2010). Because this thesis took on a qualitative data analysis method based on interpretative methods through the use of frameworks, the method of analysis was similar to that of interviews (Bryman, 2008; Lofland, et al., 2006; Yin, 2009). For consistency of the choice of an analysis method the same framework was chosen to compare and contrast the data from the participants in the focus groups to that of the interviewees (see Appendix 6; Cross case analysis framework table).

The interview and focus group data was coded, categorised and analysed to find common threads and themes about the leaders’ capacity to make decisions in relation to the scholastic needs and use of digital technology. As each school was a
bounded case study, the multiple site case study analysis was used to consider similar findings from these schools or interpret the differences.

Although the nature of the descriptive response by the interviewer was technically different to the collective response and attitudes of the focus group participants the thematic interpretation of the data through the use of a framework made vital connections between the nuances of the different survey methods.

**Validity and reliability**

As with all research it is the responsibility of both the researcher, reader, and all participants to follow a process that is seen by all involved as being trustworthy. The two measurable methods used to ensure this are validity and reliability. As previously established this research followed a paradigm of qualitative research so all references to validation and reliability have been framed from this point of reference. Although theory supports the nature of reliability to stem from positivism, (Davidson & Tolich, 2003) and validity stems from interpretivism, Cohen, et al., (2007) point out that there is a requirement to have both verified and included in research so that the research can stand scrutiny by readers and researchers in similar fields of study.

**Reliability**

The goal of reliability is to minimise the errors and bias within a research study. In order for the ideal of research being able to be replicated, or more importantly, the process of the research being repeated, Yin (2009) advises that researchers should document as many operational steps as possible so the same steps can be repeated to allow similar results to be concluded by another researcher.

In this research study an external method of reliability was to be inherent within the case study methods, where external reliability meant the degree in which the study could be replicated (Bryman, 2008; Cohen, et al., 2007; Yin, 2009). Due to the difficulty in being able to freeze a social setting and the replication of each
participant’s opinions, feelings and attitudes along with identifying exact circumstances within each school, Bryman (2008) suggests that a researcher, in trying to replicate the original study, needs to adopt a similar social role.

Reliability, therefore, in being able to sustain scrutiny of rigor by a panel of academic peers needs to assure them that the process of the research was documented sufficiently, leaving a trail of procedures for the repeat of these procedures to arrive at a set of results which may reflect similar findings but also reflect the evolution and complexity of social settings.

The choice of methodological triangulation offered this case study research strength in the use of multiple site and multiple sources of data. The more data that was used and the evidence of documentation attributed to the reliability factor of this methodology.

**Validity**

Validity is a requirement for qualitative research. No research design can stand up to the rigor of scrutiny in being 100% valid, but researchers take every reasonable precaution to undertake a research that maintains a good degree of validity. The aim of the researcher is to minimise invalidity and maximise validity (Cohen, et al., 2007). Ultimately validity is concerned with the integrity of the results and conclusions that are generated from research. (Bryman, 2008). One method of validity that may best support a case study method of research is that of internal validity, where the question of whether a conclusion that incorporates a causal relationship between two or more variables can be justified (Bryman, 2008). The goal of internal validity, therefore is trying to achieve a good match between a researchers’ observations and the theoretical ideas the researcher develops (Bryman, 2008; Cohen, et al., 2007).

In the consideration of deficiencies and issues with internal validity, Yin (2009) explains that there are two issues that can ‘railroad’ the validity of a researchers design. Where research can explain the how and why of an event that might lead to another event, an incorrect conclusion of a causal relationship between these two
events may be deemed invalid if a third event or factor may have attributed to a secondary cause to the how and why of the researchers conclusion. Overcoming this invalid process is difficult, so a process of scrutiny within the analysis of results phase of the research can limit this possible failure of internal validity (Yin, 2009). The second issue concerns the broader sense of a researcher making inferences due to the researcher not being able to directly observe the whole event. The degree in which a researcher may infer an event through interviews, focus groups or documentary evidence can result in the internal validity being deemed inappropriate for the research. Tactics for achieving results with minimised invalidity can be addressed in the methods used to analyse the research data. In particular, the more sources are scrutinised through the process of triangulation should therefore reduce the limitations and deficiencies of internal validity.

For case study research, Yin (2009) states that there are two areas of the research that can particularly target and address the issue of validity and reliability. The phase in which reliability can attribute to a good research study is undertaken in data collection and the phase for validity to best be addressed is in data analysis. In choosing interviews and focus groups as two of the research sources the researcher needed to ensure that the both methods captured what they intended to measure, in this case how leaders, digital leaders and teachers were making informed decisions in relation to digital technology.

Cohen, Manion and Morrison (2007) point out that the researcher must be free from bias in undertaking the interview and focus group process although at best this is not entirely possible. Therefore there needs to be some training undertaken by the interviewer so that when in the process of interviewing individual staff and facilitating the focus group participants the researcher does not offer any opinions, display any attitudes or give away any expectations of what is being sort through the interview. Practice for this was gained through a pilot survey where comments on the neutrality of the interviewer was be confirmed by those involved with the pilot survey.
For reliability, Cohen, et al., (2007) recommend that interviews, and for consistency of data gathering methods, focus groups, use highly structured research questions using the same format and sequence of words and questions for each setting, so that all the participants comprehend the questions in the same way. Open-ended questions are acceptable for reliability as Silverman (1993) that “this enables respondents to demonstrate their unique way of looking at the world – their definition of the situation”.

With the use of a tabulated framework for the analysis of data, validity was enhanced through the framework when the interview and focus group transcripts were categorised under the same research questions. The same measure of meaning across the three sources of data was realised through thematic analysis of the data. This data analysis method was seen then to be a methodological triangulation process which strengthened the validity of the data and results derived from the process.

**Ethical considerations**

Ethics within the realm of social science has become a necessary and cautious mandate for all researchers. The key aspect to consider in ethics is how researchers should treat others when undertaking their research study. Ethical reasoning should always contemplate whether the research is justifiable. There are four main topics a researcher needs to consider in order to eliminate the prospect of unethical behaviour which may cause harm to either the organisation or individual participants involved with the researcher’s study.

**Harm**

Bryman (2008) outlines four main issues around ethics in social science research methods, harm, informed consent, privacy and deception. Bryman (2008) points out that researchers need to be careful not to harm participants through physical, mental, personal development, self-esteem, stress or inducing them to perform reprehensible acts. In undertaking this research data-collection, participants were
assured that identities and records of individuals would be maintained as confidential, and that findings did not identify either the individual or their place of work. Within this research an annotated lettering system was used within the framework of references when considering the interview or focus group material for analytical methods.

Informed consent
This is the largest area of concern in the area of ethics. Wilkinson (2001) offers a rule-of-thumb with his explanation of ethics. “When there is no danger to the interests of the subjects in doing research, there is no need to ask for consent” (p.22). Wilkinson (2001) points out that for the sake of people’s well-being, participants in a research study should be allowed to give or withhold consent to their involvement. He points out that people know themselves best, know what’s good for them, and often choose what they wish to participate in for their own well-being. Therefore informed consent means having access to sufficient knowledge and information about the research for the participant to consent to the survey. The consent aspect means that it is “voluntary only if it is obtained neither by coercion nor by force” (Wilkinson, 2001, p.16). From the professional association known as Social Research Association (SRA), (as cited in Bryman, 2008, p.121), research participants, “should also be aware of their entitlement to refuse at any stage for whatever reason and to withdraw data just supplied”.

For informed consent, (see Appendix 1 – 4; Information and consent forms) a brief but succinct outline was offered to prospective participants, informing them of the purpose of the research and any likely benefits that might be found useful. The consent form offered full autonomy and confidentiality for both the participant and any material or transcripts obtained from the interviews and questionnaires. Participants were offered access to the transcripts of interviews and focus group material prior to having the transcripts used for research analysis and their right to having any sensitive material removed was honoured.
Deception

Wilkinson (2001) and Bryman (2008) caution the researcher regarding the issue of deception. Fundamentally, any material obtained by manipulative means, or work that is presented as something other than what it is, is known as deception. Deception is seen by authors as deliberate and an insult to any participant’s autonomy. To avoid this, clear proposals, methods of research data collection and the provision of adequate knowledge and information to the participants gave the participants clear comprehension of the research, a promise of autonomy, confidentiality and the voluntary nature of what constituted informed consent. This process enabled this research to be protected from deception.

Rules and regulations of ethical procedures

Scrutiny and acceptance of the research by UREC offered both staff and students compensation for personal liability of researchers under the insurance policies held by Unitec, provided that research was carried out according to the protocols approved by UREC. The requirements of the committee’s request for eight ethical principles and what steps were be taken to ensure harm minimisation had been provided are outlined in Appendix 7 of this thesis.

Conclusion

Within this chapter a summary of the rationale for the use of a qualitative case study research, methodological triangulation and the design methods of data collection has been presented. The use of multiple site case studies assisted in obtaining a rich source of data and offered a means of more accurate analysis of the data through a framework of triangulation. This interpretative method of analysis provided material to assist in deriving themes to support a basis of research discussions and recommendations.
Chapter Four - Findings

Introduction

The purpose of this chapter is to report the findings of the three case studies from School M, School N, and School P. Within each case study this researcher considered findings from documents provided by the Principals, information gained from two interviews; one by each school’s Principal and the other a nominated leader of known digital technology competency or whose portfolio of responsibility it was to oversee digital technology in their school. The third section to each case study took into account what was discussed within focus group sessions at each school from staff who were invited to attend based on their degree of digital technology competency and use of this technology in their classrooms.

Establishing a research participant context

In order to contextualise each case study the information in Table 4.1 provides three key characteristics that showed how each school was classified. The classifications used represent established New Zealand educational reference points that are often used when research is being undertaken to inform educational policy, educational research and educational funding by either Ministry of Education agencies or other interested organisations. The classifications also help to establish the particular context that each case study operated under when considering the responses and views expressed by the participants from these schools.

Table 4.1: Case study context for participating schools

<table>
<thead>
<tr>
<th>School Decile</th>
<th>School Roll – (July 2011)</th>
<th>Student Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>School M</td>
<td>8</td>
<td>932 - 957</td>
</tr>
<tr>
<td>School N</td>
<td>8</td>
<td>1194 - 1225</td>
</tr>
<tr>
<td>School P</td>
<td>7</td>
<td>825 - 867</td>
</tr>
</tbody>
</table>
Case Study one

Documentary analysis

The documents provided by School M were their Charter, three year Strategic Plan from 2009 - 2011, and their current Annual Plan. The school updates its Charter document annually along with its Strategic Plan which is a three yearly process. The preparation of the Strategic Plan for 2012 – 2014 was in the process of consultation for Term IV of this year. The Annual plan is a derivative of the Strategic Plan. All documents are reviewed in consultation with the staff, middle managers, Senior Leadership Team, Board and parent community.

The purpose of the Charter, Strategic Plan and Annual plan fulfilled the overall legislative Education Act requirements of Section 60 in the Ministry of Education National Education Guidelines (NEG's) for Planning and Reporting. Section 61 (2) of the Education Act states that:

The purpose of a school charter is to establish the mission, aims, objectives, directions, and targets of the Board that will give effect to the Government's national education guidelines and the Board's priorities, and provide a base against which the Board's actual performance can later be assessed. Government of New Zealand. (Ministry of Education, 2004)

Within each Charter the Board had supplied a long term Strategic Plan and an Annual Plan for establishing and executing these Plans in the designated period. The production style of these documents were a directive of statements that needed further unpacking, distribution to parties concerned, and a process of further investigation, implementation and review by those delegated with this task. The documents were written in a formal style of short, direct and concise statements, free of ambiguity.

The Charter by School M was focussed on general principles of establishing the school’s main education purpose and with whom its main clientele are by outlining its Mission, Charism, Community, Personnel and Faculties, Stakeholders, the
Principal’s Vision, the Special Character dimension and Maori Dimension. The Strategic Plan, on the other hand, considered special initiatives or objectives that the school could target over three years to increase designated areas of concern through specific themes within this Plan. The five themes were Special Character, Success for All, Quality Teaching, Environment and Community. Although there was one area that directly linked to the Schools Charter, that of Special Character, all other objectives appeared to be driven by the over-arching of the Principals Vision statements in providing “the opportunity to discover and develop their [students] talents” (School M Document, 2011, p.3).

The Annual Plan had more purposeful and short term topics which sought to investigate, plan for, improve and provide refined systems and structures that helped to solidify the processes around these topics. Some of the topics did not relate to the Strategic Plan but were seen as an urgent topic of review through either demands or requirements being imposed by the Ministry of Education’s current focus of National standards, literacy and numeracy with specific focus on Maori and Pacific Island achievement. The Annual Plan had been supplemented with a schedule of progressive achievement test (PAT) percentiles for the past four to five years with statements of intended increases as its target for 2011.

Within all three documents there was mention of digital technology but each document viewed digital technology from a different perspective. The Charter stated that School M had “A fully integrated digital technology system (including wireless) for student use, serving computer laboratories, library and classrooms” (School M Document, 2011b). The Strategic Plan document under the title of ‘Success for all’ had an Objective that stated; “Strive and support improvement in literacy and numeracy skills, including ICT literacy” (School M Document, 2011d). The action statement from this objective only suggested that there would be a continuation of being involved in the ICT cluster group (by staff). No other means of considering how ICT literacy would be addressed had been mentioned. The Annual Plan had no direct reference to any ICT or digital technology. When written there was no intended cross-reference to ICT however some aspects of the annual plan
implied the use of an LMS to provide assessment data evidence to monitor improved academic results.

From a school wide facility focus this school stated that it was well resourced in terms of having a fully digital technology integrated system for student use. The support for improving staff knowledge of digital technology through continued support of the school driven ICT cluster meetings was seen in its three year strategy. However little was offered in the way of how the school decided what was supported further in the way of teacher requests and the use of digital technology from a teaching and learning perspective.

**Principal Interview**

During the interview with the Principal of School M three major points were made throughout the interview. They were:

- The financial investment of supplying digital technology to the staff;
- Undertaking professional development in DT followed by evaluating and gauging the professional use and commitment of DT by staff; and,
- Evidence that supported effective use in teaching and learning that supported improved student progress.

When initially considering the support for DT in the school the Principal invested heavily in the supply of laptops for all staff and had data projectors installed in every classroom. The Principal then became aware that the equipment was not being used for its intended purpose. He stated that “staff actually were rarely using that technology no more than as a glorified overhead projector”. For this reason the Principal adopted a decision making process of evaluating and being presented with evidence for further requests in DT. This was a typical theme repeated throughout the interview process by the Principal when he said the following. “Okay, tell us how you’re planning to use it, what are you going to use it for, how often are you going to be using them?”
The second major point had two facets to it. Firstly, the Principal set about to improve the use of DT by providing staff with professional development in the use of DT for the classroom. “We started a professional development program here at this school. We actually became part of an ICT cluster of which we were the lead school in that cluster”.

The next issue that concerned the Principal in supporting any requests for further DT hardware or software was whether the staff had the technical knowledge to use the items or programs. The Principal sought assurance that the staff were prepared to undertake and were committed to professional development that supported the use of their DT requests. The Principal stated that:

...we’re almost forcing the teachers to reflect on their own professional development in the use of this digital technology before we will actually deliver it. [We’re] making sure that the staff member has got the professional nous to actually use it effectively...

The third major point was repeated through the interview many times. It was spoken about as one of the reasons for providing professional development to the school when the Principal said:

...and the idea of that was, in fact, to actually give teachers here at the school professional development on how the digital technology hardware and software can, in fact, be used to enhance teaching and learning.

From the first major point to this third point the Principal was consistent in his adopted decision-making process around things digital. Every request, regardless of by whom or for what reason the Principal consistently repeated this type of statement:

Show us the evidence of what you are going to use this for - link it to teaching and learning and yes – it’s all there – right, we’ll go and support you with that.
‘Us’ from the Principal’s perspective represented the Head of Digital Technology, who, according to the Principal had some degree of espoused influence with decision-making associated with DT.

**Head of Digital Technology Interview**

The Principal nominated the head of digital technology (HDT) for this second interview. From this interview many issues were raised that collectively presented themselves in these four main points:

- Philosophical cognition of DT’s pervasive future in everyone’s lives;
- Decision-making process in professional development in staff confidence, staff resistance, academic dividends of DT and the barrier of DT capability of staff;
- Requests for DT that support pedagogical practices weighed against the New Zealand Curriculum (NZC); and,
- Notion of mentoring and coaching by early adopters.

