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The impact of school leadership upon the successful integration of ICT across the curriculum in secondary schools

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Declaration

This is to certify that the thesis comprises only my original work and does not contain material which has been accepted for any other degree in any university. To the best of my knowledge and belief, this thesis contains no material previously published or written by any other person, except where due reference is given in the text. The thesis is approximately 20 000 words in length, inclusive of footnotes, but exclusive of tables, appendices and bibliography.

Student Signature:

Abbreviations

EdNa	Education Network Australia
ICT	Information and Communications Technology
IT	Information Technology
IWB	Interactive Whiteboard
NGfL	National Grid for Learning
OECD	The Organisation for Economic Co-operation and Development
PD	Professional Development
VCAA	Victorian Curriculum and Assessment Authority
VELS	Victorian Essential Learning Standards

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Abstract

The question addressed in this study was “To what extent does the nature of school leadership influence the successful integration of ICT (Information and Communications Technology) across the curriculum?”

I was led to my research questions through my passion for ICT and my commitment to and concerns about its usage in all areas of learning at the secondary school level. Furthermore, through my experiences as an Information Technology teacher and more significantly as a Technology Coordinator and a board member of the Victorian Information Technology Teachers' Association, I have come to understand that ICT is more likely to be embraced and effectively implemented across several key learning areas if school leaders are willing to invest time, money and other resources into schooling educators about how to utilise ICT tools in their classrooms. A vital element of this investment is the nature of the support offered staff in learning about useful and new technologies and the way in which professional development is presented in this area.

The study was significant because currently The Victorian Essential Learning Standards (VELS) is the mandated curriculum for all Victorian secondary schools, and ICT is a fundamental component of the Interdisciplinary Learning Strand that “...identifies a range of knowledge, skills and behaviours which cross disciplinary boundaries and are essential to ensuring students are prepared as active learners and problem-solvers for success at school and beyond” (VCAA, 2006). This suggests that ICT is a domain that is critical in all learning areas so that students are equipped to face the global environment which they encounter on a daily basis and which is rapidly expanding and permeating all facets of life.

The methodology employed in this research was primarily qualitative, as I looked to present an interpreted understanding of a school culture in which ICT is not fully integrated across the curriculum, and to then effect change in that culture and curriculum by fostering the knowledge of school leaders in ICT. To this end, I hoped to more deeply inform the participants of the obstacles to ICT integration, and how these obstacles can be overcome, by engaging in dialogue with them about my analysis of observed and documented events.

The outcomes suggested that ICT integration requires a whole school approach, guided by far-sighted leadership that is not afraid to investigate and enhance critical elements such as provision of targeted professional development for educators in the use of ICT tools and resources, is creative with budgets and overall models effective ICT use.

Chapter One Introduction

“Computer science is no more about computers than astronomy is about telescopes” (Edsger Dijkstra, date unknown). It follows from this, that learning about and with computer technologies is not just about hardware and software.

In the last decade schools in developed countries have undergone much change with respect to the implementation and use of technology, which was reflected in government initiatives and funding in the latter stages of the twentieth century and early years of the twenty-first century. Cusack, Gurr and Schiller (1999, p.227-228) noted that in New Zealand “...the Government aims ... to have an Internet connection in every school by the year 2000...”, while in New South Wales “...government priorities have focused on acquisition of hardware and software and on the provision of appropriate infrastructure to support increased use of information technology in schools...” Wozney, Venkatesh and Abrami (2006, p.174) wrote “We are experiencing exponential growth in the use of computer technology for learning in K-12 schools” and “...governments have dedicated substantial research funds to identifying and promoting ways to deliver or enhance instruction with the use of technology.” What these studies imply is that the initial Information and Communications Technology (ICT) boom in schools focused on equipment and connectivity, however there has not been much consideration given to how this change would be managed or effected by school leaders, which leads to the focus of my study. Namely, “To what extent does the nature of school leadership influence the successful integration of ICT across the curriculum?”

In the research question, the term *school leadership* refers to those bodies in schools responsible for major decision-making. In this context and in most Victorian secondary schools this comprises the Principal, any Assistant/Deputy/Vice Principals and the Curriculum Coordinator or Director of Studies. However, much of the literature suggests that other key figures in schools, such as Heads of Departments, strongly influence the extent to which the principal's vision for the school is enabled. Abolghasemi, McCormick and Connors (1999, p.80) wrote, “Principals are not the only leaders in schools...department heads are expected to fulfil leadership functions and influence the cultures of their schools. Arguably, the actions of these people may affect the implementation of the principal's vision for the school.” A decade later, Spillane (2009) affirmed that a distributed leadership framework involved “...a cast of others, ...such as assistant principals, curriculum specialists, mentor teachers, and department chairs (p.71). Harris and Spillane define distributed leadership as a perspective that “recognized that there are multiple leaders and that leadership activities are widely shared within ...organizations....It is primarily concerned with leadership practice and how leadership influences organizational and instructional improvement.” (2008, p.31) Consequently, for this study, several key figures who are directly involved in the use of ICT in the school were also interviewed.

ICT stands for Information and Communications Technology and is a pivotal term in the problem to be investigated, as it is the term used most commonly to embrace the study of all things computer related. Significantly for this study, it is the term employed by the Victorian Essential Learning Standards (VELS) and is found throughout the VCE (Victorian Certificate of Education) Information Technology Study Design produced by the Victorian Curriculum and Assessment Authority (VCAA) and is hence relevant to all Victorian schools. VELS define ICT as "...the hardware and software that enables data to be digitally processed, stored and communicated. ICT can be used to access, process, manage and present information; model and control events; construct new understanding; and communicate with others" (VCAA, 2006).

In educational discussions, *integration across the curriculum* refers to teachers and students using ICT across all key learning areas, not just dedicated ICT or IT (Information Technology) subjects. Mulkeen (2003, p.278) wrote that "...integration of ICT is taken to mean any use of ICT within subject areas, as opposed to use of ICT as a topic of study in its own right." VELS documents indicate that this means that students employ ICT tools to "...transform their learning and to enrich their learning environment" (VCAA, 2006).

Lastly, it is important to define what determines the successful integration of ICT across the curriculum. A sound definition is provided by Becta who in 2001 produced a report entitled 'The Secondary School of the Future.' In this report, it was concluded that 'the school of the future' was one that had good ICT resources and made constant good use of those resources. That is, schools that rated as good, very good or excellent for all of the following features:

1. Adequacy of ICT resources
2. Ethos for learning with ICT
3. Pupils' attitudes to ICT
4. Quality of ICT teaching
5. Attainment of ICT skills by pupils (p. 28).

Most of the research conducted on ICT integration to date has focused on obstacles to ICT integration and contributing factors to effective ICT integration. Although support of school leaders is a consistently emerging key to the successful integration of ICT across the curriculum, their role in the process, the traits required in school leaders to effect successful assimilation of technology across all key learning areas, and frameworks to guide principals and school leadership teams have not been widely investigated.

Another interesting factor is that most of the studies conducted on ICT implementation and integration in schools have been carried out in the last ten years, which aligns with the fact that globally it has only been since the late 1990s that the presence and use of technological tools has increased in our homes and workplaces and consequently in our educational institutions. Thus, much of the literature discusses the investments that governments and leading educational bodies have made into providing technological resources to schools towards the end of the 20th century.

Reports from research undertaken to ascertain the presence of technology in schools and to determine to what extent it is being used and how, are mostly qualitative in nature, although, numerous studies also include the use of quantitative tools and methods. Most of the interviews have been conducted with practising teachers and students, and fewer studies include discourse with key leading figures in schools. Yet almost all results and conclusions claim that the principal's vision and support provided by school leadership teams are critical elements in the uptake of technology by educators.

Commonalities in the literature focus on the impediments to effective ICT integration, with a general conclusion that the use of ICT across the curriculum is still low. Mulkeen (2003) commented "...the progress with integration of ICT into the teaching of other subjects has often been disappointing" (p.277). This is reiterated by Lai and Pratt (2004, p.461) who wrote "...that with the increase of accessibility, more teachers had better computing skills and were using more information and communication technology (ICT) in their work than previously; however, the level of technology integration in the school curriculum remained rather low." Recent studies show that this is still problematic today. Hayes (2006, p.565) stated that "The pervasiveness of new technologies and their rapid spread around the globe belie the fact that educational leaders still struggle with how to integrate information and communication technologies (ICT) in schools." In fact her paper comes closest to my research topic, as her three-year study examined the difficulties experienced by Australian principals in leading the integration of technologies in schools.

Schrum and Glassett (2006, p.53) concluded that:

"It appears that, although a great deal of energy and effort has been expended, we have not overcome the most obvious of obstacles. Teachers still do not have an environment, culture, support, time or skills to effectively establish ways for technology to enhance their ultimate goal: to improve student learning."

It can be inferred from these findings that principals and other school leaders still have a lot of work to do in effectively integrating ICT across the curriculum. Furthermore, the research reported, strongly suggests that the training, willingness to change, community attitude and use of ICT by principals are significant factors in the successful incorporation of ICT across all subject areas; however how this can be actualised has not been explored in depth.

The Organisation for Economic Co-operation and Development (OECD, 2001, p.16) supports the need for far-sighted school leadership: "Visionary school leadership is needed to bring about and sustain the dramatic changes enabled by ICT, to persuade and give confidence to all involved..." My research was interested in what constitutes this 'visionary school leadership' and how school leaders "promote co-operation among teachers toward [the] common goal" of effectively integrating ICT across the curriculum.

Thomson, Nixon and Comber (2006, p.466) suggested that further investigation into how school leaders can address the challenges brought about by technical change must take place: "...there has been increased emphasis on the connections between school

improvement and educational leadership... [yet] ...little research has addressed the role of the principal in meeting these challenges...in the literature about ICT and education.”

Margaret Haughey (2006) examined the impact of computers on the work of principals and one of her comments about current leadership in schools is that “Changes in leadership include a lessening of positional authority and a greater emphasis on professional expertise, collaboration among staff members and professional development” (p.25). Similarly the OECD remarks, “Within individual schools, the role of leadership is critical. ... Adapting to the technology will require a whole school approach and a shared vision of the challenges and implications” (OECD, 2001, p.89). This concurs with much of the literature reviewed in the following chapter, that successful ICT integration and realisation of a school vision depends on community, co-operation and collaboration as it involves ‘many actors.’

In the ensuing chapters I aim to provide an overview of the literature on the implementation and integration of ICT in schools over the last decade; school leadership and in particular, the qualities of leadership required for effective ICT integration. I then discuss the research methodology undertaken in order to gain a greater understanding of the nature of school leadership that can either positively influence or hinder successful integration of ICT in schools. The presentation and discussion of results presents in detail interview responses and how these compare to the literature examined, and describes the action research phase of this project, where four English teachers implemented new technologies in the classroom subsequent to my case study of the school.

In subsequent chapters I present how significant this study is in further developing an awareness of the characteristics required of school leaders in order to enhance the use of technologies, particularly new technologies, in teaching and learning within their schools and across the curriculum, with the dual aims of continually developing the skills of educators so that their own work practices are more effective and fostering students’ ICT knowledge and skills as they will become global citizens of the future. I then propose recommendations to school leaders that will provide insight and practical steps that can be taken in order to make the use of ICT across the curriculum a realistic goal that must be pursued so that education in the second decade of the 21st century keeps apace with the lifestyle that new technologies enable as described by Nicholas Negroponte (date unknown): “Computing is not about computers any more. It is about living.”

Chapter Two Literature Review

In this section I will describe the process I undertook to review the literature in relation to the research study. In managing the literature I have structured my review so that first I investigate the introduction of ICT to schools and the aims and visions of this initial implementation of technology. I then consider the extent of the implementation and integration of ICT in schools and what has stood in its way. It is critical to provide and understand this historical overview of ICT in schools to determine the role that school leaders have had in ICT assimilation so that recommendations for the future can be made. Finally, I will specifically comment on the studies that have focused on the role of leadership in leading change with ICT in schools.

General overview of ICT implementation in schools

As noted previously, schools across the globe, especially in developed countries, have undergone much change in the last ten years with respect to the implementation and use of technology, and this has been reflected in government initiatives and funding. Selwyn (2000) discussed The National Grid for Learning (NGfL) – a variety of programmes concerned with integrating ICT into schools across the UK which was introduced in the United Kingdom in 1997. Its focus was upon infrastructure, content and practice and its budget was £1.6 billion. Mulkeen (2003) wrote that in late 1997 the Irish Government also invested in the ‘Schools IT 2000’ program which aimed to increase equipment and connectivity in schools, develop an extensive teacher training program and undertake a variety of ICT pilot projects. Simpson, Payne, Munro and Hughes (1999) commented upon a consultation paper produced by the Scottish Office which set out targets for the development of applicable ICT skills in Scottish trainee teachers, and Cusack, Gurr and Schiller (1999) described government enterprises such as the establishment of an Internet connection in every school by 2000 in New Zealand and the increasing use of email, laptops and school intranets in Australia. The authors noted that in New South Wales, “...government priorities have focused on acquisition of hardware and software and on the provision of appropriate infrastructure to support increased use of information technology in schools...” (p.227). Similarly in Alberta, Canada, “...the study of computer technology is legislated as part of the provincial school act” (Jacobsen, 2001), and Granger, Morbey, Lotherington, Owsten and Wideman (2002, p.480) discussed the increase in computer-to-student ratios and the level of Internet connectivity achieved in Canada just a year later. Bryderup and Kowalski (2002) indicated that in 1990, computing, renamed ‘electronic data processing’, became a compulsory subject in all Danish schools and that in 2001 a document entitled ‘ICT strategy for education and learning’ was released.

The conclusions drawn from these studies were affirmed by Wozney, Venkatesh and Abrami (2006, p.174) who wrote that “We are experiencing exponential growth in the use of computer technology for learning in K-12 schools” and “...governments have dedicated

substantial research funds to identifying and promoting ways to deliver or enhance instruction with the use of technology.”

Literature about the copious implementation of ICT tools abounded in the early years of the 21st century as concerns were raised about to what extent, if any, ICT had enhanced the quality of teaching and learning and if all the time and money spent on integrating technology into educational institutions had been worthwhile. Pelgrum (2001) wrote:

“...it is important for educational decision-making to periodically assess the actual situation of ICT in educational practice. Many countries are regularly monitoring the status of ICT in education in order not only to account for the (sometimes huge) financial investments from public sources, but also to inform decisions about the content and directions of future policies. In addition to national assessments, governments are usually quite eager to find out how the implementation of ICT-related efforts are progressing in comparison with other countries” (p.164).