When contemplating the importance of DT in the school the HDT provided an insight into why DT needed to be taken rather seriously within schools. Not only was it the responsibility of teachers to teach how to use all the different types of ICT but that the use of ICT was not confined to the school’s hours of operation. Statements that iterated the HDT conviction that DT was extremely important were illustrated by these two sentences, “Digital technology is pervasive in the student’s lives and will become more so”, and “It’s just going to be..., in everything, every table, every chair, every piece of clothing we put on”.

The issue of professional development in DT was considered one of the weakest areas within the school. Some of the issues that highlighted this point included: how teachers needed to change how they taught when using DT; the funding of DT professional development, the support given to departments when applying for DT; staff not having confidence in the use of DT; an acceptance that they did not need to know everything about DT before using it; and, the barriers around teacher
capability. The area of staff resistance was a concern that the HDT expressed by saying, “there’s no point in throwing ICT at a school if the teachers aren’t willing to change how they teach”. Ultimately the HDT thought that there was an issue around the decision making process. Who was going to make decisions that supported the professional development of staff around these numerous issues? The HDT stated that, “it’s the decision-making process about who’s going to do the professional development, and paying for that professional development”.

The HDT acknowledged that his position of being the HDT was central to the decision-making process around requests for DT items. Staff requests were first fielded to him for consideration, then if the merits for the request were seen as beneficial against his criteria by asking the following question of them:

How’s that [request] support your teaching and learning and how does that support the new curriculum and how will..., what sort of dividends will be paid within your class..?

The possibly of their requests being granted was considerably high. An issue of traditional pedagogy was raised around staff who he saw as users of DT as tools, rather than using DT in a new pedagogical fashion. The HDT said that, “The fact that we still have a lot of traditional teachers that really just see ICT as something extra..,” was used when he was illustrating how staff saw the use of DT as a type of tick box requirement to justify the professional development spent on them by the school, “to be able to tick the box to say – yes I have done ICT”.

Although there were many issues discussed around DT there were also practical solutions offered that the HDT believed would go toward improving the use of DT by staff which would also address the confidence and competency issues of staff. Without having to go outside the school the HDT suggested identifying the expertise within the school both from within the staff and from the students. This statement supported his theory; “Because there’s a whole lot of unsung heroes running around doing amazing things”.
Both the Principal and the HDT stated that when having to address issues around DT it was pertinent to slow things down and take the time to follow an investigative decision-making process and consider school wide implications before a decision was made. As the Principal put it, “you’ve really got to take this slowly without actually rushing in”. In supporting the issue of professional development of staff the HDT summed it up in saying, “I find you have to start from the teachers who are really keen and interested; who are adopters, and then move it out from there. And that’s not a fast process”.

From what the Principal and HDT were saying it seemed that there was little in the way of an initial school wide adoption and use of DT teaching that was put into practice at School M. From the initial financial investment phase to the current decision-making process a key thrust of professional development was echoed across these two interviews. However, as previously indicated by the HDT comment on unsung heroes there appeared to be a handful of competent users from across the spectrum of departments that were acknowledged by both the Principal and HDT, and who were shoulder tapped for the focus group data research process.

**Teacher Focus Group**

As with the nomination of the HDT the Principal nominated a select handful of staff deemed to be competent DT users. Throughout the discussions the competency of the focus group members became apparent by their intuitive knowledge in the use of DT in their teaching. The focus group discussions highlighted these main points:

- Confidence and reliance in the HDT;
- The value, reliance and worth on DT within their teaching;
- Professional development in ‘trouble shooting’ DT;
- Concerns around management of DT systems;
- Ethical and moral use of DT by students; and,
- DT literacy checks.
At the onset of the discussion it became apparent that staff present wished to acknowledge the value and worth of the HDT. Not only did they rely on this person’s ability to support and supply the items they requested but they were extremely confident that this would be the case. This comment by teacher MT1 set the theme of the discussions about the staff reliance of the HDT’s support. “He is brilliant. He has his finger on the pulse, basically and senior management trust him. So – if we can convince [him] – [he] will convince them, basically.” Although the staff were very much aware of the process of having to apply for DT items via the annual departmental budget process, there was a resounding confidence echoed by the focus group members that their requests would be approved. Though not directly mentioned the focus group members, comments like “[He] is very skilled and very good at what he does.” by MT1, was repeated often in their comments.

When considering the importance of DT in relation to their teaching practice one member of the focus group commented that DT was an extra to the normal ‘chalk and talk’ method of instructional teaching. The comment by MT1 gave this impression by saying:

It’s the icing on the cake – it’s not the cake. It adds 10% but it’s..., if we had to we could go back and do ‘chalk and talk’, and in ways that would still be relevant to the students. But - we want to do the extra 10%.

It was mentioned by the focus group members how they recognised the value of having DT to support and compliment their teaching practice. A comment by MT2 reflected this in saying, “Having all this at my finger tips means that you’re creating visuals in your student’s minds all the time”. Focus group member MT5 explained how effective the use of DT was by saying, “It just adds so much to the variety of the lesson.” Another area of concern was knowledge held within text books was no longer relevant to current teaching material. The focus group members expressed a reliance of being able to access up-to-date information instantly, and conveniently via DT methods. The terms instant, current, convenient and readily was often repeated. Focus group member MT1 stated this on reasons for DT use:
...relevance and being up-to-date and you can do that with digital technologies. A text book, these days, gets out-of-date so quickly where if you have digital resources - they can always be up-to-date...

Another aspect of the worth of DT was seen by one member of the focus group as a crucial issue. The point raised by teacher MT3 was “trying to determine what actually is relevant with where we’re heading. What’s worthwhile? Teaching students with regards to digital technologies that will set them up well in the future.” A possible underlying issue that was implied through this statement was related to having a directive of focus by senior management.

Very little in the way of professional development was discussed within this focus group as conversations about how DT was being used within classrooms seemed to be the norm for these focus group members. A request by the teacher MT3 seemed to back up the level of competency these members had in DT when there seemed to be an insistence of having staff well trained and capable of trouble shooting issues in DT rather than having a dependence on an IT technician to fix these problems. The implication was the amount of down time around the reliability or trouble shooting staff could be faced with in DT breakdowns. Teacher MT3 supported this issue in stating, “...making sure that staff are well trained and up to speed and have the nous to deal with those issues as best they can on their own”.

It was made clear that the management of DT use within School M was seen by some focus group members as being detriment to equity of availability and access of use by staff. Where certain staff had access to DT by being owners of equipment within their departments and were silent of this fact, others were vocal about management issues where equipment was being shared by many departments, or staff had a reliance on the computer-on-wheels (COW’s) and not being considerate of others wishing to utilise the use of COW’s as well.

Another area of concern was the ethical and moral responsibility of the school to educate students on the use of DT. Cyber-bullying was one area of concern along with what material students published online. It was expressed that with all the convenient and available uses of DT there was also a risk of the DT being misused
by the students. Teacher MT1 stated that “...with the great potential of digital technologies there's a great potential for misuse”.

Although there were many more issues raised one stood out as an issue of digital literacy that had an impact of the assumptions staff had on a student’s ability to use computers at a basic publishing level. Teacher MT3 mentioned that:

[We] talk about numeracy and literacy but I also think, in this day and age, we also talk about digital literacy and.., we need to actually assess what level students are at in terms of their digital literacy.

From this focus group member’s experience some of the core skills in using power point and Microsoft applications were not seen. There was reasoning and agreement that the current testing of students upon entry to the school indicated a fair percentage of competencies in using Microsoft office applications but some students were in need of education which was not addressed at all through the schools teaching programme in relation to what was being taught in the ICT classes. Students do not necessarily see the need of Microsoft office when there are ready made applications (apps) for phones, tablets and IPads.

Case Study One summary
There appeared to be an alignment with the Charter, Strategic Plan and with the focus of decision-making undertaken by the Principal. The current three year strategic plan was coming to the end of its intended strategic period and linked in with the Annual plan where the management of the school was continuing to provide professional development to staff in the form of ICT cluster group meetings. The process of setting up and supplying DT hardware and operating systems were undertaken in the previous Strategic period where large financial investment of DT had already occurred. Staff competency and use of DT was an ongoing concern for the Principal and through this awareness of DT underuse remained sceptical of department requests without following a reflective decision-making process. This was reiterated by the Principal when saying:
You’ve got those huge dilemmas of the professional learning of the staff, demonstrating the effectiveness of how you’re going to it – how it’s going to enhance learning. You’ve got the practicalities of then supplying the hardware to the practitioners so that they can go ahead and do it.

There was quite a large degree of confidence that both the Principal and the focus group staff had in the HDT. The Principal had trust in the requests by the HDT. This trust was based on a developed sense of confidence the Principal had in the HDT. The Principal knew that the HDT operated from a position of expert knowledge and fully investigated all DT issues before approaching the senior management for approval. The members of the focus group had also developed a trust relationship with the HDT. Their confidence and reliance in having their requests accepted had been proven through a method of providing researched evidence that the HDT would make deliberations over, and if seen as beneficial to increasing student engagement, their faith in getting their requests was deemed inevitable.

An area of similar concern in staff professional development and competency was shared with both the Principal and the HDT. However reasons for this concern appeared to be from two separate causes. The Principal reflected on the financial investment the school had put into DT and sought the beneficial proof for new DT requests by asking teachers to prove how it would improve their teaching and learning. The HDT, on the other hand, considered how the request for DT linked to the NZC and what sort of dividends would be paid within the class. The clarification of dividends was left unjustified but implied that teachers were limited in considering how DT supported the outcomes of use within their teaching practice.

There seemed to be a divided interest from the perspective of DT used by the Principal and HDT and that of the DT competent staff of the focus group. The staff interests were around the difficulties and challenges they faced with the use of DT. Their concerns were mainly around problem solving the management systems and the implications DT had on teaching and learning. They were reflective of the impact DT was having on students and were being creative in trying to solve the
management issues faced within their department areas. In an ideal situation, they would not encounter equipment logistics issues as everyone would have all the DT equipment they needed. Professional development would be specific to their needs and equipment failure would be non-existent.

The HDT saw the complexities of professional development and the varying degrees of proficiency that staff were experiencing. Those with DT competency were being underutilised as coaches for training those who were less confident and capable. The question of funds to support more professional development was an issue the HDT wanted further support with from senior management. The Principal could see that DT had its uses within the classroom but the Principal’s perspective was holistic in seeing how DT was impacting on the demands for more professional development, increased supply and operating costs and the need to have this justified by staff making the requests.

Case Study Two

Documentary Analysis

The documents provided by School N was their Charter and three year Strategic Plan from 2011 – 2013. The school updated its Charter document every year along with its Strategic plan which was a three yearly process. The process of preparing the Strategic Plan for 2011 – 2013 was prepared by the principal and the senior leadership team. The general purpose of the Charter and Strategic Plan is outlined in the Documentary Analysis of School M [1.2.1].

School N’s Charter was focussed on general principles of establishing the school’s main education purpose and with who its main clientele were by outlining its Mission, Vision, Value Statements in Catholic Character, Primacy of Learning and Pastoral Care. The Strategic Plan considered special initiatives or objectives that the school planned to target over the next three years to increase designated areas of concern through specific themes within this Plan. There were ten strategic directional themes in total, with three themes that directly linked to the Schools Charter, that of Catholic Character, Primacy of Learning and Pastoral Care. All
other strategic directional themes appeared to be driven by the over-arching guidance of the Schools Value statements.

Within these two documents there was mention of ICT technology but the Charter only had a value statement that was interpreted to imply reference to ICT. In the value statement that considered the historical evolution of a core founding principle there was an underlying meaning that was used to justify any further reference and support of things ICT related. Part of the value statement read as, “Building … outstanding men”. The value statement went on to read “This implies a commitment to boys learning needs”.

Within the Strategic Direction Themes there were two objectives that outlined the schools ICT intentions. The first was found in Objective 1.3; No.4 where professional development in Information Technology courses and support was being offered to staff along with an expectation that staff were to continue with their own up-skilling in e-learning. The next reference to ICT was found in all five parts of Objective 2.3. The theme behind these statements was to equip the students with relevant ICT and research behavioural skills.

From a school wide focus this school was looking toward being well resourced in terms of having Interactive White Boards (IWB’s) in every room. From Objective 1.3; 4, this focus was directed by the Principal. The suggestion of a pilot scheme to introduce laptops to students at a junior school level was an initiative related to targeting holistic computer competency in ICT research methods by 2013. By then the use of these laptops will be actively encouraged by the school in all of the subject areas these students are scheduled for.

Principal Interview
During the setting of this interview the Principal would often hold up and refer to the versatility and convenience of accessible knowledge the Principal’s iPad could download. The Principal's enthusiasm was observed as well as many references made that related to its perceived brilliance and versatility.

65
There were five main points that the Principal iterated through this interview. They were as follows:

- Who has the expert and legitimate advice on things digital?
- New teaching methodology;
- Up-skilling and readiness of staff;
- Pedagogical factor of improved student engagement; and,
- Evidence of improved student exam results.

The Principal espoused to be proactive in the process of trying to ascertain who the experts in DT were and what advice was genuinely going to aid in the implementation and delivery of DT hardware and software demands from the staff. Not only did the Principal espouse in seeking advice from competent Board members, reviewed evidence of trialled DT use in other schools and consulted with the IT technician, the Principal explained that a concerted effort was being made to upskill themselves on the latest technology available. The Principal’s use of the iPad and evident enthusiasm for DT had been fuelled by stating, “I’ve seen brilliant teachers use it... it’s a very engaging sort of methodology ... you use a lot of senses... it’s very eclectic... it’s synthesising different points...”

But when trying to decide who the actual experts were in supporting any decisions on the use of school wide technology the Principal was in a conundrum due to the different ways people viewed the same issues. As the Principal with the overriding position of making the final decision the Principal stated that, “A lot of it is my gut instinct. I know what’s going to work if I’ve done it”.

The Principal was also concerned about what impact DT would have on future teaching practices. Even though the Principal made no mention to any specific literature, the Principal claimed that there were concerns that considered the trend of moving from autonomous teacher directed learning to that of teachers becoming facilitators of learning:
The clash of whole-class teaching versus individualised teaching, and teacher facilitation. That business of [when] the teacher goes into the room, he or she is in charge of the room, the fount of all knowledge. That classroom, versus the new classroom, which is - knowledge is all around you, everyone’s got it on their fingertips [internet access]. So it requires ... less whole-class [teaching] and more individual and more facilitative [teaching].

When considering the challenges around DT the Principal continued to reiterate that the staff were neither ready nor skilled in DT. The recognition that some staff were eager and willing to use DT in their classrooms outweighed the Principal’s conviction that the majority of staff were yet to be accepting of DT in their teaching practices. This point gave the Principal assurance that DT was a meaningful practice within the classroom. This was seen in this comment, “[There’s] not a critical mass of people who use it. We have to see the world in a slightly different lens. If you see it in a slightly different lens you'll actually be more, more enthusiastic about it.” The Principal’s comment about the need to up skill the staff, including senior management, was seen to be an ongoing process, one which was not accomplished by a one fix solution but rather a process of incremental stages. The Principal's comment exemplified this when saying, “It’s a slow process... it's actually up-skilling teachers in small bits, getting faculties on board little bit by little bit. I think we need to do more on that.”

The Principal's interview seemed to give the Principal time to contemplate issues around DT as the Principal was keen to prove the benefits of using technology to staff through the Principal's own enthusiastic convictions but at the same time was concerned that the use of DT had to be supported from a pedagogical stance. This comment, “Will it keep kids hooked on a bit into learning? Is it going to be effective? Does it lead to engagement [by the students]?" were questions that the Principal answered in the affirmative. But when faced with requests for DT by staff the Principal admitted that there was still a process of addressing the pedagogical factor behind the staff requests. Examples of questions the Principal asked the staff were:
I can see that you’re a teacher who would like to have this, but ... show me what’s going on, show me how you’re going to use it, prove to me that it’s going to enhance the learning process for those young people.

The interview process seemed to give the Principal time to put things into focus as the Principal was collectively considering all the issues around the use of DT, almost as a reassurance that DT had a definite future in the school. Often the Principal seemed to be deliberating issues around the significance of DT, in this case around tests and examinations. This comment typified this deliberation. “Whether it leads to better exam results I’m not sure. That’s my only little thing. And that ultimately is what’s going to happen. Does it lead to better exam results?”

At the end of the interview process the Principal’s cognitive deliberation of ideas and issues came to a resolution of three main points. These form the basis of the decision-making process the Principal appeared to use whenever considering issues and requests of DT. It is apt to finish with the Principal final words:

Those to me are the big decisions, getting the balance between making it available; making sure that the staff member has got the professional nous to actually use it effectively, and seeing the outcomes for the students that it is improving their learning outcomes.

As a point of interest the Principal did not make any specific mention of considering the opinions of the e-learning co-ordinator when referring to school decision-making process in relation to DT.

**E-Learning Coordinator Interview**

For the second interview in School N the Principal nominated the E-Learning Co-ordinator (ELC) who is also a teacher of Mathematics. The co-ordinator’s position had only been in effect since Term three of 2010. During this interview several issues were discussed that collectively represent these main points:
• Decision-making process;
• Evolution of DT and its effects on teaching; and,
• Staff buy-in and professional development.

The whole issue of decision making was a point of frustration for the ELC. Although the ELC acknowledged that they were part of the consultation process where the ELC was supplying the Principal with statistical research data that provided, in the ELC’s opinion, clear evidence of the value of DT in projects such as the laptop project, the ELC was frustrated by being just one opinion of many on the topic. To the ELC, time was a commodity the ELC could ill afford to waste. On the issue of the Board and Principal needing persuading on items of significant expense, the ELC said, “Time... it’s really difficult to compile that data to show someone why we need to spend all of this money”. The frustration was also heard around having to wait for trialled evidence before a decision was made around the certainty of buy-in by the Board and Principal.

It was apparent by the ELC’s responses that the ELC was well read and held comprehensive knowledge on current thinking around DT. The ELC was aware of new trends that had been published around how students viewed information on the screens of their computers and made specific mention to literature such as the Interface magazine. The ELC reiterated the point that conventionally, information was read from top left to bottom right from books but recent research explained that students viewed information differently on computers by picking out items or images of interest first. It was because DT is being presented and published in ways that attract the newer generation in engagement with its material that the ELC made this point:

I think it’s essential that educators are realising that things aren’t the same as when we were in school and the way we were taught. And so it’s really important to adjust for that appropriately.
Staff buy-in and professional development was a topic of great interest by the ELC. Through a Ministry of Education ICT initiative, (Ministry of Education, 2008) the school was already involved in an ICT cluster group with another school. And because of the similarities of software programmes the two schools had, the ELC explained that they bounced ideas off each other. However, the ELC was of the opinion that more effort was needed to be made by the school to help staff with barriers to DT. This comment helped to frame this concern. “I think it’s really important to have someone in the ... IT area that makes them comfortable with being a bit lost.” The ELC was keen to create a climate within the school for staff to have a willingness to learn things digital through having onsite experts who could work one-on-one or in small groups. A second train of thought was around having sufficient time for staff to be trained on new equipment. The reality the ELC said was that, “they sort of have to learn while they’re using it”.

**Teacher Focus Group**

The staff participants who were nominated to participate in the focus group meeting were selected by the ELC. Throughout the discussions the competency of the focus group members was seen by their confident responses in the use of DT in their teaching. The focus group discussions highlighted these main points:

- Student engagement;
- Senior management and decision making;
- Time management issues in resource;
- Professional development;
- Staff and student buy-in; and
- Staff competency.

The five focus group members of School N were positive in their belief in, and use of, DT in delivering lessons that contributed to student engagement. Teacher NT1 said that DT enriched the lesson more by the use of multi-media. This was supported in saying, “[There is] a wealth of information out there that can make lessons so much more interesting for the students”. Other examples of how students were engaged in lessons was explained in the use of interactivity type
devices, the tactile factor of hands-on DT usage and having the students’ work published. Teacher NT2 stated that in providing variety to each lesson had the potential to increase student engagement. This was agreed upon by teacher NT4 when saying, “Why do I choose this? Variety. And also because it makes it more real for the kids”. Although no data was provided by the focus group members to support increased student engagement, it was their observation of this behaviour that helped to clarify this issue. Teacher NT1 justified this in saying:

There are now groups of students coming through who have a need for stimulation from all sorts of digital media. If used well it can probably increase learning. And increase their interest in the subject.

There was some confusion as to who was involved in making decisions with the use of DT. Teacher NT1 first stated that the Principal, Deputy Principal in charge of curriculum and the curriculum head were the decision makers. From this point on the other focus group members appeared to be in doubt about this initial comment. From an initiative point of view the members of this focus group were under the impression that they just needed to approach the IT technician in order to have their request implemented. When considering who made decisions on DT and what processes were involved it was stated by Teacher NT4 that, “I don’t know that that’s actually clear, or transparent, as to who actually makes the final decisions and... why they’re made.” The process of proper consultation by the senior management team seemed non-existent to the focus group members. Teacher NT2 stated that:

It seems to be a top-down approach to senior management having an idea then putting it to the committee who then look at it... there doesn’t seem to be a conduit from the other way, from the bottom up, from individual teachers to that committee.

Teacher NT4 gave some philosophical insights into why senior management were distant and seemingly unattached to the pedagogical use of DT in the classroom. “I do think management want it to happen... [but] they don’t actually know how to use it themselves... because they really have no idea themselves of the intricacies of
teaching with it.” No specific mention was made of the newly appointed ELC by the focus group participants in relation to decision-making processes.

Teacher NT5 provided reasons for the use of DT in their classroom by saying, “…it makes my life easier. Having resources already made up for me by someone else, or making it myself and then you’ve got it there for the next year to use.” This prompted a further comment by teacher NT1 around time management and not having enough time within a normal teacher’s day to either find internet resources, create DT type resources, management of and updating information on the schools LMS and putting material on the LMS for students to being careful managers of their own time was reflected in the comment made by teacher NT1. “As a teacher you have to manage your time really well”. Teacher NT2 saw links between time issues and professional development saying, “I think time is a massive factor; professional development time.” The participants stated how they did not have enough perceived time to undertake in-depth and meaningful development of their resources.

Teacher NT2 spoke of how, in having an ICT cluster group with another school, with the opportunity to bounce off ideas with each other had been helpful in broadening ways to use ICT. They stated how “…being exposed to…different ideas and different ways of teaching and different ways of presenting material, and different tools that are out there which we may not have come across” was beneficial as part of their professional development. All of the focus group teacher participants acknowledged being early adopters of DT and had also attended other DT type courses which had furthered their competency in teaching with DT. But what was expressed around professional development was the school’s lack of addressing professional development needs with all teachers. When teacher NT5 explained that, “making sure that the right professional development’s in place” this teacher was referring to the second issue around professional development; that of staff buy-in.

Staff buy-in was seen to be discussed around those staff that the focus group participants were aware of that had not taken up using DT because of prior
experiences where, upon initial use of software programs or equipment not being reliable, these known staff were unconvinced of the benefits of DT use in their teaching. Teacher NT4 thought that more professional development could be offered but went on to say, “...also persuasion that it’s worthwhile” was needed as well. The responsibility of buy-in, although noted as a professional obligation by them to their colleagues, teacher NT4 thought a more convincing way to address this issue was through involving senior management on the issue:

...from management, ... a big buy-in that says, this is the way to go, people, and this is really good, and this is exciting, and it’s the way the school’s going to go, and we will resource you into it, because we really want you to take it on.

A collective issue around four issues of time management, professional development, staff buy-in and staff competency were intrinsically linked throughout this focus group’s conversations. There were many points made around competency that offered merit to why some staff were resistant to the use of DT or that DT was not easily implemented in certain subject areas. Teacher NT2 speculated with this response:

...it may just not work for some people... digital technology may be easier to implement in some teaching areas or subjects than others, as in there could be a wider range of resources out there already in certain subject areas as opposed to others. And some subjects naturally lend themselves towards different styles of teaching...

Around all four issues the focus group participants were keen to offer ways in addressing the whole professional develop competency issue. They saw the merit in continuing to network with others schools, especially with staff in similar subject areas. Observing other competent users of DT was offered as a means to expose the less competent DT staff to the use of DT by teacher NT5. The expertise of students was also spoken about but few tended to see agreement with this. There had been an earlier comment made by teacher NT2 around student apathy of
accessing and using the ultranet to download their resources that seemed to have festered with some undertones of agreement by the rest of the focus group members. None of the participants mentioned the expertise or role the ELC had within the school or if the ELC had been addressing any of these issues.

Case Study Two Summary
There was a degree of alignment between what the Principal and ELC were trying to investigate with regards to the laptop scheme and what was written within the Strategic and Annual Plans. The issue of laptops was also spoken about in the context of the decision-making process and consultation by the teachers in the focus group. This was stated by teacher NT3 in saying, “[the] proposal to integrate laptops ... in Year 9 next year... we’ve been discussing the pedagogical, the technological, the economic and the school culture impacts and... the SWOT analysis.” Although the ELC was frustrated by both the time factor and decision-making process to implement this scheme, the Principal and staff were satisfied that the process was underway, that discussions were taking place and that trialling looked positive for the eminent implication of laptops into School N.

The issue of up-skilling and offering staff professional development was a topic all parties were in agreement of. From the Principal’s point of view there was a readiness factor that the Principal continued to ponder and reiterate throughout their interview. Both the ELC and competent teachers in the focus group were concerned that other staff needed to be shown the benefits of what DT could offer in regards to the impact DT could make in teaching. Staff buy-in was seen as crucial to this point with both the ELC and teachers offering advice on how this could be accomplished. DT competency was the ultimate goal in offering professional development to those staff that were reluctant, or seen to be resistant, of DT. In their own separate ways, the Principal, ELC and focus group teachers were all competent users of DT in their respective fields. Each were sold on the value of importance DT offered in making their teaching and professional duties easier but there was no conduit of communication between these key positions in school to allow recognition of this fact.
The one area that all parties were in disaccord with was the school's managerial decision-making process. Consultation had been evident with the Principal, ELC and some members of the focus group but this consultation was seen to be limited by the ELC and focus group teachers in that it appeared to be a top-down process. Little in the way of trust was felt by these two parties, as what they had to offer in the way of expert advice didn’t seem to influence what the Principal was basing a final decision on. To this point the Principal was in agreement as the Principal often referred to the issue by saying, “Part of the problem in this area is who do you believe?” Trust between the ELC and the focus group members was not fully established although a degree of alliance between them was seen in the similar opinions held by the ELC and the focus group participants.

**Case Study Three**

*Documentary Analysis*

The documents provided by School P was their Charter, a three year Strategic Plan from 2011 - 2013, and their current Annual Plan. The school updated its Charter document annually along with its Strategic Plan that was prepared every three years. The Annual plan was a derivative of the Strategic Plan. All documents were reviewed in consultation with staff, students, Maori community, Parent Community and BOT. The School’s Charter covered five elements, that of an overall guiding vision, a description of its community, the philosophy and meaning of the school’s Motto, and purposeful vision statements derived from the values identified in the New Zealand Curriculum 2007.

School P was in its first year of the three year Strategic Planning cycle. It had six Strategic Goals for the period of 2011 – 2013. These goals do not have a clear descriptive link to the School’s Charter, but could be interpreted to link to, and support the purposeful vision statements. In considering a pathway to addressing DT within the Strategic Plan Strategic Goal No. 4 first stated: School-wide practices that incorporate and utilise 21st century technology in facilities that reflect the principles of Modern Learning Environments.
There were six objectives that addressed this specific Strategic Goal, all having a direct link to IT:

- Increased teacher and student use of information technology to improve learning – by developing and implementing an IT Plan;
- Increased access to and use of computers by teachers and students out of class;
- A school website that is effective at both communicating relevant and up to date information as well as promoting the school in a positive way;
- The introduction of an LMS;
- Develop and implement an effective wireless network solution; and,
- Update school network via Ministry’s SNUP programme.

The Annual Plan stated specific ways to start to address goal No.4 in stating:

- A school wide IT plan is in place for 2011;
- Training and equipment is provided to increase and improve teacher use of laptops, data projectors and interactive whiteboards;
- Increase student access to computers both in and out of class time;
- Develop use of E-Portfolios by both staff and students;
- Develop school wide Learning management system (LMS) for use by both staff and students; and,
- Investigate and develop a proposal for a school wide wireless solution.

At the end of the Annual Plan, School P had listed eight professional development priorities for 2011. The sixth priority was listed as - ICT skills and knowledge. There were no further descriptions as to how these priorities would be addressed within the Annual Plan.

Principal Interview

The main points from the discussion with the Principal of School P were:

- Informed expert knowledge and advice supported by proactive PD;
• Consultative decision making process and the trust factor;
• Management of issues inherent with DT; and,
• Escalating cost factors.

The Principal’s confidence in DT was related to the Principal’s method of ensuring the information they used to assist the decision making process was informed by informed expert knowledge. The Principal’s belief in being proactive to gain this informed expert knowledge was achieved by sending staff on courses and conferences that would enhance their own knowledge and ability to use DT in a more pedagogical way. In providing an example of this the Principal said:

...we’ve been quite proactive in ensuring that the decision-making people, particularly my head of ICT and my technician... get good professional development... to make sure that they can make informed decisions...

The reliance of informed expert knowledge also stemmed from the Principal’s acknowledgement that the schools IT technical support company was updated and up-skilled and at the forefront of the latest technological advancements in IT and was supplying the school with sound professional advice.

The annual budget process from each department was the method of how the Principal could initially gauge the collective requests for DT. There was also a degree of consultation at middle management level that provided each department opportunities to substantiate their requests via the HOD’s report. Over and above this process the Principal had a degree of professional trust that HODs were doing their ‘homework’ around their DT request. The principal said that:

...to a large extent we have to trust our HODs that they’ve done their homework and that they are telling us that ... the use of digital technology will enhance... learning outcomes in their subject areas.
There was also a blanket conviction by the Principal that junior classes were going to be supported in their requests for DT without much persuasion on the Principal’s behalf. The Principal’s belief that DT could motivate boys, in particular, and the lesser ability classes was seen in this statement. “From my perspective and point of view that’s gotta be a positive in enhancing the learning and engagement of junior students.”

Although there was the annual budget method of putting a coherent Plan to forecast and address Department DT requests, there now was evidence of an escalation of term by term requests for DT based on integrating learning practices that was driven by curriculum demands. As well, the school had marketed the use of DT extremely well. This was seen in this comment by the Principal:

As we’ve exposed teachers to more digital technology and how they can be more effective in promoting learning with it, the uptake is just increasing.

Other issues of a more sombre note were considered to be the process of having to manage their potential implications rather than having a positive impact on the use of DT. Safety and security of the students’ own digital devices was an increasing concern. The impact of students using their Smartphone’s for abusing data-download by accessing material through wireless connection at the school along with items that had no educational relevance was expressed by the Principal in saying, “And how do you manage that?” The most concerning issue was cyber-bullying. The principal expressed a resolution of acceptance on the issue of funding students’ access to the internet for games and music by stating, “We’re just going to have to bite the bullet and accept it as part and parcel of having an open network that people can access”.

Tied in with having a school with wireless capability was the cost concerns that was having a major impact on the Principal’s decisions to continue to support DT. The Principal had indicated the pitfalls of being an early implementer of new technology. The Principal’s explained that, “you have to be careful if you’re an early implementer because early implementation is always more expensive than wait and
see; and then buy it when it’s six months or a year old”. The Principal also stated the conundrum of financially supporting the costs of DT infrastructure, data, equipment, which was, “getting close to 10% of our total operational grant. Expenditure is either on digital technology equipment or support of software and services associated with that which is really significant”.

Another issue was the equity of providing DT resources against pulling funds away from other department budgets. The Principal was in no doubt that DT was an area that needed to be continuously supported. The Principal’s expression of its increasing demand on the school’s resources was seen by this statement. “It’s like a tide that you can’t hold back!”.

Throughout the interview the Principal’s concerns were seen to be around the holistic implications of DT in the school. Costs and potential pitfalls were being outweighed against a belief in the educational benefits of DT in supporting improved learning and engagement, especially at the junior level. The Principals’ focus remained fixed on the structural framework and collaborative support of digital technology.

*Assistant Principal Interview*

The second interview in School P was with the Assistant Principal (AP) who had responsibilities in curriculum leadership. During the AP’s interview several issues were discussed that collectively represent these main points:

- DT pedagogy that supports curriculum delivery;
- Consultation that highlighted a human resource deficit;
- A cognitive paradigm shift in ICT; and,
- Human resource difficulties in bringing about change.

Any issue or discussion that existed around DT, from the AP’s point of view, would always have root in what the curriculum could provide or imply the use of with these types of technologies. In having a curriculum leadership responsibility the AP stated that digital technology was seen, “as a facet of the NCEA framework with
classes and what’s offered to our students. Digital technology needs to support pedagogy and in ways that will enhance student learning”. In considering what information the AP considered to be important in deciding how to support requests for DT in the class this statement links the rationale of pedagogy with classroom practices. “The discussion is how technology can increase the teaching and learning practices., advance the effectiveness of the teacher and learning practices”.