Cuban (2001) wrote “In seeking to achieve three divergent purposes, techno-promoters across the board assumed that increased availability in the classroom would lead to increased use. Increased use, they further assumed, would then lead to efficient teaching and better learning which, in turn, would yield able graduates who can compete in the workplace (p.19).” However, his study of the introduction of computers into classrooms in Silicon Valley schools found that:

- “Abundant availability of a “hard” infrastructure and a growing “soft” infrastructure in schools in the late 1990s has not led, as expected, to frequent or extensive teacher use of technologies for tradition-altering classroom instruction.
- Students and teachers use computers and other technologies more at home than at school.
- When a small percentage of computer-using teachers do become serious or occasional users, they-contrary to expectations- largely maintain existing classroom practices rather than alter customary practices” (p.171).

Overwhelmingly the literature concurs then, that ICT integration across the curriculum has not been effectively achieved, although the technology in our schools continues to increase. What is interesting is that the factors which enhance or detract from the success of ICT implementation are precisely those factors identified by Fullan (1992) that influence any implementation in schools. These factors are:

“Characteristics of the innovation

1. Clarity and complexity
2. Consensus and conflict about the change
3. Quality and practicality of the change

Local conditions

4. Central office direction, commitment and support

5. Process for implementation and institutionalization
6. Professional development and assistance
7. Implementation monitoring and problem-solving
8. Principal's leadership
9. Community support
10. Environmental stability" (Fullan, 1992, p.30).

Furthermore, Fullan (1992) seemingly with foresight about the technology explosion that would occur in schools, stated that implementation has three additional components. First it is a developmental process of change for teachers attempting to use a modernisation which can involve changes in materials used, instructional practices and beliefs about the educational process; second the implementation occurs where there is a period of instigation or adoption of the modernisation execution and institutionalisation (continuance and maintenance). Third, all of these elements work together over time to achieve the overall implementation.

Uptake of ICT integration

Clearly then, a lot of time, effort and money has been invested into providing educational institutions with ICT resources. However, the literature suggests that the effective use of ICT across the curriculum has still not been achieved. Interestingly, many of the inhibitors to effective ICT use in schools that were found in studies conducted in the last decade of the last century, are still present in the first decade of the 21st century. Mumtaz (2000) wrote that teachers' beliefs about teaching and learning are pivotal in their uptake of ICT and that successful integration of it needs to consider three interweaving frameworks for change; namely, the educator, the school and the policy makers.

Twining (2001) contended that "...there is a substantial amount of evidence to suggest that computers have not made much impact on the educational practice in most schools, despite ... massive investments..." (p.10). Dale, Robertson and Shortis (2004) in discussing England's National Grid for Learning wrote that it "...had the provision of hardware and infrastructure as its main target, but offered little advice on how they might be used. This constituted the core of the management problem of ICT for schools" (p. 456).

Obstacles to ICT integration

In investigating questions regarding the uptake of ICT in schools and any consequential impact upon teaching and learning, a lot of the educational research conducted has been targeted at identifying obstacles to ICT integration. Research across the globe overwhelmingly concurs on many key impediments. A number of studies conducted between 1992 and 1995 found that inhibitors included: lack of teaching experience, lack of on-site support for technology use, lack of computer availability, lack of time to successfully integrate the use of technological tools and lack of financial support (Mumtaz, 2000).

One of these factors, lack of teaching experience, was found to be the underlying cause of teacher resistance to the introduction of ICT as explored by Robertson, Calder, Fung, Jones and O'Shea (1997), who identified that teacher resistance encompassed opposition to organisational change, resistance to outside interference, time management problems, lack of administrative support, teachers' suppositions and personal and psychological elements. Lawson and Comber (1999) suggested that fear of the technology and lack of skills and understanding of how ICT could enhance teaching and learning were paramount. Mooij and Smeets (2001) indicated that "...if teachers are not confident in their ability or competence to handle computers this may hamper their willingness to introduce technology in their classrooms" (p.266).

Another significant impediment identified earlier was lack of access to the technology. Yet this is downplayed in most of the literature, which tends to focus on more people-centred issues as is evident in the discussion that follows. Lawson and Comber (1999) concluded that the most important elements leading to a positive or negative response by teachers, to the introduction of new technology were:

- "teachers' attitudes prior to the innovation;
- the role of the IT coordinator;
- the attitude of senior management;
- the existence of appropriate support and training" (p.43).

Williams, Coles, Wilson, Richardson and Tuson (2000) found in a survey conducted in almost 700 schools in Scotland between November 1997 and January 1998 that the main reasons for not using ICT resources were:

- "Lack of availability
- Lack of access when required
- Lack of familiarity
- Lack of skills
- Inappropriateness
- Cost
- Lack of technical support
- Lack of time" (p. 319).

At the same time in Texas, Macneil and Delafield (1998) found that lack of monetary resources for hardware, software and infrastructure and lack of time for training and planning were the most significant impediments to implementing technology in the classroom. Pelgrum's (2001) survey of schools from 26 countries concurred with these earlier findings, indicating that although ICT resources in schools had increased and had improved, many of the key obstacles identified had still not been adequately addressed and this has continued to the present day as can be seen in Table 1 on the following page. Table 1 summarises commonly found obstacles to and conditions required for ICT integration in schools and clearly shows that teachers' skill level, which directly influences their confidence in using ICT tools in the classroom, and their belief in the educational

benefit of ICT tools in student learning, hinder ICT integration. This is also addressed by Livingston and Condie (2005): "Training programs must look beyond providing teachers with the technical skills required to use ICT and focus on helping them to explore how technology can transform the teaching and learning process and radically change the roles of teachers and students in the classroom" (p.157).

Granger, Morbey, Lotherington, Owston and Wideman (2002) summarised the conditions necessary for successful integration of ICT well when they concluded that "...the factors contributing to schools' success seem to be computers, commitment and community" (p.487).

<i>Gurr (2000, p.267)</i>	<i>Granger et al (2002, p.483-485)</i>	<i>O'Mahony (2003, p.308)</i>	<i>Toprakci (2006)</i>
• <i>Use of Technology: Software</i> • <i>Use of Technology: Hardware</i> • <i>Use of Technology: networks</i> • <i>Teaching and Learning</i> • <i>Working with staff</i> • <i>Administration</i> • <i>Department of Education: Help and Hindrance</i> • <i>Principal Professional Development in Technology</i> • <i>Personal Qualities</i> • <i>Impact on Office Staff</i>	• <i>Ways of learning about ICT</i> • <i>Individual characteristics of teachers</i> • <i>Educational background, experience and skills of teachers</i> • <i>Beliefs and goals concerning ICT of teachers</i> • <i>Resistance to technology</i> • <i>Environmental factors such as logistics and community</i>	• <i>Time</i> • <i>Quantity of classroom ICT resources</i> • <i>Quantity of ICT training</i> • <i>Quality of classroom ICT resources</i> • <i>Quantity of staff ICT resources</i> • <i>Quantity of ICT support</i> • <i>Quality of staff ICT resources</i> • <i>Willingness</i> • <i>Quality of ICT training</i> • <i>Quality of ICT support</i>	• <i>Budget limitations</i> • <i>Limited technical support for ICT in the school</i> • <i>Limited staff training</i> • <i>Low number of computers in the school</i> • <i>Oldness or slowness of computer systems</i> • <i>Paucity of educational software</i> • <i>Low level of interest, drive and openness to changes from Ministry of Education</i> • <i>Low level of training of teachers and principals</i> • <i>Low level of interest, drive and openness to change of teachers and principals</i>

Table 1: Obstacles to and conditions required for ICT integration in schools

Leadership and school leadership

Literature on school leadership abounds, and in a recent study entitled, “Seven strong claims about successful school leadership” undertaken by Leithwood, Harris and Hopkins (2008) the researchers provided a précis of the literature regarding successful school leadership. However, as suggested in the Introduction, there have not been many studies devoted to the impact of school leadership on ICT integration across the curriculum and the attributes required of school leaders to successfully implement technologies and change pedagogy.

The rapidly changing nature of ICT and the continual bombardment of new games, software, faster processors, wider screens, iPods and advances in mobile technology, have meant that schools and in particular their leaders, more so than ever, are impelled to plan for future uses of technologies and to facilitate these uses and changes, aspects of leadership which did not exist previously. Hence the notion of a school vision, though not new, is certainly fraught with more challenges and implications than ever before. As described by Katz (2002), “...leaders must be able to articulate an institutional/organizational vision that assumes widespread access to information and services via networks” (p.52).

Blendinger and Jones (1989, p.23) stated that “Vision imbues the culture of a school and school district with a purpose of what is important and valuable. Vision provides direction. It is a mental picture of what tomorrow can look like – an image of the future.” This definition fits well with the increasing demand upon creativity, innovation and budgets that keeping up with ICT is having. Sergiovanni (1996) and Hill (1999) (cited in International Forum of Educational Technology & Society (IFETS)– Formal Discussion Initiation, 2000), and Otto and Albion (2002) emphasised the notion of a ‘shared vision’ and a ‘shared belief’, where leadership is collaborative and where educational leaders must serve as models and continually engage in professional development and be knowledgeable in many critical areas. These findings are still pertinent today due to the increasing demands on school leaders. Demands brought about by increasing governance of schools by external educational and governmental bodies, constant changes in legislation and increased compliancy and greater responsibility for student issues such as cyberbullying. Hence as concluded by Leech and Fulton (2008), “Twenty-first century school leaders must ...” empower “...followers and” renew “their commitment to the organization's vision. Re-engineering the learning organization must be a vision shared by all members of the school community and led by the principal (p.641).

Hayes (2007) commented that “The commitment and involvement of the principal appears to contribute to successful integration of ICT, particularly when this process is tightly coupled to the school's vision for learning” (p.393). The Organisation for Economic Co-operation and Development (OECD) supports the need for far-sighted school leadership, “Visionary school leadership is needed to bring about and sustain the

dramatic changes enabled by ICT, to persuade and give confidence to all involved...” (OECD, 2001, p.16). Fullan (1992, p.39-40) wrote that “The people organizing and facilitating a change effort must have a *vision of the change process* that is conceptually sound, organizationally practical ...”

Sweeney (2005) supported these contentions as he wrote “Effective leadership is the most critical component in ensuring the successful implementation of any program in an educational setting” (p.48). He quoted a discussion paper for the Education Network Australia (EdNA) Schools Advisory Group that the roles that leaders fill are: navigator, guide, interpreter, mentor and learner (LifeLong Learning Associates, 1999, adapted from Norris and Dolence, 1996) and these qualities aptly encompass the characteristics discussed in the section of this chapter: *Type of leadership required for effective ICT integration*. Sweeney (2005) importantly acknowledged that often leaders in schools are “...good teachers, experienced educators and respected professionals” (p.48-49), yet their leadership skills are untested or ignored. This differs from the corporate sector where workers are expressly employed to fulfil a leadership position for which they have been trained or in which they have experience and expertise. This has repercussions too for the place of ICT in teacher education. In the same article, reference is made to the EdNA Schools Advisory Group (2000) which identified as one of the chief strategies “...the need for leaders to be able to incorporate ICT planning and change-management skills into the job description for senior positions and to develop those skills in the incumbents themselves” (p.49). Sweeney (2005) also discussed the difference between management and leadership and his definition of these terms suggests that a leader is the most desirable in a school as this is a person who “...is an agent of change...and creates a vision for the future” (p.49). “Louis and Miles (1990) make the distinction between leadership and management and emphasise that both are essential. Leadership relates to mission, direction, inspiration. Management involves designing and carrying out plans, getting things done, working effectively with people” (Fullan, 1990, p.83). Distinction between the two disciplines are also made by Caldwell (2007), “Leadership calls for establishing direction, aligning people, motivating and inspiring, and achieving change. ...management...involves planning and budgeting, organising and staffing, controlling and problem solving, and producing a degree of predictability (p.225). The two, however, are inextricably linked as leadership involves determining the objectives and goals of the organisation and management develops the plans and actions to be taken in order to achieve the objectives and goals.

It is clear that such leaders are ones who could be successful in effectively integrating ICT throughout the curriculum as similarly to Dunoon (2002) (cited in Sweeney, 2005), these leaders try “to forge ahead, investigate possibilities and satisfy higher needs” (p.49). Further elaboration by Sweeney (2005) contended that “Three essential qualities of a leader include: the ability to lead change; having a clear vision; and being information and communications (ICT) proficient” (p.49). And these terms are reiterated throughout

this literature review as critical qualities required of educational leaders if they are to successfully administer and exemplify ICT integration.

The role of leadership in ICT integration

As noted previously, there is a limited amount of literature available that specifically focuses on the nature of leadership required for effective ICT integration and as noted by Yee (2001), "...the ICT leadership of principals remained a topic that rarely was considered when educators or academics discussed the unfulfilled promise of ICT in schools." However, in writing about change and implementation in schools in general, Fullan (1992) described the role of the principal in any school improvement. He listed the following eight factors to which the principal must attend in the change process:

- "initial and follow-up in-service
- consultative assistance during implementation
- user planning time (during early implementation)
- user interaction and problem-solving
- latitude for risk-taking, errors and gradual mastery of new practices
- protecting users from undue demands
- holding users accountable for the change
- recognizing and rewarding user efforts" (p.43).

This is in accord with later literature where questions regarding the role of principals and senior management in ICT integration were raised. In 1997 Wilsmore conducted a pilot study into the role of the principal in the introduction of IT in schools, and found that "...modeling, adequate knowledge, leadership, change management and the establishment of effective learning communities..." (cited in IFETS 2000), were critical factors if the use of IT was to be effective. Macneil and Delafield (1998) like many others, indicated that the role of the school principal, in light of the presence of technology "...demands skills in enhanced team building, shared decision making, and increased technological competency" (p.296).

In a study conducted by Richardson (2000) of four schools across the globe, it was found that three classifications collectively defined the ability of a school to effectively integrate ICT, and clearly all three relate to the management and leadership of the school. First, Richardson (2002) identified school climate as that which encompasses a school vision for ICT implementation, commitment to the implementation strategy and working together in teams to achieve the common goals. Second, ICT management of budget, teacher training, technical support, the implementation plan and ICT maintenance; and lastly, ICT knowledge of equipment, pedagogy, curriculum and assessment using ICT tools.

In a review of selected literature about ICT and School Management, Passey (2002) discussed a research conference organised by Becta in 2001 which found that relatively little exploration of ICT and school management had been conducted. Consequently,

conference delegates raised a number of areas which they believed required further investigation. These included:

“...the nature of effective support for senior managers; the differences in managing ICT as compared to non-ICT facilities; the link between training and effective leadership; the role of project management; the applicability of findings generated from research in secondary schools to the primary sector; the quality and skill levels of senior management teams; and appropriate measures for evaluating ICT in school management” (Passey, 2002, p.1).

Becta then went on to commission a series of research reviews into several fields about ICT and school management. In his report, Passey identified areas which were well covered, areas which were somewhat covered, and those that required further ICT-specific coverage. This latter group consisted of: personnel management; resources use and resource development management; financial and procurement management; planning and project management; managing sustainability and monitoring and evaluation processes in management.

After conducting interviews with principals and other school leaders in nine schools throughout the United Kingdom, Australia and Singapore, Walsh (2001) stated, “It was clear from the interviews...that without a total commitment over time from the school leadership there was no way that ICT could be integrated into the life of the school” (p.6). In examining the impact of an ICT infrastructure on higher education, Katz (2002) also surmised that leadership had to change if ICT was to be effectively implemented, integrated and utilised. He discussed the challenges which faced leaders early in the digital revolution, and describes a leader who was defined in earlier literature. A leader who: operated in an environment of delegation; had an intimate knowledge of the institution and the information resources that could assist decision-making; took a holistic approach to ICT budgeting; understood that policies needed to be changed; acknowledged the importance of rules and protocols in managing the ICT infrastructure; ensured the privacy of members of the community; ensured the security of information and understood copyright and information ownership. He described a leader with language that is found throughout literature on leadership, educational vision and technology:

“...the leadership of the information-based organization will demand extraordinary skill in creating incentives, training opportunities, technology investments, and trust to create a vision, to engage key leaders of the institution in the vision, to remove barriers, and above all else, to give people the authority to make it happen” (Katz, 2002, p.59).

Moreover, Macneil and Delafield (1998) investigated the importance of the professional development provided which is a responsibility of school leaders, and this issue is still a pivotal one today as denoted in the most recent literature.

Similarly, Jacobsen (2001) wrote "The transformation of classroom technology from hardware, software and network connections into thinking tools for teaching and learning requires effective and enabling leadership by visionary and knowledgeable schools administrators and boards, and effective, ongoing professional development and support for teachers." His sentiments were echoed by Mooij and Smeets (2001) and Pelgrum (2001).

Studies by Dyrli (1996) showed that effective professional development provided a variety of options, emphasised skill development, provided practical training, tailored programs to suit the local environment, used genuine teaching examples and provided supporting materials; and Moyle (2006) showed that this is still what is desired by teachers today. Moyle (2006) listed 15 professional learning strategies identified by participants that could support the integration of ICT into teaching and learning. The strategies included individual and collaborative methods, and participants also commented that they benefited from seeing examples of how ICT had been integrated into teaching and learning in other environments. This complements the findings of Lai, Trewern and Pratt (2002) who found that "For teachers to effectively integrate ICT into the curriculum, or even for them to want to do so, they must first have some understanding of the role and benefits ICT can have for their particular subject" (p.542). Similarly, Mooij and Smeets (2001) commented that "Teachers need to see the advantages of ICT use to be motivated to implement it in their teaching practice" (p.266).

Work was also done on the role of computer coordinators in schools and on the role of leaders in developing a school culture that may facilitate the realisation of educational outcomes using ICT. Abolghasemi, McCormick and Conners (1999) discussed the importance of department heads in realising a school vision. They wrote, "...department heads are expected to fulfil leadership functions and influence the cultures of their schools" (p.80). This supports my decision to interview school leaders across the organisational spectrum, as I too believe that it is often those who are involved with the operational and tactical levels of the school that have the most influence in shaping school culture and implementing decisions made at the strategic level. In relation to my study the authors provide significant statements about how a principal's visionary attitude can inspire change and provide direction for teachers:

"Principal's visionary behaviour is concerned with principals' practices which are aimed at identifying new opportunities for the school, and developing, articulating, and inspiring teachers with a vision of the future. It also deals with a leader's behaviours which set an example for school members to follow that is consistent with the values which the principal espouses. Also, it relates to the efforts of principals to promote co-operation among teachers toward a common goal and to demonstrate the principal's expectations for excellence and quality" (Abolghasemi, McCormick and Conners, 1999, p.82).

Lawson and Comber (1999) found that the ICT coordinator and senior management were pivotal in empowering or hindering the integration of ICT across the curriculum. Their

findings echo the discussion of visionary leadership by Abolghasemi, McCormick and Conners (1999) as they stated that "...the support of management was vital for the long-term future of ICT" and that "...supportive managements looked ahead..." (p.49). Lawson and Comber (1999) concluded that:

"...integration is accomplished best where the senior management are committed to the idea of ICT...Their support for ICT in a public way is important in encouraging the classroom teacher to get involved and devote the time to the process of integration...Moreover, if the senior management had a vision of where they wished to go with ICT, positive responses from staff were more likely to be evident" (p.50).

Significant work on the vital role of computer coordinators in effecting meaningful ICT integration in schools has been done by Lai, Trewern and Pratt (2002; 2004). Their 2002 study focused on the ICT coordinator as an agent of change and argued that school principals are not the only leaders in schools who could envision their staff.

When asked about obstacles to their role as ICT coordinators, they nominated obstacles that match those described in *Table 1: Obstacles to and conditions required for ICT integration in schools*. In a later paper Lai and Pratt (2004) concluded that "A full-time ICT coordinator is essential if ICT is to be successfully integrated into the school curriculum. The work of the ICT coordinator has to be focused on providing curriculum support to teachers, with technical support provided by a technician" (Lai and Pratt, 2004, p.474).

The debate about the role of school leaders continued to flourish earlier this decade, yet many researchers still felt that useful solutions to the issues raised had not surfaced. In discussing the Global Forum on School Leadership which took place in the USA in 2002, Gibson (2002) wrote that:

"Increasing acknowledgement of the central role of school leaders in the successful integration of technology into learning environments and the concomitant transformation of traditional paradigms of learning, pedagogy, and schools is gaining momentum nationally and internationally. It is becoming increasingly clear that the importance of administrative support...in the integration of technology, curriculum, and instruction is understated and under supported" (p.319).

Gurr and Broadbent (2004) specifically examined the interaction of ICT and school leadership. Between 1999 and 2001 they focused on how ICT influenced the work of principals, and in 2004 Gurr explored the emerging concept of e-leadership which is closer to the core of this study. A significant comment by Gurr was that "The lack of interest in ICT in relation to educational leadership is not surprising...For those ICT-mediated environments that have been studied, there is often little acknowledgement that these environments may need a different form of leadership" (Gurr, 2004, p.115). Although Gurr's examination of e-leadership did not stem from educational settings, he concluded that a greater understanding of this type of leadership would be relevant to

school leaders as schools have become reliant on technology to conduct their daily business. Some later studies concurred with Gurr, in particular Moyle (2006), who argued that “Communication, community building and establishing trust seem to be tasks that are more important for leaders in many of these environments. Leaders also need to be able to exhibit, through whatever ICT medium is used, highly developed interpersonal skills” (p.122).

Toprakci (2005), in discussing several studies and in prefacing his own survey and study of obstacles to ICT integration in schools, clearly purported that both principals and teachers are responsible for effective ICT use by students and that “...for ICT implementation, the school administrators should oversee the performance of the teachers...” (p.2).

Likewise, the Organisation for Economic Co-operation and Development (OECD) reported, “Within individual schools, the role of leadership is critical. ... Adapting to the technology will require a whole school approach and a shared vision of the challenges and implications” (OECD, 2001, p.89).

Type of leadership required for effective ICT integration

The literature suggests then that effective, exemplary leadership is necessary for any change to be successful in an educational institution. But what qualities make up ‘effective, exemplary leadership’? Davies and Ellison (1997) accurately describe the learning setting which is still alive today as they noted that:

“...a student commencing school today will be exposed to technologies in their school years...that have not yet been invented ... The most daunting aspect of this,...is that school management has the daunting task of not only operating in today’s educational environment, but also possessing the ‘leadership capacity to envision what the future education and societal framework will be” (p.50, cited in Sweeney, 2005).

An analysis of leadership characteristics, summarised by Teare et al. (1998), established the following attributes as essential in leading successful technological implementation:

- “adapting to continual change;
- listening and responding to identified issues;
- being mindful of the future;
- planning a culture that values learning;
- having a clear sense of vision;
- possessing strong communication skills;
- displaying a sense of sincerity and confidence;
- having the ability to motivate through personal energy” (p.321, cited in Gibson, 2002).

In her study *The Many Faces of ICT Leadership*, Yee (2001) developed an ICT leadership framework of eight categories for principals, which I have summarised below:

1. equitable providing – the principal as the provider of hardware, software, other related resources and technical support
2. learning-focussed envisioning – the principal as the person who ‘kept’ the school ICT vision and who kept student learning at the centre of ICT decision-making
3. adventurous learning – the principal who was also an ICT learner and unafraid to be experimental with new technologies and learning strategies
4. patient teaching – the principal who was willing to teach and to create adaptive learning environments and who encouraged professional development
5. protective enabling – the principal who created shared leadership tasks for staff and students, removed ‘red tape’ and advocated the use of ICT and the school’s ICT vision
6. constant monitoring – the principal who ensured that ICT was being used in accordance with the school’s ICT vision
7. entrepreneurial networking – the principal who was a skilful “partnership builder” with different elements of the community and hence created a support network
8. careful challenging – the principal who was an inventive educator yet understood risk-taking.

Lee, Gaffney and Schiller (2001) also investigated the need for leaders who are “...capable of facilitating the effective use of ICT by all within the organisation, to enhance learning and to provide efficient administrative support” (p.201). They, like Yee (2001), developed a list of characteristics of an effective ICT leader:

- “has a strong understanding of providing quality education in a networked world
- has a comprehensive understanding of ICT
- understands the value of integration and how to achieve it
- operates as a collaborative leader
- appreciates the significance of knowledge management
- is an outstanding ‘networker’
- has high level analytical skills
- has excellent interpersonal and management skills
- can effectively oversee ICT staff
- thrives on rapid change and leads change management
- amalgamates the old and the new
- can operate as a senior leader in the school environment” (Lee, Gaffney and Schiller (2001, p.203).

In the United States a set of standards named the Technology Standards for School Administrators (TSSA) describe what school administrators should know and be able to

do to enhance and maximise the effectual use of technology. These are that educational leaders:

- “inspire a shared vision for the comprehensive integration of technology and foster an environment and culture conducive to the realisation of that vision
- ensure that curriculum design, instructional strategies and learning environments integrate appropriate technologies to maximise learning and teaching
- apply technology to enhance their professional practice and to increase their own productivity and that of others
- ensure the integration of technology to support the productive systems for learning and administration
- use technology to plan and implement comprehensive systems of effective assessment and evaluation
- understand the social, legal, and ethical issues related to technology and model responsible decision making related to these issues” (Sweeney, 2005, p.50).

Briscoe and Lee (2005) commented on Becta’s findings in a Review of Strategic Leadership of ICT undertaken in 2005, “good ICT leadership is characterised by: pragmatism; clear educational principles to inform ICT developments; and an ethos that encourages innovation and risk-taking.”

In another Becta report entitled ‘The impact of ICT in schools-a landscape review’ (2007) the researchers concurred with the Office for Standards in Education (Ofsted) (2005) “...that good leadership was a critical factor in the development of ICT maturity and recommended that courses on strategic leadership in ICT should be made available to middle management and those working to support schools in implementing new ways of working with ICT” (p.14).

Walsh (2001) in his paper concluded: “All the evidence to date in the progress towards ICT integration in schools points to the importance of the role of the principal. Leaders need to have the confidence to make organisational, structural and curricular changes based upon an understanding of the nature of learning and the nature of change” (p.24).

This literature review provides insight into the research conducted into many facets of ICT implementation and integration in schools over the last decade. However, it clearly shows that additional investigation into the role of school leaders in furthering ICT assimilation in education is required as studies are in agreement that effective integration of technology in schools still has not taken place. Further, it does not exhibit in-depth studies into my areas of concern about the nature of the leadership required to elicit and facilitate ICT integration across all key learning areas.

In the following chapter, I provide a detailed description of the research methodology undertaken. I discuss the triangulation strategy developed and followed, and the reasons why I felt it necessary to engage in a case study and action research.

Chapter Three Research Methodology

As indicated, the research question composed of two facets: school leadership and effective ICT integration across the curriculum. Two components of modern school life that I felt were somewhat at odds. Hence, the goals of the study were:

- to identify the qualities and behaviours of school leaders that lead to effective integration of ICT in the curriculum
- to understand and interpret the nature of leadership required to effect successful integration of ICT across the curriculum and in understanding this, provide recommendations about changing the school culture so that ICT tools can be effectively used by teachers of all disciplines
- to gain an awareness of how school leaders use ICT tools in their administrative work and their classrooms
- to become informed of the perceptions of middle to lower management, of how the school leaders have supported the integration of ICT across the curriculum.

Related questions that were addressed in the research included:

- Do personal views of school leaders about the importance of ICT to the curriculum shape its successful implementation into classrooms of all disciplines?
- Do the knowledge of and skill in the use of ICT tools of school leaders influence the extent to which it is embraced by staff of all disciplines?
- What are the obstacles to ICT integration and what should school leaders do to overcome these obstacles?

It was important to answer these questions as literature of and research conducted in the last decade has found that: "Educational leaders are key elements of the successful use of ICT in education" (Cusack, Gurr and Schiller, 1999, p.229). Granger, Morbey, Owston and Wideman (2002, p.487) wrote that "...structured collaboration and continuous communication among teachers...were reinforced by the enthusiastic support of Principals, whose work in community building further allowed technological innovation to progress in an atmosphere of shared commitment." Akbaba-Altun (2006, p.178) claimed that "Since technology integration is a complex process involving many actors, principals' leadership has been described as one of the most important factors affecting the effective use of technology in the classrooms."

It was also important to investigate the extent to which ICT is integrated across the curriculum and what its limitations are. This is because ICT tools are becoming a seamless and essential part of everyday living and today's students already use an extensive array of mobile and communications technologies in their personal lives. Hence formal education must embrace this phenomenon and maximise students' interest in these tools and educate them about how to use these tools not only to complete school work, but to communicate with them in a responsible manner and to facilitate their role in the workplace and in post-secondary education.

In order to answer the related questions and achieve the objectives of the research, a qualitative approach was the most fitting. This is because the methods most suited to attaining an insight into the nature of school leadership required to effectively integrate ICT were case study and interviews, both qualitative techniques. Freebody (2003, p.81) wrote that "The goal of a Case Study, ..., is to put in place an inquiry in which both researchers and educators can reflect upon particular instances of educational practice." This is pertinent as I aimed to, in collaboration with the school leaders, investigate ICT implementation and how it can be enhanced.

Very few studies to date have dealt with school leaders and successful ICT assimilation across the curriculum, and, even fewer studies have comprised of interviews conducted solely with staff who are in positions of leadership, as mine did. The participants of this study were key leading figures at an independent Catholic girls' school in Melbourne. In order of leadership, the Principal, the Deputy Principals, the Director of Studies, the Director of Mission, the Technology Key Learning Area Coordinator and the Network Manager. In addition, the Science Key Learning Area Coordinator and the Year 8 and Year 9 Level Coordinators were interviewed so that their perception of the extent to which ICT is integrated into the curriculum and the role of the school leaders in this were gauged.