The method of consultation with staff and HOD’s regarding course outlines and what’s on offer within each department area was seen to have been an effective process at School P as recent discussions through such a process considered the direction IT was heading as a specialty subject. When the consultation process was underway the AP mentioned that the staff involved were having to decide, “what direction courses will take and whether there’s changes... regarding what digital technology courses we offer”. The process pointed out that within the staff body there was no particular staff member with sufficient proficiency in moving IT type courses from the Text Information Management course into a new direction of computer use. The result of the consultation with departments led the senior leadership team to realise the human resource deficit of technology in the courses the school was providing and created a new position within the school to address this issue. The AP clarified this by saying:

We just recently employed a new computing teacher who is very keen on expanding the digital technology framework through technology curriculum regarding website development, coding..., all the programming – some of those areas that we don’t currently offer at school.

In considering the strategic move to plan for a new course framework in ICT, the AP acknowledged that DT was going to be more progressive within the curriculum and surmised that ICT would offer a new paradigm shift in how students would engage in this subject through saying, “I only see it as being an advantage, being able to move away from the low level cognitive work into the much higher level of cognitive work”. Early adopters of DT within the classroom environment had
contributed to this belief by communicating how it had changed the way teaching occurred in the class. The AP’s comment on this was, “Teachers that have embraced it – find that it’s changing the way that they teach... its shifting pedagogical change through the use of it”.

The AP, in stating that DT would inevitably move toward a “progression [of] one-to-one computing” realised that this would impact on how teaching practices would need to change. The biggest challenge that needed addressing, as the AP stated was the:

...human resource of teachers and staff and senior management – basically the whole school environment. Whether they’re willing to make those changes?

The human resource factor held many issues that the AP knew needed to be considered if change could in fact take place. The first was time and having to move slowly in order for sustainable change to occur in teachers practices. When talking of staff seen as resistors of DT the solution offered was outlined by saying:

We’re grabbing hold of the earlier adopters and the people that have a passion and using them to create a backbone for us to be able to push forward in the digital technology area with the equipment and with the pedagogical change that’s needed.

In acknowledging the presence of staff resistors and the challenges that needed to be addressed the AP stated that:

...the willingness for people to change the way that they teach and the perceived work that they think is there regarding learning new practices and creating new resources, and really changing the way that they teach.
This could be achieved through having more funds available from the government and creating an environment that could support this change by utilising the expertise of the early adopters of DT within the school.

**Teacher Focus Group**

In nominating a select handful of staff deemed to be competent DT users the Principal included the recently appointed specialist ICT teacher (SIT) whose responsibility included the introduction of the school’s LMS. The focus group had just two more members; one with approximately eight years experience at School P and the other being a first year teacher. The focus group discussions highlighted these main points:

- An improved consultation practice from a historic top-down dictated practice;
- Technology that lacks vision, guidance, advice or direction from the schools leaders;
- Responsible engagement through digital citizenship;
- Teaching spontaneity versus access and equipment reliability;
- Professional development and the development of openness to school culture; and,
- A question of the Ministry of Education’s obligation to provide equity in equipment and a framework of curricula guidance.

Prior to the appointment of the SIT there had been experiences where there was a perception that DT had been forced onto staff without a process of consultation to consider the readiness or necessity to support teachers in how they taught in class. Teacher PT1 explained that, “it was very much senior management making decisions and then plonking technology in the classrooms without a huge amount of consultation”. The conversations around offering the technology to this teacher was reiterated in this dialogue by PT1:

[said by the senior leadership team]... “You are a young teacher. Do you want a smart board? Oh yeah, alright. Well, we’re going to put one in your room anyway” So the decision was kind of made without consulting about
how I might use it or how I might implement it in my pedagogy. It was kind of, "we want to try it out. You can be a trial teacher. Are you willing to try it?" And that was probably about the extent of the consultation in that particular decision.

The obligation to use it was noted by both the long term teaching staff member and the first year teacher. Teacher PT1 explained that, "... a lot of us probably didn't choose to use the technology. The technology is kind of there, and ..., we don't have a lot of choice about using it...". The response to this by PT3 was that, "It costs ten thousand dollars so you may as well use it!" Since the appointment of the SIT, processes around decision making and consultation had changed considerably and all focus group members agreed that a sense of cohesion now existed between them and the SLT of School P. A process of consultation considered the feedback from key specialist staff, including those willing to participate in the process and those with competency in DT. The recognition that this process of consultation was fairly new was stated by PT2 in saying, "But I think it’s quite a new system within the school".

Along the same lines of consultation was an indication that decisions around DT were knee-jerk and lacked any real focus. Teacher PT1 explained a dialogue that the senior leadership team (SLT) possibly used when a new piece of technology became commercially available, "how can we incorporate this into our teaching?" Rather than stepping back and saying..., "Okay, this is what we’re trying to achieve with our teaching. Which tools are going to help us achieve that the best?" This was backed up by frustrations around school wide initiatives that had been the focus of professional development in Wiki’s (organisational communication through blogs) last year and the new focus on the LMS known as Moodle this year. In collating the discussions around a lack of consultation, professional development, ad hoc implementation and the perception that decisions were knee jerk, teacher PT1 stated that the school needed a, "...vision of how we want to use it in the school". They explained how this vision needed to be backed up by thorough
research and investigation into what other schools were doing, talking to experts, considering world-wide trends and arriving at a vision that would work for School P.

There was an acceptance that DT was leading toward an inclusion of student owned digital devices and an acknowledgement that with this was a moral duty by the school to teach them to use DT effectively and responsibly. Teacher PT1 stated that, “we need to be able to teach them how to integrate digital technologies into anything that they’re doing. Because that’s what their lives are going to be like in the future”. Some consequences of poor judgement of use through known scenario’s of items and images being posted on YouTube were cited as reasons why a Digital Citizenship programme was being considered by the SLT. The purpose of this programme was to highlight the safety and consequences of poor use. Teacher PT2 explained that, “What gets posted today may come back to haunt you in 25 years time”.

A degree of concern around the lack of sufficient computers in each classroom and the reliability of computers led to an issue of how computers hinder the spontaneity of teaching. Teacher PT3 explained that on the occasion where having immediate access to working computers added to being innovative in reacting to the response of students. The reality faced by staff through the ordeal of having to book laptops or the computer rooms in advance took a degree of spontaneity from the ability by teachers to react to times when differentiated learning opportunities presented themselves. In having to deal with unreliable computers, software not working, or the need to book in advance was seen by the focus group members as a hindrance to their teaching. This was stated by teacher PT2 in saying, “It takes all the spontaneity out of teaching... You can’t actually use technology in a spontaneous way.” On the issue of reliability of equipment teacher PT2 iterated that, “for example you have this ‘amazing’ lesson plan and you’re all excited and you’ve told the kids, and they’re a little bit excited to and then you sit down and it [computer software] doesn’t work.”
Throughout the focus group discussions there was a realisation that through the perceived lack of a school wide vision of DT, the purchase of three different types of IWB’s that required their own operating software and idiosyncratic methods of use was an issue that needed to be addressed by the SIT. This came on top of the desire for staff to be given professional development time to learn how to use the IWB’s more efficiently and effectively. Although it was acknowledged that the SIT already had a weekly lunch time slot dedicated to staff for professional development there was a covert activity by staff in not wanting to be recognised for their lack of computer nous. This stemmed from the admittance by some staff privately visiting the SIT’s room that they did not want to appear incompetent in the use of computers in front of students or their colleagues. Teacher PT1 saw that there was a need to create a school culture of openness and acceptance of those with less knowledge in the use of DT. This resolution of an openness to a digital culture considered the importance that teachers needed to be life-long learners and that professional development needed to include students as tutors for this cultural concept. Teacher PT1 summed up the discussion on an ethos or culture of learning DT by saying:

... developing a school culture of - us learning and incorporating the kids in our learning of technology as well. If we’re expecting the kids to be able to try new things and learn new technologies and implement them in what they’re doing in their lives then we need to be able to do that as well.

The issue of having a Ministry of Education prepared framework, generic digital equipment and software that supported teaching and learning within every school in New Zealand was continually iterated as the real issue behind New Zealand schools poor DT decision-making. One of the causes of having no Ministry of Education guidance in DT was surmised as the reason why the school had purchased random DT equipment and had software that was not seen to be industry compatible. The solution to this incompatibility was the ideal of having the Ministry of Education pay for industrial recognised generic software, site licences, annual replacement of computer hardware and having an investment in DT through
a structural framework of ICT application in specialty courses and core subjects. The equity factor of schools having to decide how much was needed to be set aside for DT could be addressed by the Ministry funding the same budget for every school. It was seen as a huge problem faced by the Principal in deciding how much money needed to be allocated toward DT against the demands by other subject requests. The final comment by PT2 seemed to cement the confirmation of this dilemma faced by their Principal when saying, “I’d hate to be in the Principal’s shoes [whispered]”.

Case Study Three Summary
There was a degree of alignment of what was written in the Strategic Plan and the progress being made toward addressing these through the Annual Plan. Of the six goals within the Strategic and Annual Plan, three had been mentioned in the interview and focus group discussions. The strategic employment of the SIT was crucial to the implementation of an LMS as reported by the AP. Although clearly stated in the Strategic Plan there was no indication that the school’s management had made any progress toward the development and implementation of an IT plan.

In considering the priority the school was intending to offer in professional development toward ICT skills and knowledge, only the Principal seemed to acknowledge this when stating the support of professional development to the SIT and IT technician for the purpose of creating expertise with informed knowledge.

From being informed of the historical practice of limited consultation by the teachers within the focus group, all three parties had described an improved method of consultation that was seen as a consistent theme from within all their conversations. A more coherent process was now a recognised standard practice seen by those who were involved in making decisions that related to issues in DT. Although some teachers had previously witnessed a poor process of consultation relating to the placement of DT equipment in classes, it was apparent that this practice had been superseded by the appointment of an expert specialist ICT teacher who, in the short period of employment at School P, had been encouraged to obtain current DT knowledge through attending professional development
courses and conferences for this purpose. In particular, an element of trust resided with the Principal and those the Principal saw as having informed knowledge and expertise.

A disparity still appeared to exist in the decision-making process in School P. Where the Principal’s vision was focussed on holistic issues and implications of DT use and the SIT was charged with the introduction of a curriculum vision, an LMS and tools to assist staff with managing their resources, the perception that a DT vision was in dire need still existed with two members of the focus group.

All the participants in School P were resonant in their concerns for the escalating costs associated with DT. The teachers of the focus group were definitely aware that equipment was expensive and felt obliged to using the DT equipment, even though they had received little training in its use. The AP in trying to consider ways to address issues in DT stated that, “It’s resourcing – it’s very hard to resource that equipment, it’s expensive.” The Principal was conscious of this fact by the mounting costs and dilemmas of supply and demand and saw the direct implications of cost through the reconciliation of budgetary demands on the school’s overall operating costs. Some alleviation of the Principal’s concerns had been resolved with the concerted efforts in promoting the school as a school of choice for international students. The success of this programme was witness to the school having over 50 international students attending School P, all for the need to counter the escalation of DT costs on the school operating budget.

There was a common issue of student use of DT that was viewed from two different directions. The principal had to address inherent issues of equipment safety along with the potential abuse of downloading material for non-educational purposes. The focus group teachers were concerned about the moral responsibility of informing students how to use DT for effective means. The consideration of a digital licence was seen to aid in the education of consequences of having material permanently published on the Web.
There was a disparity observed between the Principal, the AP and the focus group members on the topic of staff digital competency. The Principal’s focus was more on the balance of equity of equipment and DT resources by the departments. The AP was concerned with how to implement change within the school, with a particular emphasis on pedagogy and the teaching practices that include a methodology of teaching with the use of DT. The teachers in the focus group were more aware of staff that had issues in competency in front of their colleagues and students. A school wide culture to address an atmosphere of being open to these types of issues was being promoted by the teachers.
Chapter Five - Discussion

Introduction

When considering the issue of multi-case study analysis between the three schools involved with this research the process of data gathering through interviews and focus group meetings was but a snapshot of a moment of time in the life of the participants of these schools. Issues that were discussed then may now have been resolved, further compounded or new issues arisen which require these schools to continually undergo the consideration of these through their individual methods of processing and management. It is therefore important to note that any conclusions derived from the findings are past tense and very much established in the time of this research.

This chapter is divided into three parts. The first part is a synthesis of the findings across the three schools grouped around the differing data collecting tools. The second part identifies three major themes that have emerged from the findings and the third part considers the implications and challenges these themes pose the various DT leaders within these schools, specifically with regard to decisions made in the use and management of DT within these schools. The following Figure illustrates how the cross-case sources and cross-case analysis aid in the identification and merges of the implications and challenges faced by those who have a structural responsibility for DT within their schools.
DT and School context

Each school had its own culture, ethos and individual beliefs in relation to how students should be educated as stated and indicated in their Charter and Mission statements. The consideration of each school’s management structure, DT systems structure, documentation and personnel structure was outlined to show that each of the three schools were contextually different in their operations and management processes.

In Chapter 4 of this research the necessity for each school to have its own Charter, Strategic and Annual Plan was outlined within the New Zealand Education Act.
All three participating schools provided these three items as part of the request for data gathering for this research. Within each school’s Strategic plan there were statements that indicated that each school had an awareness of issues relating to digital technology. However, any similarity of how each school addressed DT issues was made apparent within their strategic plans. Although the structure of IT is discussed later in this chapter it was because each school was at different DT development stage that their documents reflected different needs and issues pertaining to DT.

Two of the three schools had ICT as a major focus within one of their strategies for consideration and implementation. Where the focus for School N was equipping their students in having relevant ICT and research behavioural skills, School P had a more holistic view of how ICT was impacting on its Strategic plan by considering school-wide practices that incorporated and utilised 21st century technology in facilities that reflect the principles of modern learning environments. The third school had surpassed this stage of their implementation of DT and appeared to be focussed on the continued support for ongoing professional development for its staff.

Professional development was documented by two schools to be strategically linked to achieving the goals for implementing or supporting ICT within their Strategic Plans. School P had made a point of professional development in DT to be an overriding priority for three years. In the third school professional development, specifically for DT, had not been specifically allotted within its Strategic Plan.

**DT and Documentation**

From the analysis of the Charter and Strategic Plan of each school it was ascertained that School M was further along in its support and implementation of digital technologies, specifically in terms of an LMS that supported its staff in managing and providing a DT infrastructure to support DT. Major equipment and teaching devices had been already been supplied and installed. Rather than having
to strategise for the implementation of DT School M had been able to address DT requests and issues of data access and wireless installation as part of its normal process of ongoing support for items pertaining to DT.

The DT infrastructure of School N was similar to that of School M in having an operational LMS and the provision of ample equipment to teachers with recognised competency and use of DT in their classrooms. Although the infrastructure was available, and acknowledgement of use by competent staff was stated, there was a noticeable lack of directed use of this system. It was not made clear as to whether the ELC was actively promoting the use of the LMS but there was substantial evidence heard from the digitally competent teachers that there were issues needing to be addressed around the use of their LMS. The consideration of an LMS was seen as a priority for School P, especially as it had made a recent appointment specifically for the implementation of such a resource management system. The installation and use of DT equipment seemed to have been driven from a historical process of *ad hoc* supply and experimentation. Although seemingly well equipped School P was at its infancy in having a recognised DT structure of purposeful implementation and use, even though it had included professional development in its planning documents.

**The Principals and DT**

All three Principals held a degree of acceptance or belief in DT for improved teaching and learning opportunities in their schools. As to what had enabled or influenced the Principals to develop a belief in providing support for DT in their school was not substantiated. However, in having an operational school ultranet and an IT infrastructure that supported teachers in the management and use of their own teaching resources was evidence that each Principal had accepted that there was a progressive need to have these DT support structures in their schools.