At the time that the data was collected, I was an employee of the school and primarily taught Information Technology from junior to senior levels. As mentioned in the Abstract, my experiences as an IT educator of ten years, a Technology coordinator and a board member of the Victorian Information Technology Teachers' Association, led me to realise that ICT integration across the curriculum was influenced somewhat by school leaders and their attitudes towards it. I felt that the school chosen was worthy of investigation as a Technology Committee had been recently established, the school was embarking upon a phase of ICT growth and there had been three changes in key leadership personnel between 2007 and 2008.

I embarked upon the processes of obtaining permission and recruitment to conduct the study in the chosen school by having preliminary informal meetings with both the Deputy Principal (March 2007) (later to be known as Deputy Principal Pastoral) and the Principal (May 16, 2007). Both of these meetings resulted in a snowball sample, as four other key figures in the implementation of ICT in the school were recommended for interview due to their experience and knowledge about ICT, and in particular their participation in the changes the school had undergone in recent years due to the increase of ICT tools. Both leaders were supportive of my study and of the question to be investigated and hence access to the site and to participants was facilitated.

The methodology employed in this research was qualitative as my investigation contained the six features of qualitative study as explained by Eisner (1998, p. 32-39):

- (i) My study was "field-focused", as I undertook my observations and interviews

in a school environment.

- (ii) I was an instrument in the investigation, as I aimed to grasp and construe meaning from that which I perceived and the findings that I documented. This is supported by Neuman who writes that “The researcher makes his or her presence explicit...the qualitative researcher is forthright and open about his or her personal involvement” (Neuman, 2006, p.153).
- (iii) The study was interpretive in manner, as I explained what I observed and what I discovered through interviews. Also, I attempted to discern the participants’ perspectives and opinions about ICT integration, and this was partly characterised by their personal history and by the role they had in implementing ICT at the school in the early years of the 21st century, and in fostering that implementation to the present day.
- (iv) The study clearly reveals my voice and my objectivity, defined by Eisner as “the use of expressive language.” Eisner feels that this is important as it is a means of “furthering human understanding” – being able to be empathetic and provide readers with a real sense of the experiences being described.
- (v) The study is detailed, as it describes distinctive elements of the participants and their environment. Eisner suggests that “particulars exemplify more than they describe directly. In the particular is located a general theme.”
- (vi) Last, my research attempted to be coherent, insightful and a tool that persuades readers of the significance of the issue. Eisner refers to these features as “the criteria for judging the success” of qualitative studies.

The process undertaken was informed by both hermeneutics (interpretive theory) and action research as I looked to present an interpreted understanding of a school culture in which ICT is not fully integrated across the curriculum, and then with the participants I identified obstacles to ICT integration in the research setting and made recommendations to leaders regarding school culture and the facilitation of ICT across the curriculum. This triangulation strategy arose from my need to gain further understanding of the problem to be addressed and my desire to enhance the use of ICT across the curriculum. This triangulation process was employed because much of the literature argues that triangulation aids in validating the data: “Interpretations that are built upon triangulation are certain to be stronger than those that rest on the more constricted framework of a single method” (Keeves, 1997, p.319). The study undertaken consisted of three types of triangulation as defined by Denzin:

“...theory triangulation, which consists of using more than one theoretical scheme in the interpretation of the phenomenon; methodological triangulation, which involves using more than one method and may consist of within-method and

between-method strategies... [and] member-check triangulation where subjects examine and confirm or disconfirm interpretations written about them" (cited in Keeves, 1997, p.319).

What follows is a discussion of these paradigms and how they relate to the study.

As an interpretive researcher I endeavoured to discern how the participants in the study created and shared meaning about the use of ICT in the school. In addition, according to hermeneutics, my familiarity with the problem to be explored was also crucial to the interpretive process. Familiarity here means preunderstanding – the extent to which I already understand that which I am trying to interpret.

The methodology employed was that of a case study of the school and several of its leaders. I aimed to, in collaboration with the school leaders, investigate ICT implementation, the extent to which it had been integrated and if so, how successful this had been and overall, how leaders can enhance the use of ICT tools in teaching and learning across the curriculum. In addition I agree with Diesing who "...places case study within the holist tradition of scientific inquiry... [where] the characteristics of a part are seen to be largely determined by the whole to which it belongs" (cited in Keeves, 1997, p.61). Hence I asked questions and employed processes that would provide a rich depiction of the school framework in which the use of ICT was being investigated.

Freebody (2003, p.83-84) suggested that a case study methodology includes four phases which I undertook in the development of this study.

Phase One - Define and clarify the research question

In completing the coursework subjects *Research Methods Parts A and B* and *ICT and Learning: Research and Practice* in 2007, I defined and clarified the research question.

Phase Two - Design of the data gathering process

This involves identifying the case to be studied and the purposive sample in this study consisted of key leading figures at an independent Catholic girls' school. In order of leadership these were the Principal, the Deputy Principal Pastoral, the Deputy Principal Administration, the Director of Studies, the Director of Mission, the Technology Key Learning Area Coordinator and the Network Administrator. In addition, the Science Key Learning Area Coordinator and the Year 8 and Year 9 Level Coordinators were interviewed. This spectrum of participants is supported by Akbaba-Altun (2006, p.178) "...in order to improve the teaching and learning processes, both policy makers and practitioners should be aware of the fact that principals, teachers and computer coordinators are the central actors in the implementations of computers' educational practices. Hence, human involvement is an essential component of ICT integration."

Another consideration mentioned by Eisner (1998) and supported by Neuman is that I was "...directly engaged in the social world studied, so [my] personal characteristics are

relevant in research” (Neuman, 2006, p.384). I am aware that my knowledge of the school, my observations about ICT integration and my perceptions about the leaders naturally affected the way in which I absorbed the data collected, interpreted the interviews and analysed the data. In addition I undertook the study assuming that a collaborative approach to the cross-curricula use of ICT was not being taken effectively by the school and that obstacles to this integration existed. However, my aim was to enrich my knowledge and that of the participants, and so I was flexible and open to the findings, altering the meaning of the key constructs and my understanding of the problem to be investigated as required. Consequently, when my propositions were challenged, I searched for and developed new theoretical stances. The term coined by Kemmis (cited in Keeves, 1997, p.62) for this process is “iterative retrodution.” This was particularly pertinent to my study as the understandings which were developed by the researcher and the participants during the initial case study process were significant when analysing the data collected from the action research phase of the project.

Most of the data was collected via interviews which were semi-structured. Initial questions were pre-determined and then issues which the interviewees deemed relevant were pursued. I developed two sets of eighteen interview questions. One set targeted the principal and two deputy principals and the other set was developed for all other participants. However, there was overlap between the two sets. Furthermore, several questions were inspired by the literature. I also engaged in unplanned interviews as I encountered participants in the school setting. Prudently, I also attended to the nonverbal communication that occurred during both the formal and informal interviews. Gestures, facial expressions, posture and position then also provided insight into how the participants viewed the questions and my role as the researcher, and this approach is supported by Lichtman (2006) who purports that the participants’ insights, emotions and assistance are essential elements of the conversation process. My insights and feelings were also significant as their disclosure not only enhanced the discussion but assisted in building rapport.

Lichtman identifies five main components of interviews, and these assisted me in the data gathering process.

- (i) Advanced Planning - this involved identifying topic areas that I wished to cover in the interviews and identifying demographic details that I wished to collect.
- (ii) Opening – I prepared opening statements about my purpose, what I would do with the information, how I would maintain confidentiality and how long the interview and study would take.
- (iii) Getting started – in my study developing rapport with the participants was not difficult as I had already established professional relationships with those to be interviewed. However, I did need to consciously remind myself of my

role as the researcher throughout the study process. In addition, I established early on with participants, their understanding and definitions of the key constructs so that I could develop a more informed interpretation of their stance when discussing ICT integration across the curriculum. Neuman defines this as 'argot'.

- (iv) Body of the Interview – I conducted the interviews remaining particularly attentive to questions or comments that I wanted to follow up. In addition, to enhance the accuracy and validation of the data collection process and to enable in-depth investigation of participants' responses, interviews were audio-recorded. However, I still took notes throughout. Additionally, I often rephrased questions if responses appeared to be lacking in detail or frankness. Fraenkel and Wallen (2006) argued that it is important to ask the same question in different ways so as to corroborate the researcher's understanding of what has been said and to ask participants to repeat answers if there is uncertainty about the completeness of their response. It is also pertinent to note that in no interview, were all eighteen predetermined questions asked. This was due to not only lack of time, but more often than not, the responses given covered more than one question, and other unstructured questions asked were more appropriate as they followed the thoughts of respondents. However, all participants were asked the following questions:

1. How would you describe the culture of your school? Has this changed with the introduction and implementation of ICT in schools? How?
2. How would you describe the overall leadership style at this school? Has this changed with the introduction and implementation of ICT in schools? How? Why?
3. Moyle (2006, p.30) identified the following six inter-connected organisational conditions necessary for supporting teaching and learning with ICT – can you comment upon each of these in relation to the teaching and learning of ICT in this school:
 - Strategic plan
 - Vision
 - School culture
 - Whole school approach
 - School infrastructure
 - Organisational structure
4. List 5 attributes that are required of leaders who support teaching and learning with ICT.

- (v) End of the interview – throughout the interviews, I was acutely aware of time. This was particularly important in the school setting and in interviewing

leaders who had many responsibilities. In addition, after thanking interviewees for their time and participation I confirmed or established follow-up discussions and actions where required. Furthermore, when not restricted by my teaching responsibilities, I also engaged in reflection and storage of the data immediately following the interviews.

Baker (1997) saw interviewing "...not so much as a 'data-gathering', but rather as a 'data-generating' method. The interactions that make up interviews are dynamic, not static, forms of social action..." (cited by Freebody, 2003, p.137). Hence I was aware that the interviews were interactions where knowledge and experiences were shared and that the questions were crucial parts of the data.

Phase Three – Data Analysis

In order to analyse the data collected from the case study interviews, I transformed handwritten notes and transcriptions of the interviews into word processed data. I then developed a matrix (Appendix 3, p.66) that simply represented a distilled account of this data. As argued by Miles and Huberman (p.92, 1994), such a display is "...arranged coherently to permit careful comparisons, detection of differences, noting of patterns and themes, seeing trends, and so on."

In the display, the variables were based upon the pre-determined questions asked of each respondent and the role of each respondent, similar to that described by Miles and Huberman (1994) as a role-ordered matrix. Columns contained questions and the rows hierarchically contained the roles of the respondents interviewed. The matrix did not contain questions which were not predetermined; however, a column to represent other significant information or quotes gleaned from the participants was added in order to ensure that the most vital records were documented. As described by Miles and Huberman (p.98, 1994), I underwent a process where I located significant data segments from within the field notes, condensed and summarised these – making judgements about the selection as I proceeded. I also included representative quotes, in particular looking for those which were in stark contrast to or in agreement with those of others.

Phase Four - Reporting

In compiling the report I looked for patterns and themes, attempting to build a "logical chain of evidence" (Miles and Huberman, p.100, 1994). I found, as aptly put by Miles and Huberman (p.101, 1994) "Writing, ...does not come after analysis; it is analysis, happening as the writer thinks through the meaning of data in the display. Writing is thinking, not the report of thought." In formulating conclusions I went through iterations of "...noting patterns, themes; making contrasts, comparisons; clustering; and counting" (Miles and Huberman, p.243, 1994). Iteration involved checking back with field notes so as to validate conclusions that were being made. I also carefully selected examples, cases in the literature and respondents' quotes so as to further verify my conjectures.

Once the analysis of the interpretive study had been conducted and conclusions had been drawn, I embarked upon a cycle of action research.

“Action research aims to help practitioners investigate the connections between their own theories of education and their own day-to-day educational practices; it aims to integrate the research act into the educational setting so that research can play a direct and immediate role in the improvement of practice; and it aims to overcome the distance between researchers and practitioners by assisting practitioners to become researchers” (Keeves, 1997, p.173).

Kemmis defined action research as “...a form of participatory and collaborative research aimed at improving educational understandings, practices, and settings, and at involving those affected in the research process” (cited in Keeves, 1997, p.173).

Kemmis and McTaggart (1988) outlined the following attributes of action research:

- “It aims to improve education by changing it and learning from the effects of the changes
- It develops through cyclical phases of planning, acting, observing, reflecting and then replanning, further implementation, observing and reflecting
- It is participatory
- It is collaborative as it involves self-critical communities of people who partake in and cooperate with each other in all stages of the research process
- It involves the participants in theorizing about their practices
- It involves that people ‘test’ their practices, ideas and assumptions about institutions
- It is open-minded about what constitutes the data and involves keeping a journal about learnings of the practices being studied and learnings about the process of studying them
- It allows participants to develop records of their improvements
- It usually begins with the implementation of minor changes and works towards more expansive changes
- It involves participants in making critical examinations of the environments in which they work
- It is a political process as it involves making changes in social practices”

(cited in Keeves, 1997, p.175-176).

Several models of the action process cycle are presented in the literature however all include similar stages and I pursued the following which are an amalgamation of the work of MacNaughton (2001) and Costello (2003) on action research:

1. Define the problem with participants

In analysing the data collected in the interpretive phase of my study it was clear that

the most current ICT problem facing school leaders was assisting educators in learning how to use interactive whiteboards (IWBs) which had been installed throughout 2008 and how to tap into the technologies and ways of communication that students were using outside of school hours. Hence I had informal discussions with participants and decided to work with one respondent (Year 9 Level Coordinator) who was keen to use such technologies in the English classroom. This participant was most enthusiastic about incorporating new technologies and had already dabbled with the IWB and was somewhat aware of other technologies that could enhance teaching and learning.

2. Observe the problem in its educational setting and collect data

Due to the installation of several IWBs in the school, several professional development activities took place for all staff towards the end of the 2008 school year. These training sessions clearly depicted that staff were keen to uptake the technologies presented, however obstacles identified in the interviews and in the literature stood in the way.

3. Plan actions based on the observations and evaluations of the data

In this stage the data was examined in relation to solving the research problem defined. Crucial questions considered were

- What is happening in the school now in regards to the integration of new technologies?
- What changes are we going to introduce to enhance cross-curricula integration of new technologies?
- What do we expect to happen when we make the changes?

These questions were adapted from Costello (2003) in order to pave the way for the action research to take place and in the hope that other educators within the school would be incited to action.

At this point, in collaboration with the Year 9 Level Coordinator, data collection methods and the process to be undertaken for this phase were determined. These included the investigation of technologies that could be implemented for various aspects of the English course at Years 9 or 10, such as the use of an interactive whiteboard to enhance the teaching of an English text or the use of an IWB for language analysis which had traditionally been taught with the aid of a data projector but had never included student interaction – they merely listened to and observed the visual display. Our initial plan was to collaborate further to plan a sequence of lessons that included the IWB as a medium of teaching 'Macbeth.' However, due to time restrictions nothing eventuated before the end of the year.

4. Introduce change

I was keen to embark upon this next stage early in the 2009 academic year, at which

time I again met with the Year 9 Level Coordinator to discuss continuing our work on the use of the IWB. It was clear that the participant was still keen to pursue this technology; however, during our discourse, I discovered that earlier in the term the English faculty had attended professional development (PD) on IWBs and other technologies at another school. As a result of this, the Year 9 Level Coordinator decided to develop a wiki (a database of web pages that can be edited live by members of the wiki), which at the time of our discussion, had existed for just over a week, in a Year 9 English class for the study of a film. Additionally it was revealed that several Year 10 English teachers had been inspired by the PD to use an IWB in their classes.

Hence, although the Year 9 Level Coordinator was still determined to learn and teach with the IWB, he was clearly passionate about the use of the wiki and what it had already presented about students' learning habits. Therefore, we decided to pursue this technology for the action research phase and I also decided to approach the Year 10 English teachers about their experiences with using the IWB in order to further develop the questions raised in the research project.

5. Reflection on the effects of the change

I shared initial findings and reflections with the Year 9 Level Coordinator on the use of the wiki. This primary discussion is described by MacNaughton as the first level of data to be collected (MacNaughton, 2001, p.213).

6. Determine theories and processes to guide further actions

In collaboration with the Year 9 Level Coordinator we discussed further use and expansion of the wiki in the Year 9 English classroom and administrative access to the wiki was provided to me so that I could gauge first hand, through the interactions on the wiki, the impact upon student engagement and student learning. Additionally, upon learning that the Year 9 Level Coordinator was to present the wiki at a Plenary (general staff meeting) which resulted in two training sessions for staff, in agreement with the participant, I observed and took notes at the Plenary and I videotaped one of his training sessions.

Amidst my interactions and investigations with the Year 9 Level Coordinator, I also arranged to meet with the Year 10 English teachers who had used an IWB in their classes. In order to save time, we decided to conduct a group interview at a scheduled Year 10 English meeting.

The questions for the group interview were semi-structured and audio-recorded. I focused on determining how the PD had encouraged them to use the IWB; to what extent they had used it and the positive and negative outcomes and experiences of this; the level of student interaction with the IWB (if any) during the lessons and overall the participants' opinions about using this technology.

I felt at this stage, that my research had reached a turning point and thus I embarked on the next phase of the action research, namely, to further investigate the change that had been introduced into English lessons. My discussions so far, made me more fully appreciate the findings in the literature reviewed as a lot of the comments jelled with my reading. Neuman (2006) writes, in relation to the critical researcher's view on human agency, that "People make choices, but the choices are confined to what they feel is possible. Material factors...and cultural-subjective schemes... set what people feel to be possible or impossible, and people act based on what they believe is possible" (p.97). And this was clearly obvious in the discourses held in the action research phase. Participants felt strongly that often the obstacles to effective ICT integration are determined by the resources available and the obstacles that are perceived and the leaders' understanding of how these resources can be utilised and the obstacles overcome. So I was further driven to investigate the role, if any, that school leadership had had in the uptake of these new technologies. Hence I developed another set of questions (Appendix 4) that were an amalgamation of several insights that had caught my attention in the literature review and I asked all action research participants to respond to these in writing. Only two did.

7. Reflection on the effects of the change.

Finally, I transcribed the group interview, processed written responses and began to draw conclusions for the action research phase. This synthesis is described by MacNaughton as the second level of data to be collected) (MacNaughton, 2001, p.213).

The diversity and scope offered by the use of mixed methodologies enabled me to more fully appreciate the extent to which ICT was being employed and the impact that senior management did have on those educators who were middle managers and also those whose prime responsibility lay in the classroom. The action research phase of the project enhanced my understanding of the interview data as it facilitated me in making links between what was said and what was happening between teachers, between teachers and leaders and between teachers and students.

In the next chapter I present a thorough analysis of the data collected and findings with the aims of providing answers to the research question and in further establishing the appropriateness of using a mixed methodologies approach.

Chapter Four Presentation and discussion of results

Case Study

This section provides an overview of the participants' responses to the interview questions. The case study results examine the participants' views on:

- School culture
- Leadership style
- Organisational conditions necessary for supporting teaching and learning with ICT
- Attributes required of leaders who support teaching and learning with ICT
- Staff training
- Obstacles to and activating factors for successful ICT integration across the curriculum.

Organisational structure

In order to fully understand the findings, it is important to first understand the specific context of those interviewed and significantly to clarify their roles within the organisation and their working relationships to each other. The organisational chart on the following page shows the hierarchy of the interviewees.

Within the framework of the school, the Principal, Deputy Principal Pastoral and Deputy Principal Administration are known as the Executive Leadership and will be reported as such throughout this dissertation. The Leadership team comprises of the Principal, Deputy Principal Pastoral, Deputy Principal Administration, Director of Mission and Director of Studies.

From the conversations had, it was clear that at times, participants were reluctant to comment upon their superiors; however, strong opinions about the place of ICT were elicited and all of those interviewed were passionate about the positive influences that ICT could bring to the classroom. Furthermore, the organisational chart that follows aims to show that all major decision-making in the school, including that pertaining to ICT, follows a hierarchical path that is ultimately controlled by the Principal and two Deputy Principals, something which in the context of this case study and as discussed in this chapter, has a significant impact upon the five criteria determined by Becta (see p.9) as being pivotal to successful ICT integration.

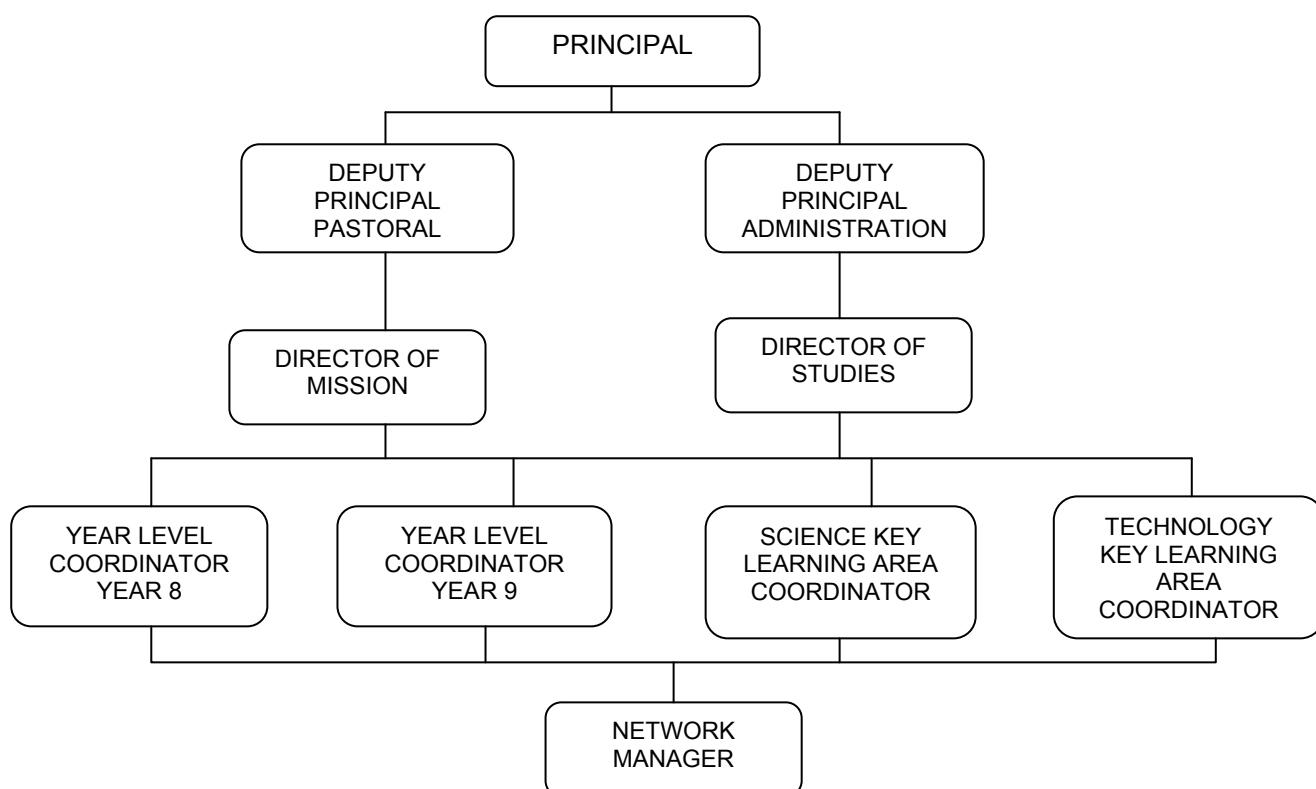


Figure 1: Organisational chart of school leaders in case study school

School culture

Overall, participants directly stated that the school had an academic culture and made comments that implied that the teaching and learning that took place were of paramount importance. Additionally, participants felt that they were part of a caring community which valued sharing and collaboration amongst staff and students. This sense of working together was often raised throughout the interviews as one of the most significant elements of teacher confidence in using ICT.

Similarly, participants indicated that inherently the scholastic and collegial nature of the school had not changed with the introduction of ICT tools. However, many commented that communication processes had altered dramatically with the introduction of email. It was noted by some of the participants who had been at the school during the introduction of email, that many staff at the time were reluctant to use this technology and they inferred from this that such attitudes were still obstacles to ICT facilitation today. This concurs with the literature that lack of teacher confidence in their capacity to use technology while dealing with organisational change, impedes the uptake of ICT. However, technologies such as email and the use of Markbook (an electronic reporting system) were enforced by the school leadership, and hence staff had to adapt to these changes in order to fulfil their responsibilities. Interestingly, several participants commented that email made staff at all levels more accountable. It was seen as a transparent medium that not only disseminated information but made all school members accessible. The Deputy Principal Pastoral in particular felt strongly about this, saying “People don’t need to seek me out, ...can schedule appointments – has made the job

more efficient and more accountable; we are more accessible to parents and students: very important to me.” This indicates that there was recognition by participants that technology had both positive and negative elements.

The Deputy Principal Pastoral also commented that pedagogy had changed considerably with the introduction of ICT although some other participants were less convinced of this. Others seemed to feel that in general, the school was still quite technologically behind other schools who had similar socio-economic characteristics and educational aims and that many educators had still not embraced ICT to a sufficient level in order to make a noteworthy impact on teaching and learning. One could speculate as to why there was discrepancy here; and perhaps it could be answered by some of the comments made about Executive Leadership throughout the interviews. In particular, a few of the respondents commented that Executive Leadership needed to have a further understanding of how diverse technologies worked and how they could be utilised by educators for teaching, and that they needed to witness firsthand what was happening in classrooms. The Science Key Learning Area Coordinator asked “Should leaders visit classes?” and such concerns were shared by the Network Manager who commented: “Leaders are not really aware of new technologies; ... their time is not given to this and they are more concerned with daily running of the school.” Such beliefs were also found by Moyle (2006, p.11): “...principals would be derelict in their work if they did not take a leadership role in integrating ICT into teaching and learning.”

Leadership style

In discussing the leadership style, overwhelmingly, there was strong conviction that the Executive Leadership, particularly the Principal and Deputy Principal Pastoral were not digital natives and did not embrace ICT themselves. Their working and leadership practices had not changed much, except for the use of email. There was consensus that the ICT directions and initiatives were led by the younger members of the Leadership Team, including the Deputy Principal Administration and in particular the Director of Studies who is responsible for teaching and learning and the enhancement of student outcomes across the school. However, those interviewed were not critical in reflecting upon this reality, but rather accepted it as such.

Overall, opinions about the leadership style were favourable. Terms such as “strong”, “supportive”, “open” and “facilitating” were used and repeatedly implied throughout interviews. Additionally, in describing the leadership and organisational conditions discussed below, it was apparent that participants felt that they were governed by a shared leadership/distributive leadership. A leadership approach “where the leadership capabilities of others are fostered and developed...” (Moyle, p.17, 2006).

Organisational conditions

At the time of the interviews, the school was working on a Strategic Plan for ICT. As noted by several participants, one had not existed and ICT had not been an integral part of the school's overall vision. One respondent commented, "ICT strategic plan is essential and lack of this has caused some of the current issues we face." Remarks made by the Network Manager, and which seemed to sum up a lot of the feeling, were: "This provides a documented vision for the school in adopting ICT and the direction we wish to take with it" and "Strategic plan...tied up with funding and finding solutions that work." Two respondents commented about the life of the Strategic Plan, indicating that a Strategic Plan for ICT had to be a dynamic document to keep up with the rapid changes in technology. Moyle too found this to be the case. (Moyle, p.30, 2006).

The Principal vigorously purported to support the importance of ICT in fostering the School's vision, and this sentiment was reinforced by several others who saw that the vision and school culture were vital in all aspects of pedagogy and that ICT is a mechanism of pedagogy. Additionally, in several conversations, respondents discussed the Five Goals that underpin the vision of the school. Staff have a common understanding about these goals and discuss them with a common language; goals that are recurrently celebrated and upon which there is ongoing reflection.

A whole school approach was seen as the necessitating factor in the school's vision for ICT, and this condition was also seen as a favourable characteristic in the findings of Moyle (p. 14, 2006). Comments demonstrated the belief that if ICT was to be successfully integrated across the curriculum then the physical environment, educational practices, attitudes of all school community members and a practical approach to this end had to seamlessly intertwine.

In discussing infrastructure, a common understanding was that although there had been many changes throughout the last decade, the school was still under-resourced and there were issues concerning the rift between the administration system and the school network, and limited or impeded access to school resources including the Internet. All participants were hopeful about the possibilities that the upcoming Intranet would have in improving teaching and learning and in fostering the School's vision. The inception of a Technology Committee (2007) was viewed as a positive and necessary element in the school and as the hinge that connected the whole school. In relation to this, there was positivity about the employment of a Network Manager several years ago, who is also an educator, and the employment of an Intranet Manager which occurred soon after the conclusion of my case study.

Leadership attributes

Leadership attributes identified by participants as necessary in supporting teaching and learning with ICT included the following and I have grouped them in five of the eight categories of ICT leadership as identified by Yee (2001), (see p.24).