All three schools had utilised the Ministry of Education TELA scheme for the benefit of providing teachers access to and use of a computer for their professional teaching needs. In having a portable laptop computer, Cowie, Jones, and Harlow
(2011) found that teachers became more efficient, confident, competent and productive in the use of laptops and saw an increase in the professional quality of lesson material. By taking the utility of the laptop to the next stage, all schools had indicated a commitment to providing data projectors into each teaching space. Although not specifically stated Cowie, et al., (2011) imply that through the increased use of multi-modal electronic resources and incorporating these resources into their lessons teachers were quick to see the benefit of sharing and customising their teaching materials through the use of multi-modal resources that could only have been seen by the students through the use of data-show projectors. Where two schools were still in the implementation stage of providing data projectors School M had met this need and had already observed that these projectors had been under utilised. The principal of this school was of the opinion the data projectors were being primarily used as glorified overhead projectors. The reality was that staff had simply progressed from preparing handouts and overhead transparencies to displaying their prepared documents via the data projectors. In their work on Interactive Whiteboards (IWB’s) Betcher and Lee (2004) have identified the need for staff to comprehend the potential in DT and not fall into the trap of converting old teaching methods into new digital form, a phrase they coined as ‘old wine into new bottles’. The belief that having access to and the use of this equipment required a different method of teaching was substantiated by the Principals commitment to educate the teachers through establishing and continuing to support a cluster group, for the purpose of DT professional development.

The recognition of increased costs in supporting DT was common to all three schools. All Principals were aware of the escalating cost of data download and the necessity to budget for this as more demand for internet access came about as more staff started to use DT for internet exploration. In two cases Principals had mentioned that the cost in providing access to the internet through the Internet Service Provider was increasing. In School P in particular the Principal mentioned that equipment in the past had been the expensive DT item but this was being superseded by the cost of internet access and data download. In their work on identifying the role of the computer coordinator in secondary schools Lai and Pratt (2004) point out that the Principals and the ICT coordinators have different
understandings of the purpose of ICT in schools. They state that Principals see the cost of equipment as the most important obstacle to overcome in having ICT fully implemented in their schools. This may have been the case seven years ago but current trends indicate that internet access is the over-riding issue for Principals to contemplate. As for coordinators seeing DT issues from a different understanding, Lai and Pratt’s (2004) findings were seen to be similar in the case of these three schools where the digital leaders were focussed on the issues of equipment supply, training and management.

Professional development by the Principals was seen as both successful and a varied point of difference in these schools even though Tiene (2001) strongly suggest that teachers need to take advantage of what the various technologies do best in the classroom. The importance of professional development from Tiene’s (2001) perspective suggests that learning how to use new instructional strategies will be far more of a challenge than the task of learning the technology itself. By the continued strategic move to provide ongoing professional development to staff through their involvement in IT cluster groups the Principals were aware that the uptake of use in the utilisation of digital practices was increasing. Although the Principal of School N continued to support the cluster group initiative with its sister school, this Principal continued to hold a degree of uncertainty that the programme was successful in achieving its goals.

Of major ongoing concern but an accepted practice on their behalf by two Principals was the process of getting staff to justify the requests being made for more digital technology equipment. Although the provision of providing professional development was seen as imperative in developing and promoting more use of how teachers could benefit from the use of their LMS and other software programmes two Principals appeared to hold reservations that more equipment was still being requested. There appeared to be a catch 22 situation where the Principals wanted to see increased use of DT equipment for improved teaching and learning but teachers had to provide the evidence for this before they were supported further. The third Principal acted out of a different stance

94
altogether. Rather than having to justify their requests, the Principal was more trusting of requests made from Department Heads.

In all three schools there was a hierarchical method of annual budgetary requests which some of the focus group teaching staff did not fully comprehend or seem to have knowledge about. Most teachers interviewed acknowledged a hierarchical structure within their schools where their requests for DT equipment and support were directed to either a staff member with HOD positional responsibility or who held a degree of expertise and could advocate for their requests. In School M there was a clear reliance with the staff and their HDT that requests would be granted by this person’s advocacy. Both School P and School N used an annual process of departmental budget requests. A perceived process of not understanding the hierarchical structure or not having any faith on the department heads advocacy skills attributed to comments by the Principals where they entertained individual teacher requests for equipment that bypassed the annual budget process. It can be conjectured that some staff who bypass the budgetary process may have their own particular needs or agendas, but it may also be that schools now need to consider the introduction of budgets that specifically target DT requirements by staff, regardless of which department they are associated with. There is little known literature that can support this conjecture as most scholarly literature seldom looks specifically at this budgetary issue.

**Digital Leaders and DT**

Both the Assistant Principal of School P and the HDT in School M considered the relationship of DT when viewed in context with the NZC. Although the Assistant Principal held the perspective that pedagogy was a factor that needed to be considered in teaching practices of DT, both were reflective and conscious of the fact that DT needed to have links to the NZC and exhibit pedagogical benefits. With School N, consideration as to how DT impacted on the NZC was not the responsibility of the ELC.
The most common element of similarity between all the three schools from the DT leaders points of view were that of professional development and staff buy-in. In considering the importance of teachers and data-driven decision making Wayman (2005) states that professional development is crucial to the sustainability of any initiative involving teachers and technology. The significance of this is so that staff are not having to learn informally from their colleagues. With all the Web 2.0 type technologies available through the Web, Williams (2008) also advocates for professional development so staff can learn about what Web 2.0 can offer them and plan to harness these into their teaching. In studying how technology savvy administrators in the US learned about new DT Schrum, Galizio, English, and Ledesma (2011) learned that without professional development and training new DT did not seem to influence the teachers ability to effectively use DT. From their research Schrum, et al., (2011) found that, “It takes considerable practice for teachers to become technically proficient and for new behaviours to integrate with existing teaching repertoire” (p.261). One of the major findings by Keane (2011) is that professional development in ICT practices is paramount for teachers to become proficient in its use. The main difference from a school positional stance was that two of the DT leaders were in positions where they could actively do something about the staff buy-in issue where as the ELC in School N was only seen to be in a position to support the staff through the organisation of cluster group meetings. The Assistant Principal in School P and the HDT in School M were both anxious over staff resistors and each was contemplative over their resolutions to address this dilemma.

In stark contrast to how the belief in and reliance of the HDT by the staff of School M was seen as pivotal to the success of DT systems and processes there was no mention of such a condition in the other two schools. School N had recently undergone a process of reorganising its internal structure of having a representative from each department attend meetings concerning DT to that of individual invitations to meetings by the ELC. It was clear from the focus group responses in School N that this process was unknown by the majority of their participants. It was most fortunate that the specialist ICT teacher (SIT) attended School P’s focus group meeting as the system of reliance or representation of DT
advocacy was unclear by the other members of this group. The staff were starting to recognise the SIT’s expertise and ability to persuade and inform the senior management of DT needs but this recognition was still in its infancy and only just starting to become par for the course by these teachers.

The context of teachers in relation to DT

Within all schools it was clear that all participants within their respective focus groups were actively engaged in and utilising DT devices and a large range of computer programmes, specifically those with an interactive function. Those staff with a developed LMSs in their respective schools espoused skill in preparing, managing and utilising the material within the LMS as a class resource. There was a general agreement across all schools that the digital interactive programmes provided a positive means of student engagement. This point is strongly supported by Lee and Winzenreid’s (2009) research in IWBs where they suggest that digital teaching resources offer compelling reasons for improving student engagement in the classroom. All three schools agreed that a positive means of student engagement was essential for differentiated ability classes or lower ability classes where student engagement was a factor in the delivery of a good lesson plan. Although the LMS was very much a new teacher tool in managing resources in School P and the SIT had been recently offering professional development in its many functions the teachers of School P were still proactive in using a diverse range of digital programmes that aided in student engagement.

In terms of professional development the competent DT staff in School M and School N acknowledged the benefit of sharing ideas from contributing schools and in developing mini departmental cluster groups for continued communication of ideas. There was no indication that these staff had a reliance on this professional development for their own up-skilling. It was obvious that they were early adopters of DT and had an extensive knowledge of DT as indicated by the variety of DT practices they employed in their classes. School P did not indicate any involvement of external professional development meetings with other schools, rather an in-
house process of professional development in the instructional use of their LMS by the SIT.

From the teacher’s perspective there seemed to be an increasing need to establish an in-house forum for discussing DT issues. All schools expressed an array of issues that were made apparent through the medium of the focus group forum. All focus groups indicated that DT enhanced their teaching and learning prospects (Lee & Winzenreid, 2009) as reiterated by all participants but that it took the focus group forum to make their issues heard. This was apparent by their responses to leading questions. It was noted that the responses by the focus group participants was unsolicited by the focus group process or considered pre-empted by the process of participants being invited to attend a focus group discussion on DT.

In providing an open forum for discourse in the use of DT within these three schools a common element of concern in the short-comings of DT was espoused when the staff examined the reliance they had on DT in their teaching practices. An example of this was the network speed as well as equipment and operating systems failure. In particular, School M saw the competent DT teachers wanting skills in trouble shooting IT type issues rather than having to rely on IT technical personnel. This last point was clarified by the staff in School M where the reliability of operating systems was a point of continued frustration in having to rely on DT to work consistently. In the research of IT technical support in some secondary schools in New Zealand, Bremer (2008) found that the IT technician was not suitability qualified or had sufficient knowledge to understand the needs of the teaching staff. Bremer (2008) was of the firm belief that there needed to be a teacher coordinator who had sound pedagogical knowledge in teaching that needed to liaison and advocate for the needs of the teachers. This was best summarised by Bremer (2008) in saying:

How, I do believe that a teacher, someone who knows and understands the pedagogical purpose of the ICT infrastructure, should remain in operational control of the infrastructure. This is necessary so that they can ensure that
the way in which technology is implemented and maintained will meet the teaching and learning needs of the school. (p.26)

Rather than having all staff trained in how the infrastructure works, schools would best be served by having their digital leader in a position of strategic placement between the teachers and the network support personnel. The most recent findings by Keane (2011) support what Bremer (2008) was recommending; to have a digital leader with an educational background to be in a strategic position to field teacher enquiries and relate these to the IT support staff.

In the use and dependency of an LMS the two schools that had this system clearly established were positive in their recommendation of its benefits to improve this resource management and assessment procedure. School P, again by its apparent infancy of use, was only just starting to recognise the benefits of an LMS and through the in-house professional development offered by the SIT were seen to be excited by the array of supplementary teaching material that this system could provide them. In contrast to its benefits School N was arguably negative on just one point in having a comprehensive LMS, that of the lack of time to make effective and efficient use of their LMS.

When considering the whole school level of digital competency by these schools two focus groups pointed out that there was a growing concern in the disparity of competency amongst their staff that needed to be addressed. That two of these schools recognised this disparity by the labelling of staff as DT resistors gave weight to this whole issue. Another concern was expressed in terms of poor persuasion techniques that Principals, their senior leadership team or those responsible in supporting DT had used to provide evidence of the positive benefits DT offered in teaching. Common to all three focus groups was the recognition of their own expertise these participants had in DT and the underutilisation of their ability in being mentors or coaches to the rest of the staff body. The DT leaders in School M and School P were of the same view and indicated that this was an area of interest in providing professional development to those staff yet to be convinced of the benefits of DT in their teaching practices. From their respective positions all
the DT leaders expressed concerns of varying degrees in staff competency and stated similar reasons for this issue.

An underlying element of fear by some staff in School P in not being competent in the use of DT in front of their colleagues or students was a primary concern of the SIT. This seemed to cement this school's concern for more professional development to help staff overcome this fear through a theme of openness and trust amongst the staff of this school.

In considering the holistic impact of DT in these three schools and in coming to terms with ongoing issues and short-comings by these schools, the perception of a lack of cohesive DT forums and direction along with the disparity of abilities by staff continued to be made apparent by a lack of total conviction by all staff in these schools. Although the schools were providing an infrastructure of DT and early adopters of DT had a belief in the beneficial use of DT to enhance their teaching practices a question of the decisive purpose of DT within these schools remained un-clarified. A question of whether the digital leader could aid in this issue is made by Keane (2011) who makes the link from not having a clear direction to DT to that of positioning the digital leader within the school's management structure. Keane (2011) suggests the importance of having the digital leader belonging to significant teams within the schools' infrastructure in order to create a link to distributed leadership opportunities for the digital leader.

Having staff who lacked conviction or who had experienced unreliable processes or access to DT seemed to provide a smoke screen to the real issue behind the necessity for schools to provide leadership in DT to their staff. Although the early adopters and competent users of DT were complimentary of the diversity of applications and programmes, and the versatility of devices to support student engagement in their classes none were conscious of pedagogy that contributed to student learning. In their work on instructional technology in schools, Lee and Winzenreid (2009) point out that computer technology had not altered the practice of teaching significantly enough to make a substantial difference in convincing those teachers who are literally set in their ways of instruction. This is best
illustrated in Lee and Winzenreid’s (2009) work within the industrial sector and schools were they say:

Technology has altered irrevocably the means of operation in most commercial facilities; however schools still operate on much the same way as they have always done, with the teacher and the classroom as the setting for learning, and with technology playing only a minimal role. (p.vii)

The reliance in having DT equipment, systems and interactive software to support their own belief in having lessons that offered methods of increased student engagement was articulated clearly by the competent DT teachers, even though a few staff from School M and N recognised that DT was not the be-all and end-all of teaching practices. This is again articulated by Lee and Winzenreid (2009) where they say, “Good teachers have always been good at using a variety of approaches and tools in their teaching” (p. 5). But it was not made clear by either the Principals, digital leaders or competent teachers of DT how this technology supported pedagogical practices that proved how students learned how to learn through using this technology.

**Themes**

Intermeshed across the different personnel groupings that shaped the previous sections are three inter-related themes, particularly in relation to leadership and decision-making. The next section in this chapter addresses these themes of expertise, trust and pedagogy.

**Expertise in DT**

Within the structural framework of the three schools there was a variation of who held jurisdiction over issues relating to DT. Owens (2004) states that not everyone gets to be involved in every decision and those with positional responsibilities due to their hierarchical status are seen to have jurisdiction. In the case of School P jurisdiction was that of the school’s AP due to responsibilities relating to curriculum
management. Rather than jurisdiction School M had acknowledged through both the Principal and the focus group members that the HDT held the expertise in DT that supported decisions relating to DT. The recognition of personnel with jurisdiction or expertise is supported by Owens (2004) and Cardno (1998) in their work on who should participate in making decisions in schools. It could be argued in the case of School N where no apparent position of jurisdiction or expertise was identified with the school’s decision making process in DT the Principal may have included the ELC through the zone of sensitivity (Owens, 2004), where the Principal recognised the interest the ELC had in DT matters. This is also supported in Cardno’s (1998) consideration of expertise where expertise may need to be developed from those who hold positions of relevance in decision-making. In this case the ELC could also be considered to hold a high degree of relevance to DT decisions but the final decisions in DT are still left up to the Principal. In School P where the AP had jurisdiction over DT issues it was considered that this may change in the future by the Principal’s efforts in providing professional development opportunities to the SIT. Copland and Knapp (2004) support this practice by a Principal suggesting that the Principal in School P may be using a method of shared leadership and acting strategically; the outcome of the support given to the SIT is to help develop their potential to assume and exercise leadership in DT.

An interesting discussion lies in locating DT expertise within these three schools. From the Principal’s perspective in School M the HDT was the DT expert as this person held delegated responsibilities for DT. In identifying this style of leadership in School M, Cardno and Collett (2004) would suggest that the Principal was distributing their leadership responsibilities because they recognise the quality of skills the HDT has in DT. Cardno and Collett (2004) add that in distributing leadership to the HDT allowed the Principal time to focus on big picture issues within their school. Within School N expertise was not recognised by the Principal, however it could be argued that this Principal may have been acting strategically (Copland & Knapp, 2004) in finding and supporting the ELC with prospects of developing a trust relationship with this person. Copland and Knapp (2006) state that Principals who act strategically and recognise those with potential can be developed to direct and support others in their learning. This is recognisable in the
effort the ELC was putting into the research, support, promotion and commitment to the school’s participation in their DT cluster group meetings. The Principal in School P was also seen to lead by acting strategically in recognising the potential of the SIT had in helping to take DT into a new direction. A style of transformational leadership would support such a move by this Principal in delegating the responsibility of staff DT development by the SIT (Cardno & Collett, 2004).

From the perspective of the focus group members, expertise was not recognised within just one individual person. School M was the exception as the focus group participants of this school made it clear from the start that their reliance and trust in the HDT was uncompromising. Through the HDT’s knowledge and practise of supporting staff in their requests for DT, the HDT was known to be the school’s DT expert. This is supported by Ifenthalar, et al., (2011) where experts are known and recognised in having extensive knowledge and practice in DT through long periods of focus and practice. The knowledge that the HDT had in deliberating responses to DT held a depth of cognitive measure that can only be gained by a person with years of experience (Ifenthalar, 2011). Where expertise was not allocated specifically to one person within their schools, the focus group participants of School N and P were themselves unknowingly recognised as experts in DT by this researcher. There is little literature to support such a pretence of teachers being experts in DT by their early adaption of DT in their teaching practices other than the recommendations by Betcher and Lee (2009) for teachers to see and comprehend the potential of DT within their teaching practice. In being early adopters of DT through the belief that DT supported their practice of teaching is supported by Lee and Winzenreid’s (2009) own work in offering compelling reasons for making significantly greater use of digital teaching resources.