Careful challenging	Adventurous learning	Learning-focussed envisioning	Patient teaching	Protective enabling
• Visionary • Forward thinking • Innovative • Excitement and vision about ICT • Risk taker	• Open to new ideas • Open • Willing to learn • Flexible • Open to change • Be learners themselves	• Commitment to improving pedagogy • Aware of new technologies and how these can be used • In touch with classroom practices • Up to date with current educational practices • Observe classrooms to see what is happening and visualize what can happen	• Practical in supporting others • Supportive, encouraging of staff – provide incentive • Lead by example • Understanding and appreciation of staff and technologies • Role model/modelling	• Delegator • Able to identify talents of others • Assess IT skills of staff

Table 2: Leadership attributes identified by participants

These findings also compare favourably with those attributes identified in the research by Moyle (2006); and as commented by Moyle, although some of these characteristics seem nonspecific, they are to be interpreted in light of their connection to teaching and learning with ICT. Such a comprehensive range of attributes stemming from only ten participants clearly exhibits the multi-faceted nature required of school leaders to support the integration of teaching and learning with ICT. It was clear too, that current executive leaders sat comfortably in the Patient Teaching and Protective Enabling categories, but less comfortably with several of the elements identified in the other three categories, which were equitable providing, constant monitoring and entrepreneurial networking.

Professional Development/Staff Training

Although not all of the participants were specifically asked about the importance of staff training, all of them discussed it in some way. This coalesced with the literature that the importance of training in the use of ICT for teaching and learning cannot be emphasised

enough. The Deputy Principal Pastoral, who is the person responsible in the school for Professional Development, concurred with the other participants that peer-to-peer or collegial teaching was the most effective means of learning how to effectively employ ICT tools and resources within the school environment. She corroborated this comment by indicating that professional development given by external and specialist trainers and organisations was only approximately 10% of the overall professional development undertaken by staff. Reasons for this lay in comments by other participants such as “Whizz bang PD can put people off and it’s threatening – assume a level of knowledge that not all people have” and “Peer training makes attendees feel comfortable. Experts can be intimidating for some.” These sentiments are supported by O’Mahony (2003), Livingston and Condie (2005), Toprakci (2006) and Moyle (2006) whose participants found that to cope with the changing demands of ICT, professional learning needed to include

- “Mentoring relationships;
- Communities of practice; and
- Learning Teams” (Moyle, p.24, 2006).

The Deputy Principal Pastoral also commented that the openness of staff to undertake training was a vital element in enabling learning and this too was mentioned by several other participants, “...primary responsibility for PD is in the staff member.”

Inhibiting and activating factors

Although in the pre-determined questions for other school leaders, there was no specific question regarding impediments to ICT integration, inevitably in discussing teaching and learning with ICT, all participants did comment upon the obstacles that faced cross curricula use of ICT. I then often followed such comments with a variation of Question 15 ‘What factors do you perceive as contributing to successful classroom implementation of ICT?’ Table 3 on page 44 summarises both inhibitors and activators of ICT integration as identified by participants and I have grouped them according to common threads.

The factors identified in Table 3 are akin to those shown in Table 1 on page 16, which summarises the obstacles to and conditions required for ICT integration in schools as found in the literature of the last decade. This implies that in most developed countries, educators have faced and continue to face similar challenges in teaching and learning with ICT. And in relation to my study, school leaders can be both inhibitors and activators - not only directly by role modelling, but more significantly, indirectly in their management and understanding of how to manage funds in order to maximise acquisitions and staff training and in their engendering of a school culture that promotes both collaborative and individual learning of ICT through the provision of time and resources.

Leadership support of ICT

Questions 6, 7 and 11 of those for other school leaders, centred on the role and responsibilities of senior management in relation to ICT integration and the support given to lower level management in their teaching and learning of ICT.

The Director of Mission strongly contended that Executive Leadership was reactive rather than proactive in their approach to ICT, which complied with comments made by the Science Key Learning Area Coordinator who suggested that senior management responded to pressure exerted by prospective students and parents, - i.e., a "...keeping up with the Joneses" attitude. The sentiments in general were that Executive Leadership was very supportive of staff members wanting to develop and augment their ICT literacy, as opportunities for training were not denied. However, respondents felt that senior management's handling of ICT across the curriculum lacked dynamism and sufficient forcefulness. A distinctive comment was: "No disincentive – but no overt encouragement."

In discussing their support of staff, Executive Leadership members agreed that their main role lay in encouraging staff to pursue ICT and providing Professional Development opportunities. Each of them felt that affirmation and encouragement of staff were critical and as discussed, this support was clear to the other respondents. Yet, clear too, was that such support – without a sound knowledge of ICT and without closer scrutiny of and attention to an ICT vision – was simply not enough. Sentiments verbalised by Louis and Miles (as cited in Fullan, 1990, p.83) almost twenty years ago: "Leadership relates to mission, direction, inspiration."

Personal attitudes

All respondents were convinced of the positive impact that ICT could have upon teaching and learning. Each of them was enthusiastic about the possibilities that ICT could offer education and all of them were unafraid to explore these possibilities. It was clear too that the participants were frustrated by the limitations, and that due to these obstacles they felt that they were encumbered in their facility to explore technologies such as wikis, blogs, interactive whiteboards and mobile tools. A shared recognition was that today's students are attracted to ICT. Comments about students such as "...visual learners and shorter attention spans" and "...ICT readily engages students – gains their attention quicker" indicated the belief that the respondents had in the benefits that ICT could bring to the classroom.

Members of the Executive Leadership team discussed their attitude within a framework of their roles as supporters of the use of ICT by teaching members of staff. That is because, and as was clear throughout the interview process, that Executive Leadership who had minimal teaching responsibilities did not employ ICT for teaching and learning on a daily basis. As identified by all respondents, Executive Leadership primarily employed ICT for

communication purposes and the production of school documentation, and rarely explored it beyond this.

Inhibitors		Activators	
Teacher attitudes	Infrastructure	Collegiality	Student issues
- Attitudes toward to ICT - Staff reluctance to learn and to troubleshoot - Lack of openness to change	- Setting up of classroom - Limited access to technology through bookings - Physical size of classrooms can be troublesome - Under resourced – hardware & software	- Collegial PD - Primary & secondary cross fertilization - Sharing between colleagues - Openness + personnel + personality + structures working together	Student knowledge and acceptance of ICT
Time			PD
- Time to 'play' with the technology - Time to do PD - Time to set up for lessons - Scheduling of PD/training	- Bandwidth issues - Internet issues - Technology failure	- Trialling - Intranet	- Ideal PD is timetabled - Purposeful PD/relevant training - Context for using technology
Beyond reach	Executive Leadership modelling	Middle management modelling	
Experts intimidating	- Lack of expertise of executive leadership - Lack of role modelling by leaders	- Affirmation - Role modelling and understanding of technologies by school leaders - Create enthusiasm in staff	
Money	Planning		
- Finances - Budget - Money	- Need closer ICT management – Strategic Plan - Challenged by constant change		

Table 3: Inhibitors and activators to ICT integration

Table 3 above, shows the inhibitors and activators to ICT integration as identified by the participants in the study and I grouped them according to common threads.

Other useful insights

A paradox that I found in interviewing the Deputy Principal Administration concerned the sharing of ICT knowledge between teachers. As noted previously, most respondents commented favourably about the collegiality that existed within the school. Many also mentioned the success and appreciation of ICT training sessions provided by peers throughout 2008. Yet, in observing the use of ICT within the school and informally conversing with staff while conducting my study, it was apparent that several motivated and keen teachers were using technologies such as podcasting and video recording, and this was largely unknown by other staff members. Hence their knowledge and experience was not being transferred. The Deputy Principal Administration and I discussed that there were attempts being made to remedy such situations, as staff were consistently invited to present how they used ICT at Plenary. However, this invitation was not often taken up, and the Plenary agenda was regularly too full to allow these presentations to take place. Such realities confirmed that a whole school approach that balanced the strategic plan, vision, school culture, school infrastructure and organisational structure had not been achieved and faced various obstacles.

As found in the literature and in this study, time to learn about ICT was one of the greatest inhibitors to ICT integration, and in particular respondents felt that this had to do with the School calendar. The Deputy Principal Administration, who is responsible for developing the annual school calendar and the school timetable, understood the tensions that existed in scheduling the myriad of school events. Remarks included: "...what do we get rid of? We have fewer meetings now....Ideal PD is timetabled into loads – but what's the impact?" Moyle's participants too found that time and timetables were problematic: "...timetables reflect what a school community values and that time can be organized to reflect a school's priorities" (Moyle, p.45, 2006).

Action Research

This section provides an overview of actions taken by several teachers in implementing new technologies into the English classroom; the outcomes of those actions and the role of school leadership in the uptake of the new technologies.

The troubled process in organising and undertaking the action research phase of the project evinced that as elaborated in the literature and in the case study, lack of time was one of the greatest inhibiting factors in pursuing methods of teaching and learning with technology. This inhibitor was mentioned time and again by interviewees and by those who participated in the action research. Furthermore, the Year 9 Level Coordinator indicated that the IWB training that had occurred late in 2008 hindered immediate follow

up to this technology due to the summer holidays which took place soon after. My observations of the staff confirmed this. There was much enthusiasm about the technology during the professional development sessions; however, the busy nature of school towards the end of an academic year and the finalising of courses did not provide sufficient scope for educators to investigate how to implement the technology into their classrooms. By the beginning of the 2009 academic year, the 'gloss' had worn off, and limited uptake of the IWB has occurred to this point.

Another factor which played a role in the Year 9 Level Coordinator's uptake of the wiki prior to the uptake of the IWB was ease of use and ease of implementation; and these too were recurrent in the literature and were found to be obstacles to ICT integration in the case study. The participant indicated that the use of the IWB was a "...more involved and complex learning process' whereby the wiki was more accessible. This acquiesces with the three criteria purported by Richardson (2000) as those by which successful ICT integration should be evaluated. She writes "The study shows that the earlier tendency to measure the degree of ICT implementation by student to computer ratio has now given way to more qualitative measures of ICT applicability, accessibility and connectivity. Indeed, both Canada and Australia warn against the danger on placing too much emphasis on the amount of equipment available, to the detriment of quality and equity of access, and a sound pedagogical basis in ICT use" (Richardson, 2000, p.3).

It is clear that without attendance at the professional development session at another school (hereby known as School B), neither the Year 9 Level Coordinator nor the group of Year 10 English teachers would have decided to utilise a wiki and an IWB respectively, at this time. Hence, as indicated in the literature and in the case study, implementation of technologies across the curriculum cannot occur without the support of school leadership. In this case, and as purported by all case study participants, the leaders at the school are supportive of educators who wish to pursue professional development that enhances the teacher's skills with and knowledge of technology. Professional development applications are approved without hesitation and this gesture is one which decreases the obstacles to ICT integration across the curriculum.

As noted previously, after speaking with the Director of Studies, the Year 9 Level Coordinator was encouraged to present his wiki and his use of it within the English classroom at a staff Plenary – another avenue by which staff is supported in their endeavours to use technology in their classroom; and this eventuated into several hands-on training sessions for other practitioners in the school which has led to the use of wikis by several teachers. The findings of each of these activities follow.

Throughout my discussion with the Year 9 Level Coordinator about the wiki, it was apparent that he was overwhelmed by the speed and breadth with which the students had engaged with the technology. It was evident that students had taken ownership of the wiki. Several keen students had begun their own discussion threads, unaided and

unprompted, and this encouraged several of those who had been disinclined to engage in great depth so far, to become involved further. The Year 9 Level Coordinator was convinced too that the school's sense of community and belonging and the students' ease with online technologies greatly contributed to the seamless way in which the wiki had become a part of English learning.

Another benefit ascertained is the ability for the teacher to witness the virtual collaboration taking place and make judgements upon the comments and insights contributed; offering suggestions and corrections in real time and using the wiki as another tool by which to assess students' understanding of the film text (in this instance) being studied. It was noted too that the wiki was a topic of discussion at Parent/Teacher Interviews which took place in March. Parents now had another path by which they could observe and engage with their child's learning.

During the wiki presentation made to staff at Plenary, the Year 9 Level Coordinator advocated the enhancements that this technology had made to student learning. These included:

- Extension to or variation of formal homework which was not seen as labour intensive by students
- Complements students' modes of communication and the way in which many of them complete homework
- Facilitates all students by being a constantly accessible repository of learning materials
- Students reading other students' comments is interesting and motivating
- Encourages student collaboration.

Overall, the Year 9 level Coordinator commented that the experience has been satisfying and positive and that this has re-energised him to not only expand the wiki, as suggested and encouraged by students, but continue to investigate other emerging technologies. A regeneration that lead this participant to join the school's Technology Committee shortly after the conclusion of my investigation.

However, the Year 9 Level Coordinator has remained mindful of the checks and balances required in any classroom strategy undertaken and is acutely aware that this technology is only a part of the overall teaching and learning plan and that its success is underpinned by the teacher's commitment to it. There is some frustration that time is still a significant inhibitor to the teacher's ability to be online for prolonged periods and that responses to students and between students themselves are often delayed. Furthermore, the educator has ensured that the wiki is encased within guidelines that are true to the school's five goals and to the aims of English teaching. These include that comments made are respectful of other individuals in the wiki group; that comments are relevant to the topic at

hand in an attempt to further the understanding of the issues under discussion and that conventions of English are adhered.

The experiences of the Year 10 English teachers in using the IWB were quite different, and it can be concluded that this is due to the complexity of the technology itself compared to the facility of the wiki.

In opening the discussion, I asked participants to comment upon their knowledge of IWB in teaching and learning and the impact that the PD provided by the school in 2008 had had upon their decision to use the tool in the English classroom. All three participants commented that to date, apart from the PD experienced at School B, they had found presentations on this new technology daunting and over reaching. Expressions given included “intimidating”, “too remote”, “Here comes another change” and “This is so far beyond anything I can achieve.” However, for all three, the PD undertaken at School B, earlier in 2009, was pivotal to their joint decision to make use of the IWB. These findings regarding teachers’ emotions and their responses to meaningful PD are typical when they are faced not only with change, but in particular, technological change as found by Lawson and Comber (1999) who recognised that teachers’ attitudes preceding a modernisation and the provision of suitable support and instruction were critical in developing positive or negative reactions from educators.

Needless to say, I wanted to know why this particular PD had made such a difference when the school in which they taught had spent money, time and resources to provide several IWB presentations in the previous year. One participant commented that first, the infrastructure and environment in School B were conducive to use of the IWB. Additionally, this participant felt at ease during the instruction, as the presenter had undergone similar experiences and came from a non-technological background. The other participants had been struck by the presenter’s simple, yet effective and pedagogically sound use of the IWB, its relevance to their subject area, its apparent ease of use and the step-by-step presentation style. These positive reactions to a different style of PD coalesce with Moyle’s (2005) findings that educators are goaded by seeing how ICT can be integrated into teaching and learning and more acutely, with the findings of Lai, Trewern and Pratt (2002) that teachers’ motivation and volition to take up technology are enhanced when they can internalise how it can benefit their particular teaching areas.

We then discussed how the IWB had been used so far. Two of the participants had developed a series of lessons to instruct students in language analysis. The plan was that the initial lesson would be team taught which aimed to alleviate anxiety felt by the instructors in using the technology for the first time within a classroom setting. Teachers commented that the lesson had required a lot of preparation and practice and that the circumstances were not ideal as approximately fifty students and two teachers were sharing a room which also housed the IWB, a computer and other furniture. Yet, although

the technology failed on occasion throughout this first lesson, both participants were determined to try again as they had seen the possibilities it allowed. In a subsequent lesson, one of the participants adapted the lesson plan presented in School B which required that students cluster ideas by moving text around on the IWB. Several insights were gained here. The teacher noted that the IWB facilitated the movement of ideas and allowed each student a chance to engage with the technology in a simple way which the others found interesting. Additionally, it enabled and surprised the teacher to see the many combinations that were created by students – something that if done without an IWB would have taken a lot more time and would have been more laborious for all concerned. The teacher observed that in moving their ideas around and having this witnessed by peers, students gained a sense of ownership and displayed a greater keenness to perform well. It also assisted students to understand that all ideas are valid and that alternatives are worth considering.

The third English teacher had used the IWB in a Year 7 English lesson. The use was simple yet effective, and student interactivity occurred without much planning or forethought as it became clear during the course of the lesson, that three of the students were fairly proficient users of the technology as they had been exposed to it and had used it interactively in their primary years. This student engagement allowed the instructor to observe student learning and make more informed judgements about student understanding as the teacher became a mere viewer while the students manipulated the IWB.

I then enquired about how the use of this new technology had already, or would, impact, on teaching practice and pedagogy. All agreed that when preparing lessons they now considered how technology could be used to enhance the teaching and learning in some way, and that this altered their teaching style and the presentation of content. However, they also felt a sense of trepidation as they were fearful about what could go wrong with the technology and this also precipitated their need for a 'back up lesson plan' to be in place.

Throughout the discussion, all three participants described obstacles that they faced in implementing the IWB and many of these concurred with those found in the literature. It was also apparent that although each could see benefits in using the technology within their classes, they were frustrated by the challenges which continued to face them. The main obstacles were learning how to use the IWB effectively and the inconvenience in setting up or accessing a room in which to use the technology. One participant in particular was deterred from using the IWB regularly because of the lengthy process involved. A room that housed an IWB had to be accessed and this usually meant swapping classes with another teacher who was already timetabled in that room; a laptop and other teaching materials had to be carried from class to class and often across the school campus and then the equipment had to be connected and set up for the lesson. Clearly, this process involves a lot of time and inconvenience and results in most

significantly, loss in valuable class time. Another participant too felt that such hassle was often too frustrating to overcome. This participant had already decided that the IWB would not be used in a lesson that immediately followed another lesson because of the time required in setting up. This teacher commented that if there was a room or several rooms which were permanently equipped with IWB technology and laptop, then it would provide incentive for greater use of the technology and for further consideration about how technology could be further integrated into English teaching: "I would build it into my teaching a lot more."

I will now discuss the responses given by two participants – the Year 9 Level Coordinator and a Year 10 English teacher to the questions developed for the action research phase of the project as described in the Research Methodology (p. 33) and as can be found in Appendix 5, p.83.

In answering the first question the participants took different views. One indicated that leadership changes can result in greater reliance on professional expertise and staff collaboration but that it was important for staff to know "WHO is responsible for WHAT." However, the other response noted that a change in leadership can result in a more "authoritarian and restrictive approach" which could hinder staff collaboration and professional development.

Both respondents indicated that the school encourages the use of new technology and that professional development in this area by teachers was expected. Both also are willing to learn about teaching with new technologies yet this has involved reorganising their lesson planning and pedagogy.

The respondents had similar views regarding time required to learn and set up new technologies and ICT training. As found in the literature and the case study, lack of time is one of the greatest inhibitors to ICT integration throughout the curriculum coupled with inappropriate support and ineffective training. An interesting observation by the Year 9 Level Coordinator was "I certainly agree that teachers' attitudes are vital – they are generally motivated by time – do they have time to learn and reinforce the skills necessary?"

In accordance with the literature and the premise of this research project, the participants commented that it is vital that ICT initiatives have the support of school leadership that is far-sighted. One respondent commented too, that it was imperative that a principal have excellent leadership in curriculum and technology, though it was not necessary for him/her to be directly engaged in ICT integration. Furthermore, as identified in the case study, neither respondent was aware of a school vision for ICT and both acknowledged that ICT management overall was "poor" and "piecemeal."

Both respondents were thwarted by being asked to classify the Executive Leadership of the school. Neither could do so and it was again reiterated that the school vision encased

within the five goals was adhered to by Executive Leadership, yet that the ICT vision was not apparent. Additionally, it was noted that the seven categories presented in the question, assumed that the principal was the most influential figure in the school's use of ICT and that this was not the case in the school under investigation.

In answering questions about the role of leadership in the uptake of new technology, it was agreed that the personal views of school leaders about the importance of ICT were somewhat important; but that it was more important for them to "communicate their vision and inspire." Both also contended that leadership support was central in teachers' uptake of technology, but that their own proficiency with ICT was not, as staff "have become ICT proficient from outside sources."

Lastly, obstacles listed echoed that which has been purported throughout this research project. Namely, lack of money and lack of time.

As a summation of the action research, both respondents commented on their use of a wiki and IWB. Again it was evident, that there had been a lot more use of and student engagement with the wiki due to its facile nature. Both teachers indicated that not a lot of preparation or maintenance was required and that the nature of the technology itself attracted students: "I posted questions for discussion on the wiki and let it run its course...I found it quite liberating in terms of letting go" and "Even students who do not normally speak in class are excited by the use of this technology."

However the IWB posed a greater problem. The Year 9 Level Coordinator had not used it in a classroom setting, yet indicated that "The implementation of the IWBs compels us to use them – or at least try to." And this was echoed by the Year 10 English teacher. However, neither felt that school leadership had been a great influence in their decisions to implement these technologies apart from the fact that they had provided PD.

It is clear then, that the uptake of technology by educators is affected by many diverse factors. However, as the school leaders are ultimately responsible for the opportunities afforded teachers to learn new skills and improve their teaching, that teachers' access to and comfort with technologies is directly influenced by the leaders' vision for the school and its future with ICT.

In the following chapter, I will elucidate the opinions formed from the research findings and endeavour to establish the significance of the results in informing school leaders about the leadership qualities and environmental conditions necessary for efficacious ICT integration across the curriculum.

Chapter Five Conclusions and Recommendations

In this chapter I will present conclusions drawn from the case study of a single school in Melbourne and state the contribution that the findings can make to further understanding the impact that school leadership has upon ICT integration across the curriculum and what is required of school leaders to ensure that this integration is effective. I will first describe my findings and conclusions in relation to the goals of the study; then I will assess to what extent ICT has been effectively integrated across the curriculum based on the five criteria defined by Becta and finally I will make recommendations about how school leaders can foster successful ICT integration across the curriculum.

Discussion of extent to which goals of the study were achieved

1. to identify the qualities and behaviours of school leaders that lead to effective integration of ICT in the curriculum

On page 41 I listed the leadership attributes that interviewees identified as those necessary to support teaching and learning with ICT and I grouped them according to Yee's (2001) ICT leadership framework. These attributes suggest that educators require leaders who are:

- Ingenious
- Risk takers
- ICT learners who are unafraid to experiment with the latest technologies and learning strategies
- Managers of the ICT vision who focus on student learning when making decisions about ICT
- Willing to teach and be creative in modifying the school environment
- Encouraging of professional development
- Willing to create ICT leadership tasks for staff and students
- Advocators of ICT and the school's ICT vision.

2. to understand and interpret the nature of leadership required to effect successful integration of ICT across the curriculum and in understanding this, provide recommendations about changing the school culture so that ICT tools can be effectively used by teachers of all disciplines

The characteristics identified above provide an outline for leaders in managing successful technological implementation. They indicate, and as found in the literature, that above all, a clear sense of an ICT vision is imperative and that leaders must possess the ability to motivate educators by exhibiting a passion for ICT and the benefits it can bring to teaching and learning.

3. to gain an awareness of how school leaders utilise ICT tools in their administrative work and their classrooms

The case study showed that due to the nature of the work of executive leaders, that their use of ICT was predominantly for communication and production of documentation. As noted, these leaders have minimal teaching responsibilities and hence their purpose for using ICT is administrative-focused rather than student-focused. However, middle management who have greater teaching responsibilities and whose day to day interactions are with students, do attempt to use technology more creatively to facilitate their teaching and enhance student learning. This band of leaders displays more of the qualities identified by Lee, Gaffney and Schiller (2001), and in particular qualities that relate to the place of ICT in education, namely a deep appreciation of providing quality education in a digitally connected world and an understanding of the significance of integration and how it can be achieved.

4. to become informed of the perceptions of middle to lower management, of how the school leaders have supported the integration of ICT across the curriculum

There was consensus amongst the non-executive participants interviewed, that the school leaders do show support of ICT initiatives by:

- promoting and allowing professional development – both in-house and externally
- facilitating the formation of a Technology Committee
- investing in required hardware and software where the budget has allowed.

From my own knowledge I know that the Director of Studies, in collaboration with the Chair of the Technology Committee and Network Manager, are given much liberty in managing ICT within the school and this demonstrates that Executive Leadership are attempting to cultivate an environment that is conducive to teaching and learning with ICT. However, it was clear that, due to a lack of an explicit ICT vision, participants viewed the overall management of ICT in the school as slow moving and lacking vitality.

Assessment of effective ICT integration

1. Adequacy of ICT resources

None of the participants overtly stated that the school lacked ICT resources, although there was a feeling that the Intranet to be introduced in 2009 was long overdue. Additionally, there was concern about the management of ICT resources and the infrastructure that supported the use ICT tools. In particular, great frustration was aired by participants regarding the booking of ICT resources and/or rooms that housed ICT tools such as interactive whiteboards. Hence, it appears that the greatest difficulty regarding ICT resources is their accessibility.

2. Ethos for learning with ICT

As indicated, at the time of the case study, a strategic plan for ICT was being developed and this was communicated to staff in early December 2008. However, there has been no

overt implementation of this strategic plan, and hence, staff are unaware of a vision for ICT and are unfamiliar with the strategic plan – something that participants found disconcerting. On the other hand, staff have felt some pressure to take up new technologies and to further develop their ICT skills and knowledge due to the development of the Technology Committee and subsequent subcommittees, the purchase of several interactive whiteboards, the provision of in-house and external professional development, and the introduction of the Intranet. Thus there is a sense by teachers that ICT should play an integral part in teaching and learning in the 21st century, yet those interviewed felt that there was no clear and universal direction for this within the school.

3. Pupils' attitudes to ICT

It was patent that those who engaged a lot with students in their teaching and through other activities felt that students did react positively to the use of ICT. Participants purported that students were

- visual learners
- digital natives and hence open to the use of ICT
- at ease with online technologies.

4. Quality of ICT teaching

There is no direct evidence regarding the quality of ICT teaching, however some conjectures can be made regarding teaching with ICT. Overall, it appears that to date, there is a substantial use of ICT in the classroom and by educators for preparing lessons and completing other tasks. However, the depth and complexity of the use of ICT tools with students appears to be lacking. From my observations and those of the participants, most teachers appear at ease with students using word processing tools, presentation tools and the Internet in order to complete school work because these are the applications that are primarily used by the educators themselves. However, use of newer technologies such as wikis, blogs, interactive whiteboards, podcasting and vodcasting, is minimal and as noted, obstacles to the uptake of these technologies across the curriculum are varied and paramount. Hence it can be argued, that the quality of ICT teaching is meagre because at present, it is not done to a great extent and it is not used in all subject areas which is the key to integration across the curriculum.

5. Attainment of ICT skills by pupils

Following on from the claims made above and from participants' knowledge and understanding of student learning, attainment of ICT skills by pupils occurs both within and outside of the school walls. As indicated, it appears that students overall are comfortable with using ICT and know how to use a variety of tools; but as an IT teacher, I would argue that most of them still lack sophisticated use of technology and that this can only be learned in an environment where such use is modelled, practised and advocated.

It can be inferred then from the qualitative study of the school, that currently it is not 'a school of the future' as defined by Becta (2001). The findings show that there is still a lot to be done to augment each of the five assessment criteria.

Recommendations

The recommendations that follow aim to guide school leaders in implementing strategies and processes that have been shown to be necessary if ICT is to be effectively and efficiently implemented across a school curriculum.

1. Articulate an ICT vision

As found in the literature and in the research findings, educators feel that an explicit ICT vision which is embodied within the School Vision is imperative. An unequivocal understanding by all within the school setting of the goals for ICT within the broader educational context will shape the directions that need to be taken by educators and leaders alike.

2. Encourage and inspire use of new technologies

Although the research findings denoted that it was not imperative for school leaders to be skilled users of technology in order for there to be effective use of ICT within the school, it was desirable that leaders overtly encourage use of new technologies and do attempt to 'showcase' it in order to inspire others. Additionally, it is desirable that leaders actively investigate how ICT is being used within the school and look to more fully understand its potential.

3. Clearly exhibit passion for and commitment to teaching and learning with ICT

This can be effected by leaders who strongly and consistently advocate the use of ICT and are willing to invest in experimentation with new technologies. Leaders need to be seen as being imaginative in creating opportunities for teachers to acquire ICT skills and in allowing them to take risks in using technologies.

4. Lead change management

It is inevitable that change will occur in any institution and hence leaders must be capable of managing change. As identified in the literature, leading and managing includes fulfilling the organisational vision which includes designing and carrying out plans, achieving goals and working effectively and collaboratively with others and providing direction and inspiration.

5. Engage in ICT professional development

In order for leaders to keep abreast of emerging technologies and of the ways in which ICT can enhance teaching and learning, and due to the rapid rate of change in the technologies available, it is important that school leaders undertake ICT professional development. Such engagement will give them first-hand knowledge and experience of how ICT can improve all facets of the school and most

importantly, the work of teachers and students. Furthermore, it is important too that leaders attend a range of ICT professional development activities. They should participate in whole school PD as a means of not only furthering their own understanding but as a way of showing their support for ICT use and integration and they should attend professional development that informs them about ICT leadership and not just school leadership.

6. Undertake a whole school approach to ICT integration

Participants in the project expressed that it was vital that a whole school approach, under the direction of the ICT vision, was necessary if ICT was to be successfully integrated across the curriculum. This is true of any change where it is important that all stakeholders contribute to the outcome so that all feel a sense of ownership and responsibility for that which takes place.