From a students’ perspective teachers who demonstrated using DT in their teaching practice were the experts in this field. In Wilber’s (2010) studies in new digital literacy’s teachers within the subject areas of English, Geography, History and other subjects that require literacy knowledge have a greater responsibility to offer digital practices in their teaching as students are becoming more reliant on abbreviated text in their literacy practices, especially in social networking. Wilber
(2010) states that teachers who must consider methods of improving student literacy in their own subject areas should not overlook the new literacies the students use outside of school. In all focus groups the range of subjects represented across the Art subjects was covered and that these teachers espoused the use of a variety of DT uses through interactive programmes sustained the notion that students recognise teachers as having expert knowledge and ability in the use of DT in their teaching.

The next aspect of DT will discuss who benefits most from having a DT expert in school. Simply put, Principals benefit most so that they can focus on bigger picture issues (Cardno & Collett, 2004). DT is but one of a raft of issues Principals face each day in their duties as Principal. This was evident in all three schools where these Principals contemplated holistic issues in DT with references to cost, staffing development and the perception of pedagogical factors of DT. The best evidence of a school benefiting from a DT expert was observed in School M where the focus group members stated their reliance and faith in their HDT, especially in having a go-to person to help resolve their problems or experiences of DT in their teaching practices. When comparing the difference between teacher formal leaders and teacher informal leadership, Leithwood (2003) supports this idea through recognising a school having teacher informal leadership, especially as these teacher leaders are the go-to person for holding various capabilities in knowledge, skills and ability. The teacher informal leader develops strong relationships with staff in motivating and working effectively with staff. They are known to be good listeners and hold organisational expertise.

The last point of discussion considers whether decisions in DT were reliant on the expertise in these three schools. School M had a greater degree of reliance by the Principal than the other two schools simply as there was a clear individual who was recognised as having expertise in the knowledge and understanding of DT throughout the school. The development of the SIT in School P was the Principal’s answer to establishing a degree of trust in what the SIT could offer in terms of advice in DT matters. The Principal in School N did not seem to have faith that any one particular individual within their school could provide the right kind of
knowledge in decisions relating to DT. Within all three schools the practice of top-down decision making was still a dominant practice. Although this is supported in Gurr’s (2004) consideration of a leadership paradox in DT, Gurr (2004) clarifies that ICT is facilitating input into decision-making from all levels within any organisation. However, the dilemma the Principal faces in the consideration of a collaborative process of staff involvement in decision-making is deciding when to use control over the process. It seems that there is a large degree of collaboration practiced in School M, but only varying degrees of collaboration, in one case – minimal, in the other two schools as Principals appeared to hold onto the notion of hierarchical decision-making within their respective schools.

From the teachers point of view there was a large amount of reliance between the focus group members and the expert HDT in School M. In both other schools the staff could not identify any reliance on one individual expert, and were unable to identify where the expertise was being sort by their Principals. There was a degree of consultation between senior management and staff but this provided little evidence that the Principal or senior management were reliant on what any teachers said in the benefits of using DT in their teaching practices. This brings the discussion to the next theme – that of trust relationships.

**Trust relationships in DT**

On the matter of trust relationships between the Principals and the next level of digital leadership, both School M and School P were operating from a similar vision of support for DT along with an alliance that the process of deciding on the direction and continued support for DT was shared between these digital leaders and their Principals. This development of trust to allow followers to envision similar technological opportunities is seen in Deck’s (1994) work on leadership without followers. Although Deck’s (1994) research is seemingly outdated for the advancements in DT, it still appears to hold true in what was observed in these three schools. For technological leadership, Deck (1994) suggests that leaders need to inspire to work toward a shared vision through the relationship of trust. Only
School N had a dissimilar relationship to a relationship of trust between the Principal and the digital leader. Where the ELC was new to a position of DT leadership the Principal had historical knowledge that the was not known by the ELC. It was apparent that the ELC was unaware that a trust relationship and alliance with the Principal existed.

The process by which the Principals selected their digitally competent leaders with DT knowledge, leadership, experience or expertise was inconsistent across all three schools. What was a consistent thread in this selection was the degree of confidence the Principals had in who they selected. Again, from the older research of Deck (1994) it was apparent that a trust type relationship was evident with the Principal’s and their DT staff. Deck (1994) explained that leaders have faith in new DT and therefore build trust relationships to allow staff to share this same vision of worth in DT. This definitely seemed to be the case in these three schools. In identifying the digitally competent leader the Principals held a degree of trust that the responses these leaders would provide would be fairly consistent with their own ideals in DT. This confidence was not held by the ELC in School N because the trust between the ELC and the Principal had not been nurtured sufficiently for the ELC to recognise it.

It would help to identify the types of trust relationships that exist in these three schools in order to establish that trust is not necessarily recognisable in the relationship between the Principal, staff and the DT expert. Trust relationships were understood by the research participants to be at differing stages and for differing reasons within these schools. From the Principals’ perspective the trust they had in leaders of digital expertise were at three separate stages of recognition. School M had a clear overt relationship between the Principal and the school’s HDT. School N had a covert relationship as the Principal conveyed some reliance of trust with the school’s ELC however from the perspective of the ELC, the issue of trust was an obscure concept and never acknowledged to exist. School P had a relationship that was seen to be transformational as the expert SIT was being groomed to aid in decisions that would lend weight to the Principal’s process of DT deliberations. It can be argued that each Principal operated from a different style of leadership but
the issue of trust remains paramount if the experts in DT are to get the type of support they need in order to function effectively in their ICT-mediated environment (Gurr, 2004). Trust, Gurr (2004) says, needs to be established by the Principal through greater communication so that ICT can be seen to aid the changing climate of DT in schools.

From the perspective of the digital leaders in the three schools the degree of trust was reciprocated by the responses in relation to these relationships. The HDT saw the same overt relationship between their dealings with the Principal in School M. The notion that the trust relationship the digital leader as the SIT in School P was being nurtured by the Principal was not reciprocated by this person, but rather their own acknowledgement that the senior management were starting to listen to the SIT’s ideas was a sign that this relationship was becoming overt. In the case study research undertaken by Robertson (2007), trust relationships are possible through leadership that is stable but these relationships also require a degree of contemporary trust developed between the Principal and those with digital expertise. Although Robertson (2007) also recommends that flattened hierarchies support trust relationships as a critical element that can encourage and sustain change in the DT environment this was not yet a concept the Principals in these three schools were willing to entertain or consider as an option in being contemporary in the development of their trust relationships in their schools.

An avenue for discussion is the importance these three schools place in their trust relationships with the digital leader. The relationship of trust between the Principal, the staff and the HDT in School M was seen to be consistent from all positions in this school. The notion of trust between the Principal and the SIT in School P was not overly obvious but an interpretation of the importance of this trust relationship was seen by the Principal’s desire to up-skill the SIT in knowledge and further abilities in DT. In School N, DT was important to the progress of developing their students in using DT for relevant ICT and behavioural skills, (School N Document, 2011-2013), however, any evidence of achieving this through any trust relationship between the Principal, the staff who used DT in their classrooms, and the ELC was not established. The faith that this Principal had in DT and its versatility did not
seem to translate into trust between this Principal, the staff or the ELC. Deck's (1994) research in the early years of DT into schools still holds true to what was a clear case of the Principal having a deep belief in the worth of DT but had not yet built up a trust relationship to share this faith in DT with. Deck, (1994) states that trust in DT stems from the leader to have faith in this technology and in doing so, builds trust relationships to allow staff to share this faith that this technology is worthwhile. The importance of shared leadership along with the decision-making in DT needs knowledge from all perspectives within the organisation (Deck, 1994). From the Principals' stance Deck (1994) explains that:

True solutions to problems are always based on ideas from multiple perspectives; no individual, however capable, can incorporate the full range of knowledge and experience needed to invent an educational system that fulfils the needs of a diverse community. (p.27)

A question of whether there is any benefit in building trust relationships in the use of DT can best be described as an empowerment exercise by the Principal. By the time investment in the development of trust through empowering those keen to utilise DT with their teaching practice, each Principal in the three schools interviewed were seen to be benefiting from this style of transformational leadership practice. Transformational leadership works on developing trust relationships that can help the school leader achieve their goal of setting directions, developing people and redesigning the schools structure in supporting DT (Starratt, 2003). One of the benefits of trust relationships seen by staff in getting their requests met was by the trust they perceived to have with their digital leaders. A flow-on effect of those benefitting from trust relationships developed within a school was seen in the quality of teaching students received in these schools.

An aspect of the trust relationship found in these three schools also considered where this trust was positioned in relation to the DECISION-MAKING PROCESS. In all three schools the trust between the Principal and any digital leader was varied due to the level of trust developed by the Principal in these schools. Lai and Pratt (2004) point out that because Principals are not the single source of direction and
inspiration they use a role of shared leadership with those who are experts in DT. It is their opinion that the ICT expert leads decisions in IT. Therefore the importance of the development of trust between the Principal and digital leader is critical if the Principal is seeking to make sustained organisational changes in DT.

**Pedagogy in DT**

The comprehension, understanding and utilisation of pedagogy in DT was undefined and misunderstood by the three Principals of the schools involved with providing data to substantiate these claims. In a broad sense all the Principals were pondering the existence of pedagogy in relation to the effectiveness of DT as a teaching practice in their schools. Instead of having a clearly defined understanding of the pedagogy in DT all of the three Principals worked from a personal belief in DT. However, within the framework of the overall school management process the Principals from School M and N each took a position of having staff provide proof that DT could enhance teaching and learning in their classes when requesting more digital devices and funding for these. The term ‘learning’ is the only link these Principals had in relation to pedagogy within teaching practices in classrooms. Exactly what learning evidence the Principals wanted to have clarified was never disclosed in their discussions on pedagogy and DT. The clarification of pedagogy within DT practices amongst scholarly research is indeed very recent. A brief outline of what possibly constitutes pedagogy within DT is presented here so an argument for pedagogy within schools can be realised.

In the case study work undertaken by Jones, Kervin, and McIntosh (2011) in considering how interactive software that is used on Interactive Whiteboards (IWB) they provide two definitions of interactivity; that of technological interactivity where the physical activity between the user and technology is known as Techno interactivity, and the second definition of pedagogical interactivity which can be described as a range of classroom discourse practices through which educational outcomes are met. The characteristics of pedagogical interactivity are actions which stimulate the reflection and intentionality of high-order learning.
In school P the proposition to establish high-order cognitive classes in the digital type subject areas was the focus behind the appointment of their new specialist technology teacher. The evidence Jones, et al., (2011) in their case study research initially found that high Techno interactivity was displayed by the students in the primary school context but there was little evidence to support pedagogical interactivity in knowledge transfer activities. Hadjerrouit (2011) in his study of interactive software programs that are available as WBLOs from the internet suggests that there is pedagogical value in these WBLOs in helping learners to discover and explore things for themselves through these interactive, flexible, differentiated and motivating activities. The term ‘explores and discover’ are the links to pedagogy that suggest that the students will retain knowledge through their interactive practices in learning about new things. This offers teachers some evidence that WBLOs have an element of pedagogical value to programs with an interactive component. The reality behind interactive programs is that they are written by expert software designers who, Hadjerrouit (2011) suggests, are ignorant of learner needs and although written for subject specific areas, are not linked to curriculum objectives.

The question of whether DT will keep students engaged on learning through having digital devices, equipment and access to the Web for opportunities to research knowledge and use interactive programs to engage them is one which remains unanswered by all three Principals. Principals are in favour of having DT for the provision of improving student engagement and motivation as they have continued to invest and provide support for DT requests, even though their belief in its pedagogical value is undetermined.

The belief that students were motivated and engaged in their learning by digital practices in the classroom was stated by all focus group participants in one form or another. The emphasis was more on motivational and engaged terms rather than a pedagogical explanation of how DT practices enhanced student learning. In Lai and Pratt’s (2004) study of the role and purpose of the ICT coordinator in schools they suggest that teachers’ pedagogical beliefs regarding the value of DT in their teaching affected the use of ICT type methods. If the ICT coordinator could provide
pedagogy that supported the use of ICT then teachers were more likely to adopt DT in their teaching. Unfortunately Lai and Pratt (2004) did not justify what this pedagogy was. In the study of IWBs, Lee and Winzenreid (2009) identified the false pedagogical practice of teachers simply converting old teaching material into digital form. Data projectors were the replacement device for overhead projector machines. They advocated, in their belief, that IWBs are the next best instructional teaching device, that teachers need to see and comprehend the potential that DT offers, to master the tools and mindset in claiming the potential in DT and collaborate with their colleagues and student in the effective use of digital tools for teaching in a digital world. This was where the value of cluster group meetings was benefiting schools in offering a means to support the collaboration of DT through open dialogue between these schools.

The teachers in the focus groups discussions were all advocates for DT in their teaching practice, but none espoused pedagogical learning methodologies. The benefits of DT within their teaching practices was stated often by these teachers and that DT was a tool for supporting their teaching was also never underestimated. This supports what Lee and Winzenreid (2009) argue, that good teachers have always been using a variety of approaches and tools in their teaching. Almost all scholarly authors that were reviewed relate benefits for DT within teaching practice and although some evidence considers the pedagogy behind DT (Hadjerrouit, 2011; Jones, et al., 2011) most research authors suggest that DT is a tool that teachers could use to benefit and enhance teaching and learning. Williams (2008) takes a broader view on the progress of teaching and the benefits if interactive programmes where professional development should not just retool teachers in the use of DT but retool teachers in their own competencies in DT.

The studies and research around pedagogy and DT in the learning environment is inconclusive and the link between pedagogy and DT is tenuous at most. It is only the most recent literature by Jones, et al., (2011) and Hadjerrouit (2011) that starts to consider the pedagogy behind digital teaching practices that can offer any evidence to substantiate the effects DT has in student learning. In this research the
findings were no different. Perhaps it could be better stated that the silence of pedagogy was inherit in the responses by all participants in this research. As educators and leaders of educators, from all levels of teacher intuitiveness, awareness that good teaching requires a fundamental knowledge of the concepts of pedagogy behind teaching practices, was not articulated but inherit in the participant responses. It would seem that it is only a matter time before literature becomes available through educational resources and independent literature that schools will become aware of the benefits of pedagogy behind the use and integration of DT in classroom teaching practices.

Cross-case considerations of Implications and challenges for DT Leadership

Leadership in DT was situated within many personnel in these three schools. From the Principals’ perspective the overriding leadership was theirs due to their positional responsibility within these schools. Being the instigators of preparing and delegating initiatives documented in their strategic and Annual Plans (School M Document, 2011d; School N Document, 2011 - 2013) their hierarchical position enabled them to know and understand the holistic issues in their schools, not just those with a DT nature. Consultation around DT issues was inclusive of senior management, digital leaders and staff with DT sensitivity (Owens, 2004) within these schools however the degree of trust these Principals had varied from school to school.

The perception of differing leadership styles would equate to this variation of trust where the Principal of School M used a dispersed leadership method in the reliance of knowledge and expertise in the schools digital leader. In Gurr’s (2004) work on e-leadership traditional leadership methods are still relevant in general school environments but when having to contemplate DT issues Gurr (2004) suggests that leadership needs to adapt due to the level of complexity in DT that has not existed before. In using dispersed leadership the Principal can create a relationship with the digital leader to aid in ICT – mediated environments. In school P where the decision to create a new teaching position in DT very much suggests that the
Principal’s leadership used a strategic process (Copland & Knapp, 2006) of decision-making to address the deficit expertise issue in this school. It also suggested that the Principal’s focus was strategic in stimulating and supporting activities that would have a direct and intrinsic relationship with learning and teaching.

Where the leadership was situated from the staff’s perspective in all three schools was through the primary hierarchical system which included the senior management. In many respects this just translates to transformational leadership (Robinson, et al., 2009; Robinson, et al., 2008; Silins, et al., 2000; Starratt, 2003). In School M the HDT held a high degree of positional trust with the Principal, senior management and the staff. This could mean that since Lai and Pratt’s (2004) research where they saw the ICT coordinators only having a say in the direction and decision making in DT there now may be a recognised reliance of this persons knowledge and expertise by the Principal through leadership that is dispersed.

The types of leadership that support DT from the focus of the Principal looking at issues in DT would not be that of transformational leadership but an adaption of this to include dispersed, shared, distributed or allocated leadership. The ideal leadership would be that which supports or promotes trust relationships. Many scholars (Robinson, et al., 2009; Robinson, et al., 2008; Silins, et al., 2000; Starratt, 2003) recognise that the basic concept of transformational leadership includes setting clear visions and directions, nurturing the capacity of the staff through trust relationships and spending time in the design and development of the schools structure that supports the adults within these schools. Due to the new ICT-mediated types of DT environments (Gurr, 2004) that have imposed a level of complexity of DT decisions the need to share their leadership to those with expertise is now becoming a normative practice. This notion is supported by Keane’s (2011) recent work where she advocates for the digital leader to lead various teams within the school as this digital leader recognises the complexity of DT and should be in a strategic position to direct and lead this complexity.
When Wallace (2001) expressed his argument for leadership to be shared ideally and extensively it was from a focus of teacher entitlement as teachers were, from his opinion, entitled to share in decisions that affected their work in the classroom. Through this entitlement teachers would have been empowered and have an ability to collaborate more readily on decisions relating to DT. With the emergence of early teacher adopters of DT, Principals should be utilising these teacher experiences through the role of the digital expert who, from Wallace’s (2001) opinion should have shared leadership responsibilities. The digital leader experts in the three schools interviewed did not hold any formal authority in DT decision-making and these schools still appeared to rely on the traditional type of transformational leadership in this process. Evidence of effective leadership (Blase & Blase, 2000) suggested that the Principal of School P was likely to develop a strong trust relationship with their newly appointed SIT.

The styles of leadership that could better support DT from a staff focus would be leadership that promotes and executes a clear vision for DT. This suggests that transformational leadership is still the best form of leadership for staff as the focus for transformational leadership is in inspiring staff with a vision that energies and encourages them to collectively work toward a common good (Robinson, et al., 2009). The digital leader in the three schools interviewed did not have positional authoritative leadership as part of their duties in being recognised as experts in their respective schools. All of them were involved in staff professional development to some degree and all recognised within themselves the value of their own knowledge and expertise in aiding those with issues in DT but none espoused total leading authority over decisions in DT. The HDT in School M had a perception that all DT types of issues were being solved by the HDT but this perception was not confirmed by the Principal. It seems then that leadership was not truly dispersed or shared with expert personnel in these three schools but the development of trust relationships between the digital leader and their respective Principals was crucial for these digital leaders to execute their duties effectively. Lai and Pratt’s (2004) work in identifying the role of the ICT coordinator found that the DT expert, a positional term which has superseded the positional role of an ICT coordinator, has major responsibilities related to DT but stated that leadership in their role was not
fully recognised. It seems that this point remains to be true as DT experts from the Principals’ hierarchical position are staff who hold invaluable experience, knowledge and expertise in DT but have yet to be given full trust to run DT independently of the Principals overriding authority.

To translate this into diagrammatic form, Figure 5.2 proposes to illustrate a relationship of hierarchical positions from Principal down to a teacher level, suggesting that leadership opportunities could exist between the boundaries of these levels and that trust could be considered as the all encompassing envelope that is paramount for DT to coexist within a schools purpose for DT.

![Figure 5.2. Trust relationship for DT within schools](image)

The people that benefit from DT leadership in these three schools would be the teaching staff, specifically those known as early adopters or those known for the integrated use of DT in their teaching. From the Strategic and Annual Plans (School M Document, 2009-2011, 2011a; School N Document, 2011 - 2013; School P Document, 2011-2013) to the commitment to provide ongoing professional development to their staff, the Principals continued to promote the use of DT as a tool that could engage students with the hope that these DT’s could ultimately support improved learning and results. The belief in DT was constantly confirmed
by the Principals even if they were contemplating the worth of DT throughout their dialogue. The focus of the Principal in School M particularly was pivotal in establishing how the staff could benefit from leadership that had their best interests at heart. In the recognition that teachers were using DT to do things that were merely a digital conversion of old teaching methods, a term known as ‘old wine into new bottles’ (Betcher & Lee, 2009) this Principal set out to provide professional development that would encourage the staff to create entirely new teaching methods that weren’t possible with old technologies (Tiene, 2001). This leadership vision was not espoused by the HDT. The leadership the HDT provided was in the content and training offered to the staff through the expertise in professional development sessions.

All the participants in the focus groups agreed that all the staff in their respective schools could benefit from leadership in DT (Keane, 2011), for the purpose of better student engagement and increased whole school digital competency. Only the participants from School M were being led by a Principal who had been reflective and observant in recognising that DT had more potential to offer the staff in terms of pedagogical instruction. In William’s (2008) research into Web 2.0 technologies he states that leaders need to be well informed and enterprising. His research suggested that a Principal, with the belief in the advancements in Web 2.0 technologies could provide teachers, was pivotal to for the development of a whole school strategic focus. In redirecting and continuing to provide professional development, the Principal of School M had made the focus of DT important to all staff for them to benefit from the utility of interactive Web 2.0 type technologies that would, in the Principal’s belief, increase the teaching and learning of the students. Both School N and School P had been proactive in making DT part of their strategic and annual focus but neither had contemplated how the DT was effective in teaching and learning and from the perspective of their staff, had no clear vision for DT to address this concern. In their advocacy for IWBs in schools as the only instructional technology that supports improved teaching delivery through its interactive ability, Lee and Winzenreid (2009) explain how DT can enrich teaching, make learning more relevant, engage all manner of students individualised teaching, enhance teaching efficiency, open up new unexplained worlds and
reduce teacher workloads. This provides substantial evidence that staff can benefit from DT in their classes but within School N and School P the leadership for this benefit was yet to be determined and visualised.

A final point to note with leadership in DT is that no one quality is best suited for DT (Glanz, 2002). In his consideration for leadership styles that support educators Glanz (2002) suggests that each person in an educational environment has specific talents and can make unique and valuable contributions to school. In the role of leadership the qualities the leaders possess can teach and inspire others in a significant way. In identifying various types of leadership styles that can possibly support an environment for learning in DT the bottom line for Glanz (2002) is this, “Everyone can lead, yet not all leaders are equal” (p.80). This is possibly the best explanation for why the Principals are seen to lead differently in their schools. They possess leadership skills and abilities and to the most extent, are leading their schools successfully in all holistic issues of school management but in leading specifically in DT their styles differ and have various degrees of effective leadership in inspiring those within their school environments.

**Conclusion**

The realisation that trust and expertise in DT was the major factor that underpins all leadership within these three schools suggests that a closer look needs to be taken into the various leadership opportunities that could be further established and utilised for improving DT practices in these schools. The focus of digital competent teachers was always on ways to improve student engagement through the use of interactive programmes and Web 2.0 technologies available on the Web. The reliance in accessing both the school's intranet and Web was a constant issue faced by these participants. Time was also an issue that hindered the amount of progress that was being made in utilising the advantages that an LMS could provide. What was clearly lacking, from the competent digital teachers point of view was an articulated DT vision from senior management along with decisive
leadership and a forum method to communicate issues faced by the digitally competent teachers.

Digital leaders were more focussed on monitoring the effectiveness of DT systems and having to deal with requests for assistance in DT software applications and addressing the ever increasing need to have a dependable network system with the capacity to provide internet access to staff when needed. The leadership in providing advice to those needing DT assistance was often given without consideration to the digital leaders’ position within the schools hierarchical structure, rather their knowledge and expertise in DT.
Chapter Six - Conclusion and Recommendations

Introduction

This chapter sets out to conclude the research questions that were investigated through a research methodology of interviews, focus group discussions and a secondary source of documentation analysis. The research questions were:

1. Why are secondary school leaders expected to play a significant role in decision-making processes related to digital technology?
2. What knowledge or information is used by secondary school leaders to inform digital technology decision-making to support classroom practice?
3. What challenges do these leaders face in relation to digital technology decision-making?

In analysing the answers to the research questions three themes were found to hold significant importance to the ongoing development and provision of DT within the three schools researched; that of expertise, trust and the issue of pedagogy. In comparing these three schools a key factor that seemed to influence the culture of the school around DT was the expertise situated with digital leaders in these schools (Copland & Knapp, 2006; Leithwood, 2003), as well as expertise recognised in teachers who were competent in the use of DTs.

The knowledge Principals had in relation to DT was more specific to the overall operating procedures and implications of introducing and maintaining a IT infrastructure that supported the needs of the teaching staff using this technology (Lai & Pratt, 2004). The ad hoc nature of entertaining individual requests was evident in all three schools, a procedure that suggested that a transparent process of DT requests was not always followed through the annual practice of department budgets. It was more a case that advancements in DT that teachers, undertaking their own professional development, wished to utilise immediately in their teaching practice. By approaching the Principal directly teachers, armed with the latest knowledge of DT practices, could easily persuade the Principal that their teaching...
and learning would be enhanced by the purchase of new DT devices or supporting programmes.

In the address of the research questions it had been the most recent literature in DT that has provided evidence to support these findings which have not necessarily been presented in Chapter 2 of this research which was mainly written prior to data analysis.

*The significant role of school leaders and decision making in DT*

A key point in trying to substantiate the types of decisions leaders made in relation to digital technologies was the realisation that leadership was not dependent on any one particular role within a school’s organisational structure. Leadership was based on expertise independent of any role within the organisation, particularly those considered to be informal teacher leaders. Leithwood (2003) states that teacher leadership is found within departments and this leadership needs nurturing by the Principal. This was evident in School P where the specialist ICT teacher was independent of a formal leadership role but was proactive in leading teachers in the use of their LMS and fielding issues of teacher professional development and tuition. Leadership in DT therefore needs to be shared with those having particular expertise in the knowledge and use of DT in teaching practices.

In all three schools the Principals held a degree of certainty and personal belief that DT was beneficial to student engagement and learning (Deck, 1994). Therefore the development of mutual trust relationships is paramount. The ideal leadership in DT is one which supports the development of trust relations. This should be across all levels throughout a school’s organisational structure. It was recognised in these three schools that digital leaders held no positional authority in DT decisions but the development of mutual trust between the DL and Principal was paramount for digital leaders to effectively execute their role as DL. This was most evident in the relationship the senior leadership team had with the HDT in School M.

In trying to pin-point and recognise DT leadership in all three schools there was a variance of what constituted this leadership in these schools. Leadership in
positional trust was overt in School M. DT leadership in levels below senior management was displaced in School N and DT leadership in School P was being nurtured by senior management. Copland and Knapp (2006) stated that shared leadership and leadership that acts strategically help those with expertise to assume and exercise leadership. For these schools to utilise the expertise within their organisations, principals should recognise and consider the utilisation of expertise in early adopters and competent DT teachers in enabling the expertise to emerge and to be used effectively. In all three schools the issue of not having a clear direction and focus for DT was articulated in all three focus groups.

Where school leaders access knowledge to inform DT decision making
A historical point that was noticeable within the literature that supported the findings of this research was that it was only the most recent literature that had started to consider issues of leadership and expertise within digital technologies that schools are now only recognising themselves. The knowledge that Principals used in regard to DT had been accumulated from their own experiences in the use of DT along with recognising the need and demands departments place on DT. However, the resounding evidence these three Principals stated within their interviews was the knowledge of DT that was gained from the expertise within the staff. Knowledge in DT is dependent on where it sits within the teaching staff who have either formal or informal teacher leadership traits.

For Principals, accessing knowledge from so-called experts outside of the school environment only added a layer of distrust and confusion as to whose knowledge and expertise should be taken into consideration when related to an educational environment. This adds another layer of decision-making complexity that need not exist if a mutual trust relationship has been nurtured over time between the Principal and those with recognised DT expertise in the school organisation, particularly those with pedagogical teaching knowledge.
Due to the amount of variance in recognising leadership within the digital leader in the three schools, Principals were at various stages in the development of trust in their digital leaders. Digital leaders, themselves were at various stages of recognising that they had any leadership responsibilities in DT. Although it was acknowledged by senior management that there was staff with expert knowledge of DT within the school the issue of purposely providing professional development to digital leaders to enhance their knowledge was never mooted. In recognising that teacher centred learning may soon be changing toward a more student centred learning focus, Williams (2008) states that leaders in DT need to be well informed and enterprising.

Leadership should be dispersed and needs to adopt due to the level of complexity that exists in DT. This allows for a degree of positional trust to occur. Gurr (2004) suggests that due to the level of complexity that has come about from having technologically mediated environments that are impacting on the way schools understand leadership. Leadership needs to be distributed through communication, community building and establishing trust relationships. Robertson (2007) supports this in stating that leaders need to disengage from old structures and ways of knowing and commit to engage in new ways in digital technology.

Digital leaders should hold a recognised and distributed leadership position as their position within the organisation enables them to gather collaborative knowledge in DT (Scribner, et al., 2007) and teams of subject expertise, especially in the uses of DT, need leadership to consciously build team cohesion (Bell, 1997) In recognising the skill set, knowledge and expertise the digital leader has within the school, the digital leader is a in a strategic position to build strong relationships and motivate those with difficulties in DT.

The declaration and considerations of pedagogy was inherent within discussions and interviews and implied by Principals’ concerns for improved teaching and learning, particularly in the deliberations as to whether DT would keep students hooked on learning. Pedagogy has yet to be fully realised within DT. DT is a tool to
enhance teaching and learning (Betcher & Lee, 2009; Spector, 2008; Williams, 2008), as there is limited evidence of pedagogical methodologies within these three schools, coined in this research as the silence or issue of pedagogy. Although current literature would support such a concept that pedagogy is unsubstantiated within teaching practices, the most recent literature is only now considering the implications of teaching learning through the use of digital devices and interactive programmes from a pedagogical stance (Ifenthaler, et al., 2011; Jones, et al., 2011; Keane, 2011; Wilber, 2010). The silence of pedagogy could also be attributed to the limitations of this research as well as a possible finding of this research.

When concluding that digital leaders should be strategically placed within a schools organisation (Keane, 2011), and hold a position of distributed leadership the model in Figure 6.1 indicates where the digital leaders placement could help visualise the complexity of information the digital leaders use to formulate their knowledge and conviction in DT implications and purpose in teaching and learning benefits in the classroom.
Figure 6.1: Strategic placement of digital leader

The purpose of sustained professional development that encompasses all personnel involved with DT is to counter the reaction by teachers who find little time to make use of material gained from this professional development. By providing ongoing professional development as part of school strategic planning initiatives staff are more likely to try out the skills and knowledge gained from sessions and realise the benefits of DT that competent DT teachers already know. Williams (2008) explains that staff need to learn about what Web 2.0 can offer and should plan to harness these. This can only be realised by a programme of sustained professional development that is accepted and undertaken by all school personnel that includes senior management and the IT support personnel.

Trust relationships are situated primarily with the senior management team and the digital leader. It is from this relationship that distributed leadership can exist between the digital leader and all other teams within DT. Because this trust relationship sits within the envelope of sustained professional development there is
a situational responsibility of the principal and senior management team to nurture and develop this relationship.

Competent teaching staff need to be proactive in playing their part in sharing knowledge and expertise through their involvement in an IT committee. A spin-off is the conceptualisation that their skills and knowledge can be utilised in the form of coaching and mentoring staff less competent. Again, this is a form of professional development, not necessarily seen in the form of whole school sessions but a structure of one-on-one sessions as organised through the digital leader. The reiteration of professional development in whatever form is paramount to the success of this model.

In the realisation that most staff rely on the knowledge and skills of the IT support personnel to maintain the IT systems it is crucial that the direction and management of IT personnel be aligned with the skills, knowledge and expertise of the digital leader, and that the lead for introducing any DT devices or programmes needs to come from the digital leader or leaders. Again, the importance of providing professional development to both the digital leader and the IT support staff underpins how efficient and effective the school will operate when both these key people have the same comprehension of the educational needs of the teaching staff.

**Recommendations**

Because DT is yet to be fully realised as an innovative complimentary teaching tool where good teaching and learning practice utilise its full potential within secondary schools these recommendations are provided as a means for schools to reflect on their own DT practices and provide a discussion point for further deliberations.
Recommendations for School leaders

1. *Schools should have a decisive and articulated vision and purpose for DT*
   The benefits of DT as an innovative tool to support teaching and learning should challenge teachers to be more inquisitive in the use of diverse instructional methods in DT. Teaching practices should consider the benefits of interactive programmes and the availability of Web 2.0 technologies that offer bountiful educational material to contribute to holistic use of technological devices and teaching for complimentary learning methodologies. The trap of using DT as a conversion of historical teaching practices has been realised – ‘old wine into new bottles’, and needs the vision and purpose to convince staff that DT is more than a simple technological conversion.

2. *Principals offer improved distributive, dispersed, shared or allocated leadership opportunities with their digital leaders based on expertise*
   Principal who entrust their digital leader to lead holistic initiatives and allow them greater contribution to school strategic plans will reap benefits through the development of a mutual trust relationship with their digital leaders. This mutual trust relationship is crucial for making sustained organisational changes in DT.

3. *Principals use the test of expertise to aid in their decision-making process*
   For schools to best utilise the expertise within their organisations principals should recognise and consider the utilisation of expertise in early adopters and competent DT teachers in enabling the expertise to emerge and be used effectively in school wide collaborative decision-making opportunities.

4. *Principals developing the leadership ability of digital leaders*
Strategic leadership should recognise DT leader deficiencies and put in place a programme of professional development to nurture the ability of the digital leader for the purpose of leading others with the knowledge and skills gained from this professional development.

**Recommendations for digital leaders**

5. *Sustained PD that targets all levels of staff DT competency*
   The recognition that all staff within the school’s organisation require up-skilling in DT is seen as a priority for digital leaders. Through sustained articulation of the benefits of DT through offering professional development to all members of the school’s organisation, which can extend as far as individual programmes for senior management to the nuances of subject specific activities, the digital leader can effectively contribute to a cultural change of belief in DT.

6. *Lead whole school forums for DT discourse*
   The development of a collaborative means to share expertise, experiences and knowledge in DT will fuel the interest and potential for all staff to visualise innovative ways to better their own teaching and learning practices. Through open discourse, issues of fear, distrust, and reluctance of DT can be aired and addressed through honest and open dialogue. The role of the digital leader and senior management is to strategise ways to overcome the fear of DT for a culture of belief in DT to be fully valued.

7. *Advocate for time being set aside for teaching staff to manage and utilise resources within LMS and on-line resources*
   For a culture of DT to be fully realised there needs to be time set aside for teachers to research, strategise, experiment, plan and manage the multi-modal resources available through on-line Web 2.0 technologies and a school’s LMS. The digital leader can be proactive in directories of on-line
subject specific resources and the promotion of literature that supports educational teaching practices through DT.

Recommendations for digitally competent teachers

8. **Digitally competent teachers are proactive in offering to be mentors, coaches or DT buddies to staff with fewer competencies in digital technologies**

In the creation of a trusting environment for open DT discourse staff with more knowledge, experience and expertise in particular DT fields, can provide those without this knowledge, a more comfortable one-on-one tuition opportunity.

9. **Digitally competent teachers are proactive in sharing DT teaching practices with other departments as a collaboration of the use of DT in curricula areas**

Where one form of DT may work within a specific curriculum area, other departments may capitalise on this through disclosure within a collaboration of shared DT teaching practices.

Recommendations for schools wanting to best utilise DT

10. **In addition to the recommendations listed a few organisational recommendations are suggested here**

   a. All dept requests for DT should be separated from annual budget process and addressed by a committee of DT competent members, a member of SMT with curriculum responsibilities and chaired by the digital leader.

   b. Having senior management personnel present does not suggest that the digital leader has no positional authority within an organisation, but rather, within current hierarchical structures being dominant in New Zealand secondary schools, the senior manager should aid in the persuasion and acceptance of DT recommended by this committee.
c. Having the requests for annual DT items separated from the normal department budget process must give the digital leader opportunity to observe the demands for DT and plan for the implications and management of these demands through the digital leader's strategic placement within the organisation.

11. **A digital technology committee should create and visualise a clear strategic plan and has the authority to implement this plan**

Ignoring which lexicon is used, a committee comprised of members who hold relevance, expertise, trust and sensitivity in matters pertaining to DT should be encouraged and nurtured as a strategic move in supporting DT. Members within this team of DT experts who are recognised for their level of expertise, interest, ability and belief should be lead by the digital leader and given a degree of decision making capability within the organisation to create and implement a plan that supports improved learning opportunities to students.

**Future research opportunities**

12. **Identify pedagogy that substantiates educational benefits in the use of DT**

The demand for buy-in by teachers in secondary schools in the benefits of DT as a method of improved student engagement and learning in classroom teaching practices needs to be validated by those with DT expertise and skill. Almost all of the teaching experiences and practices by competent DT teachers agree and can testify to the benefits of DT as an innovative and useful addition to the armoury of teaching tools they possess. In the area of providing academic proof that DT can increase the learning ability of students through its use. This has yet to be identified through quality assured research.
Limitations of research

Pedagogy could have been given prominence within research questions to help establish whether leaders within secondary schools have an understanding of pedagogy behind the use of DT or if the findings on the topic of pedagogy reflect what academic authors have been saying over the past decade DT is best realised as a tool for supporting good teaching and learning (Betcher & Lee, 2009; Spector, 2008). However, removing pedagogy from the research questions allowed for answers to be open to the contemplation of pedagogy by research participants rather than be forced and contrived within the data gathering process. Academic literature on what type of pedagogy supports learning is an area that is only just being considered by research authors. Rather than a limitation, the consideration of pedagogy may best be realised in a few years time when further literature is available.

The question of choice in using higher decile schools only, situated in greater Auckland area needs further clarification. In the use of a qualitative case study research method in trying to gain insight, discovery and interpretation of findings (Merriam, 1998), the choice of selecting schools of a high decile was seen as an approach to gaining research data that was considered to be conservative and similar in the schools demographic makeup. By choosing to collect research data from higher decile schools meant that the degree of financial stability and operational management of the schools digital systems were initially perceived to be similar. This was seen to be true in the choice of the three schools who took part in this research.

An initial case study proposal considered undertaking a research study between a low decile, a medium designated decile and a high decile secondary school, thereby providing a cross-section of findings between secondary school deciles. Within the greater Auckland area there are no decile 5 designated schools and the one low decile school that had shown initial interest in DT was lost due to a change in school leadership. In strategising for the same level of decile it was thought that
in keeping the findings similar with regard to school decile would provide a level of consistency in the schools’ geographic and demographic status.

Although it was seen to be adequate to choose only three types of research gathering tools (Bryman, 2008); that of interviews, focus groups and secondary documentation, the consideration of undertaking an initial questionnaire prior to the interviews may have helped to define, or in the matter of pedagogy, redefine the direction of this research. There was also the issue of the smaller focus group in School P where the depth of discussion offered by the participants may have increased if more participants had attended the discussion.

The choice of cross-case analysis (Yin, 2003, 2009) was instrumental in defining the themes behind DT and the implications and challenges DT disclosed within the three schools researched. This was probably the best use of a cross-case analysis method in establishing the outcomes for this research.

**Final concluding statement**

Principals have a moot belief in the benefits of using DT as a tool and means to both engage students and keep them interested in learning. Although digital technologies have been given financial support in the supply and implementation of digital devices, intranet, LMS and access to internet, Principals still ponder the rationale of DT requests as they continue to question whether DT has any pedagogical benefits in student engagement and learning. The reliance from staff with expertise in DT has not been totally established, although a realisation that schools need such personnel is considered essential through the development of mutual trust relationships with senior management and Principals.

Decisions in the request and support for appropriate DT systems, devices and processes stem primarily from staff who are identified as experts or early adopters. They hold a wealth of digital knowledge that needs to be exploited through the
establishment of a digital leader with strategic placement in a school’s hierarchical decision-making structure.

The trust between a digital leader with knowledge, experience, expertise and a sound teaching background, with others needs to be nurtured by the senior management team. Having the right person appointed as a digital leader is paramount to keeping DT managed for innovative educational advantage.

It seems that if schools do not have such a digital leader, teachers are still being equipped with DT through the moot belief held by senior managers and principals who acknowledge the importance of maintaining a principle of keeping up-to-date with technological advancements.

The most important and yet over-looked factor in decisions pertaining to DT, specifically with regard to establishing a culture of belief in the benefits of DT within the classroom, is sustained professional development. Sustained professional development from a multitude of relationship building factors and up-skilling reasons needs to be lead by a network of expert DT staff with common interests and belief in DT, lead by a digital leader who has strategic placement and can feel the pulse of DT through collaborative means.
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Parker, M. (2010). The analysis of qualitative interviews. In M. Parker (Ed.), The science of qualitative research (pp. 57-81). New York: Cambridge University Press.


Te Kete Ipurangi (Producer). Technology in the New Zealand curriculum.


Appendices

Appendix 1 - INFORMATION SHEET

Title of Thesis: Digital technologies and the challenges of pedagogical decision-making for secondary school leaders

My name is Anthony Weijermars. I have been a secondary school teacher for the past 23 and am currently on full time study leave. I am enrolled in the Master of 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 Masters degree. As a teacher of technology for the past 18 years and a member of my school’s leadership team for 5 years I have become most interested in the swift development of digital technologies that has become available to teachers as an additional instructional teaching tool for learning.

I wish to investigate what decisions Principals and teachers are faced with in the support of digital type technologies being utilized by teachers. And in undertaking my thesis research at (insert school) I am seeking teachers willing to attend a focus group meeting, preferably after school for about an hour, at a time and venue to suit within your school. The aim of my project ‘is to investigate the perceptions of how leaders and teachers in secondary schools make pedagogical decisions about the use of digital technologies’.

You are the recipient of this information sheet as I asked your principal to suggest teachers who are competent users of IT/digital technology. I formally invite your participation in the following way. I will be conducting focus group interviews and would appreciate your contribution as a member of the focus group. Should you be selected to participate I will also be asking you to sign a consent form regarding this event.

Neither you nor your organisation will be identified in the Thesis. Anonymity and confidentiality will be preserved for all participants involved from your school along with the request that all participants will also respect each other’s contribution to the focus group and not repeat what is discussed within the meeting. I will be recording your contribution and will provide a transcript for you to check before data analysis is undertaken. 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 Howard Youngs and may be contacted by email or phone. Phone: (09) 815 4321 ext 8411 Email: hyoungs@unitec.ac.nz

Yours sincerely

UREC REGISTRATION NUMBER: 1198

This study has been approved by the Unitec Research Ethics Committee from July, 2011 to June, 2012. 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.

139
Appendix 2 CONSENT FORM – FOCUS GROUP PARTICIPANT

CONSENT FORM – FOCUS GROUP PARTICIPANT

DATE

TO: [Participant's name]

FROM: Anthony Weijermars

RE: Master of Educational Leadership and Management

THESIS TITLE: To investigate the perceptions of how leaders and teachers in secondary schools make pedagogical decisions about the use of digital technologies.

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 and that anonymity and confidentiality will be preserved throughout the whole research process along with the request that I respect my colleague’s contribution to the focus group and not repeat what is discussed within this meeting. 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: ______________________________________________

UREC REGISTRATION NUMBER: 1198

This study has been approved by the Unitec Research Ethics Committee from (date) to (date). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix 3 CONSENT FORM - PRINCIPAL

CONSENT FORM - PRINCIPAL

DATE
TO: (Principal)
FROM: Anthony Weijermars
RE: Master of Educational Leadership and Management

THESIS TITLE: To investigate the perceptions of how leaders and teachers in secondary schools make pedagogical decisions about the use of digital technologies.

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 and anonymity and confidentiality will be preserved for all participants involved in the research from our school. 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: ________________________________

UREC REGISTRATION NUMBER: 1198

This study has been approved by the Unitec Research Ethics Committee from (date) to (date). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
INFORMATION SHEET - PRINCIPAL

Title of Thesis: Digital technologies and the challenges of pedagogical decision-making for secondary school leaders

My name is Anthony Weijermars. I am currently on full time study leave and enrolled in the Master of 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 Masters degree.

The aim of my project ‘is to investigate the perceptions of how leaders and teachers in secondary schools make pedagogical decisions about the use of digital technologies’.

I formally invite your participation in the following way.

I will be conducting an interview with you at a time and venue as designated by you.

I will also be asking you to sign a consent form regarding this event.

I will be asking for any public domain type documents that may have any relation with the topic of digital technology, either as policy type documents, curriculum documents or other material that may assist in the support of digital technology use at your school.

Neither you nor your organisation will be identified in the Thesis. Anonymity and confidentiality will be preserved for you and all participants involved from your school. I will be recording your contribution and will provide a transcript for you to check before data analysis is undertaken. 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 Howard Youngs and may be contacted by email or phone.
Phone: (09) 815 4321 ext 8411  Email: hyoungs@unitec.ac.nz

Yours sincerely


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Appendix 5 Documentary Analysis Framework

(These questions are selected and based on the analysis frameworks developed by Wellington (2000) and Fitzgerald (2007)

School Code Identification Number

What type of document is it: What is its prime intended purpose? (eg, policy, curriculum, prospectus, etc)

Authorship: Who wrote it? What is their position in school?

Production: When and where was the document written?

What prompted the writing of the document?

Audience: Who was it written for? Why them? What assumptions does it make, including assumptions about its intended audience?

Production: Style, function, genre: In what style is it written? How direct is the language? Is it written to inform, to persuade, to convince, to sell, to cajole, to provoke..?

Content: Which words, terms or buzzwords are commonly used, particularly in reference to DT? Are any values conveyed, explicitly or implicitly? What has not been included in this document?
### Appendix 6 – Cross Case Analysis Framework Table

**Question One:** Why are secondary school leaders expected to play a significant role in decision-making processes related to digital technology?

With all the different types of abbreviations and computer terms banded around its use in schools, how would you define the term - digital technology?

Schools, M, N, P  Principals = P, Digital Leader = L, Teacher = T, Teachers Numbered = 1, etc.

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Who would be involved in making key decisions related to digital technology in your school? (If no major SMT Leader is suggested, ask....)

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What processes are usually used to make these key decisions around digital technology?

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**What knowledge or information is used by secondary school leaders to inform digital technology decision-making to support classroom practice?**

What are the types of digital technology practices used in the classroom?

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What information do you use to base your decisions on when considering the support of digital technology practices used by teachers and students?

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How important do you see digital technology as a method of supporting classroom instructional practices?

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**What challenges do these leaders face in relation to digital technology decision-making?**

What decision-making processes in the use of digital technology are most difficult to address in school?
What do you see as the biggest challenge needed to be overcome in the use of digital technology in school?

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How would you go about addressing these challenges?

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Appendix 7 – UREC ethical steps

Eight ethical principles and the Steps taken to ensure harm minimisation

Informed and voluntary consent
The leaders and participants will be supplied an information sheet about the purpose of the research, their proposed participation, the method of data recording and usage, along with how the data will be stored. The researcher contact details will be provided with this information sheet. The consent forms will need to be signed by all leaders and participants involved. All those who participate in this research will have the right to full access of their own contribution in order to check their respective transcripts. They then have the right to withdraw their participation at any time up until the end of the interview of focus group data collecting process once transcripts have been reviewed by all participants.

Respect for rights and confidentiality and preservation of anonymity:
Anonymity will be preserved for all participants, leaders and schools. All data, including relevant school documentation, will be coded in order to protect the anonymity of the participants and leaders. Only the supervisor and researcher will have access to the research data.

Cultural and social sensitivity
With regard to social sensitivity, at the beginning of the focus group meeting all participants will be requested not to make mention of performance issues of other colleagues. Where participants inadvertently disclose matter of a social sensitive nature, this will be edited from the transcripts before handing the transcripts back to participants for checking to protect what may be disclosed in confidence.

Limitation of deception
The researcher has an obligation and responsibility to be honest, offer respect to participants and leaders and to keep all participants fully informed about the
research. Principals will be given access to the overall findings of the study which may be of interest to them but, under no circumstances, have access to raw data. The participants will be given the right to refuse to answer any question should they so wish. Piloting of both the interview and focus group questions will be conducted prior to the gathering of data from participants. The interview questions will be trialled by a colleague from my previous school who has a strong interest in DT within his own school. His school was not asked to be involved with my research due to the bias I may have had with both my colleague and previous school. The focus group questions will be trialled by another colleague at my current school who has a particular interest in DT. My current school has remained independent of my research for obvious conflict if interest issues.

Respect for intellectual and cultural property ownership
All intellectual and cultural property ownership will be respected in this research. All names and resources will be acknowledged and referenced. Transcripts will use pseudonyms and when given the opportunity to check their responses the participants will have their pseudonym highlighted for ease of distinguishing their response from others. All references to the schools in any documents will be removed and if necessary replaced with a pseudonym.

Avoidance of conflict of interest
The researcher will declare any special relationships that exist with the research participants, acknowledging them with due respect and offer full confidentiality in the participants’ anonymity so that the research process is seen as fair and free of bias. Participants will be offered the opportunity to withdraw from the research if they see that a situation of conflict will hinder the research.

Research design adequacy
The ethics application for research was approved by the Education Dept, Research Proposal Approval Committee in July, 2011.