7. Employment of an ICT coordinator/manager who oversees all of the ICT in the school

In the school investigated there were three people responsible for the use of ICT, and this is not ideal as often decisions are made disparately which has caused conflict. It is clear then, that although ICT needs to be supported throughout the school and that ultimately the Principal is responsible for the school budget, a central ICT manager/administrator is desirable. This person must be that who oversees all 'things ICT' and be held accountable for such.

It is apparent then that ICT can be effectively integrated across the curriculum if school leaders proactively participate in a shared approach towards this end, and are clearly seen to be keen learners and providers of technology.

Bibliography

- Abolghasemi, M., McCormick, J., & Conners, R. (1999). The importance of department heads in the development of teacher support for school vision. *The International Journal of Educational Management*, 13, 80-86.
- Akbaba-Altun, S. (2006). Complexity of Integrating Technologies into Education in Turkey. *Educational Technology & Society*, 9, 176-187.
- Becta. (2001). *The Secondary School of the Future*. Coventry: Becta.
- Bogdan, R. C., & Biklen, S. (2003). *Qualitative Research for Education* (Fourth ed.). Boston: Allyn & Bacon.
- Brooks-Young, S. (2006). *Critical Technology Issues for School Leaders*. Thousand Oaks: Corwin Press.
- Bryderup, I. M., & Kowalski, K. (2002). The role of local authorities in the integration of ICT in learning. *Journal of Computer Assisted Learning*, 18, 470-479.
- Condie, R., & Munro, R. (2007). *The impact of ICT in schools - a landscape review*: University of Strathclyde.
- Costello, P. J. M. (2003). *Action Research*. London: Continuum.
- Cuban, L. (2001). *Oversold and Underused - Computers in the Classroom*. Cambridge: Harvard University Press.
- Cusack, B., Gurr, D., & Schiller, J. (1999). The impact of technology on the work of educational leaders. *Leading and Managing*, 9(Spring/Summer 2003), 227-230.
- Dale, R., Robertson, R., & Shortis, T. (2004). 'You can't not go with the technological flow, can you?' Constructing 'ICT' and 'teaching and learning'. *Journal of Computer Assisted Learning*, 20(6), 465-470.
- Dijkstra, E. (2001-2009). Brainy Quote. Retrieved 2 July, 2008, from <http://www.brainyquote.com/quotes/quotes/e/edsgerdijk201168.html>
- Dyrli, O. E. (1996). Essentials for telecommunications staff development. *Technology and Learning*, 17(3), 2.
- Eisner, E. W. (1998). Six Features of Qualitative Study. In *The Enlightened Eye: Qualitative Inquiry & the Enhancement of Educational Practice*. New Jersey: Prentice-Hall.
- Ercikan, W., & Roth, K. (2006). What Good is Polarizing Research into Qualitative and Quantitative? *Educational Researcher*, 35, 14-23.
- Fraenkel, J. R., & Wallen, N. E. (2006). *How to Design and Evaluate Research in Education*. New York: McGraw-Hill.
- Freebody, P. (2003). *Qualitative Research In Education*. London: Sage Publications.
- Fullan, M. G. (1992). *Successful School Improvement*. Buckingham: Open University Press.

- Gibson, I. W. (2002). Leadership, technology, and education: achieving a balance in new school leader thinking and behavior in preparation for twenty-first century global learning environments. *Technology, Pedagogy and Education*, 11(3), 315-334.
- Granger, C. A., Morbey, M. L., Owston, R. D., & Wideman, H. H. (2002). Factors Contributing to teachers' successful implementation of IT. *Journal of Computer Assisted Learning*, 18, 480-488.
- Gurr, D. (2000). The Impact of Information Communications Technology on the Work of School Principals. *Leading and Managing*, 6, 63-76.
- Gurr, D. (2004). ICT, Leadership in Education and E-leadership. *Discourse: studies in the cultural politics of education*, 25(1), 113-124.
- Gurr, D., & Broadbent, D. (2004). Interaction between ICT and School Leadership. *Leading and Managing*, 10(2), 18-31.
- Harris, A., & Spillane, J. P. (2008). Distributed leadership through the looking glass. *Management in Education*, 22(1), 31-34.
- Haughey, M. (2006). The impact of computers on the work of the principal: changing discourses on talk, leadership and professionalism. *School Leadership and Management*, 26, 29-36.
- Hayes, D. (2006). Making all the flashy stuff work: the role of the principal in ICT integration. *Cambridge Journal of Education*, 36, 565-578.
- Hayes, D. (2007). ICT and learning: Lessons from Australian classrooms. *Computers & Education*, 49, 385-395.
- IFETS. (2000). *Information Technology and schools: the principal's role*. Paper presented at the International Forum of Educational Technology & Society, Australia.
- Jacobsen, D. M. (2001). *Building Different Bridges: Technology Integration, Engaged Student Learning, and New Approaches to Professional Development*. Paper presented at the AERA 2001: What We Know and How We Know It, the 82nd Meeting of the American Educational Research Association.
- Karagiorgi, Y., & Charalambous, K. (2004). Curricula considerations in ICT integration: models and practices in Cyprus. *Education and Information Technologies*, 9, 21-36.
- Katz, R. N. (2002). The ICT Infrastructure - A Driver of Change. *Educause*(July/August), 50-61.
- Keeves, J. P. (1997). *Educational Research, Methodology, and Measurement: An International Handbook*. Oxford: Elsevier Science Ltd.
- Lai, K., & Pratt, K. (2004). Information and communication technology (ICT) in secondary schools: the role of the computer coordinator. *British Journal of Educational Technology*, 35, 461-475.

- Lai, K., Trewern, A., & Pratt, K. (2002). Computer coordinators as change agents: some New Zealand observations. *Journal of Technology and Teacher Education*, 10, 539-552.
- Lawson, T., & Comber, C. (1999). Superhighways technology: personnel factors leading to successful integration of information and communications technology in schools and colleges. *Technology, Pedagogy and Education*, 8(1), 41-53.
- Lee, M., Gaffney, M., & Schiller, J. (2001). Integrating ICT in your school - New Opportunities for Leadership.
- Leech, D., & Fulton, C. R. (2008). Faculty Perceptions of Shared Decision Making and the Principal's Leadership Behaviors in Secondary Schools in a large urban district. *Education* 128(3), 630-644.
- Leithwood, K., Harris, A., & Hopkins, D. (2008). Seven strong claims about successful school leadership. *School Leadership and Management*, 28(1), 27-42.
- Lichtman, M. (2006). *Qualitative Research in Education A User's Guide*. California: Sage Publications.
- Lim, C. P. (2002). A theoretical framework for the study of ICT in schools: a proposal. *British Journal of Educational Technology*, 33, 411-421.
- Lim, C. P., & Khine, M. S. (2006). Managing teachers' barriers to ICT integration in Singapore schools. *Journal of Technology and Teacher Education*, 14, 97-126.
- Livingston, K., & Condie, R. (2005). The Impact of an Online Learning Program on Teaching and Learning Strategies. *Theory into Practice*, 45(2), 150-158.
- MacNaughton, G. (2001). *Action research. Doing early childhood research: international perspectives on theory and practice*. Australia: Allen & Unwin.
- MacNeil, A. J., & Delafield, D. P. (1998). Principal Leadership for Successful School Technology Implementation. *Technology and Teacher Education Annual*, 296-300.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis* (2nd ed.). California: Sage Publications.
- Miles, M. B., & Louis, K. S. (1990). Mustering the Will and Skill for Change. *Educational Leadership*, 47(8), 57-61.
- Mooij, T., & Smeets, E. (2001). Modelling and supporting ICT implementation in secondary schools. *Computers & Education*, 36, 265-281.
- Moyle, K. (2006). *LEADERSHIP AND LEARNING WITH ICT - Voices from the profession: Teaching Australia - Australian Institute for Teaching and School Leadership*.
- Mulkeen, A. (2003). What Can Policy Makers Do to Encourage Integration of Information and Communications Technology? Evidence from the Irish School System. *Technology, Pedagogy and Education*, 12(277-293).

- Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. *Technology, Pedagogy and Education*, 9(3), 319-342.
- Negroponte, N. (2001-2009). Brainy Quote. Retrieved 10 April 2009, 2009, from http://www.brainyquote.com/quotes/topics/topic_computers.html
- Neuman, W. L. (2006). *Social Research Methods* (Sixth Edition ed.). Boston: Pearson International Inc.
- OECD. (2001). *Schooling for Tomorrow Learning to Change: ICT in schools*. Paris.
- O'Mahoney, C. (2003). Getting the Information and Communications Technology Formula Right: access + ability = confident use. *Technology, Pedagogy and Education*, 12, 295-311.
- Otto, T. L., & Albion, P. R. (2002). *Principals' Confidence Toward Teaching with ICT: a critical element in leading appropriate change*. Paper presented at the Australian Computers in Education Conference.
- Passey, D. (2002). *ICT and School Management - A Review of Selected Literature*. Lancaster: Lancaster University.
- Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education*, 37, 163-178.
- Phillips, D. K., & K., C. (2006). *Becoming a Teacher Through Action Research*. New York: Routledge, Taylor and Francis Group.
- Richardson, J. (2000). *ICT Implementation in Education: An analysis of implementation strategies in Australia, Canada, Finland and Israel*. Luxembourg.
- Robertson, S., Calder, J., Fung, P., Jones, A., O'Shea, T., & Lambrechts, G. (1996). Pupils, teachers & palmtop computers. *Journal of Computer Assisted Learning*, 12(4), 194-204.
- Sashkin, M. (1993). The Visionary Principal: School Leadership for the Next Century. In M. Sashkin & H. J. Walberg (Eds.), *Educational Leadership and School Culture*. Berkeley: McCutchan Publishing Corp.
- Schrum, L., & Glassett, K. (2006). Technology Integration in P-12 Schools: Challenges to Implementation and Impact of Scientifically-Based Research *Journal of Thought*(Spring), 41-58.
- Selwyn, N. (2000). The National Grid for Learning Initiative: connecting the learning society? *School Leadership and Management*, 20(4), 407-414.
- Simpson, M., Payne, F., Munro, R., & Hughes, R. (1999). Using Information and Communications Technology as a Pedagogical Tool: who educates the educators? *Journal of Education for Teaching*, 25, 247-262.
- Spillane, J. P. (2009). Managing to Lead: Reframing School Leadership and Management. *Kappan*, November 2009, 70 - 73.

- Sweeney, B. (2005). Management and leadership in schools. *Teacher*(August), 48-50.
- Thomson, P., Nixon, P., & Comber, B. (2006). A Case of Intention Deficit Disorder? ICT Policy, Disadvantaged Schools, and Leaders. *School Effectiveness and Improvement*, 17, 465-482.
- Toprakci, E. D. (2006). Obstacles at Integration of Schools into Information and Communication Technologies by taking into consideration the Opinions of Teachers and Principles of Primary and Secondary Schools in Turkey. *e-Journal of Instructional Science and Technology*.
- Twining, P. (2001). Planning to use ICT in schools? *International Journal of Primary, Elementary and Early Years Education*, 3-13(29:1), 9-17.
- VCAA. (2006). Interdisciplinary Learning. Retrieved 17 March, 2007, from <http://vels.vcaa.vic.edu.au/essential/interdisciplinary/index.html>
- Walsh, K. (2001). *ICT's about Learning: School leadership and the effective integration of information and communications technology*. Melton Mowbray: King Edward VII School.
- Williams, D., Coles, L., Wilson, K., Richardson, A., & Tuson, J. (2000). Teachers and ICT: current use and future needs. *British Journal of Educational Technology*, 31(4), 307-320.
- Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing Computer Technologies: Teachers' Perceptions and Practices. *Journal of Technology and Teacher Education*, 14, 173-207.
- Yee, D. (2001). The Many Faces of ICT Leadership. *Technology, Teaching and Learning: Issues in the Integration of Technology*.

Appendix 1

Interview Questions for Principal and Deputy Principals

1. How would you describe the culture of your school? Has this changed with the introduction and implementation of ICT in schools? How?
2. How would you describe your style of leadership? Has this changed with the introduction and implementation of ICT in schools? How? Why?
3. Moyle (2006, p.30) identified the following six inter-connected organisational conditions necessary for supporting teaching and learning with ICT – can you comment upon each of these in relation to the teaching and learning of ICT in this school:
 - Strategic plan
 - Vision
 - School culture
 - Whole school approach
 - School infrastructure
 - Organisational structure
4. What attitudes do you hold about teaching and learning with information and communication technologies?
5. What factors appear to be important in the development of this attitude?
6. List 5 attributes that are required of leaders who support teaching and learning with ICT?
7. How is teaching and learning with ICT supported by leadership in this school?
8. How confident are you in justifying and articulating the educational value of teaching with information and communication technologies?
 - a. To school staff
 - b. To parents
 - c. To students
9. How important is professional development for you concerning the cross-curricula integration of ICT?
10. What sorts of training do you require?
11. How important is staff training for your teachers to learn how to employ ICT as a curriculum tool?
12. Estimate the hours of staff professional development time this year that your teachers will use to train on any type of technology. What percentage of overall staff professional development time is this? What percentage of the overall staff professional development budget will be spent on technology training?
13. What is/are the major obstacles to integrating technology in the classroom?
14. How and when do you plan to overcome these?
15. What factors do you perceive as contributing to successful classroom implementation of ICT? (Granger et. al, 2002, p.480)

16. How do these factors act, and interact, to make their contributions? (Granger et. al, 2002, p.480)
17. Discuss the ways in which you use ICT to do your (non-teaching) work.
18. Discuss the ways in which you use ICT in the classroom.

Appendix 2

Interview questions for other school leaders

1. How would you describe the culture of your school? Has this changed with the introduction and implementation of ICT in schools? How?
2. How would you describe the overall leadership style at this school? Has this changed with the introduction and implementation of ICT in schools? How? Why?
3. Moyle (2006, p.30) identified the following six inter-connected organisational conditions necessary for supporting teaching and learning with ICT – can you comment upon each of these in relation to the teaching and learning of ICT in this school:
 - Strategic plan
 - Vision
 - School culture
 - Whole school approach
 - School infrastructure
 - Organisational structure
4. List 5 attributes that are required of leaders who support teaching and learning with ICT.
5. What is your understanding of the principal's vision for ICT integration across the curriculum in this school?
6. What can you say about the leadership of the school and the role of senior management in relation to ICT integration? (Tearle)
7. What responsibilities should members of the leadership team have in relation to the integration of ICT across the curriculum? (Moyle, 2006)
8. How is teaching and learning with ICT supported by leadership in this school?
9. How important is staff training for teachers to learn how to employ ICT as an integrated curriculum tool?
10. This year you will spend approximately XXX hours on ICT professional development. Do you think that this time is sufficient? Why?
11. In what ways do you feel supported by senior management in your use of ICT both personally and in your classrooms?
12. Would you like more support? Why/why not? If you would like more support from senior management, what is the nature of support that you require?
13. What attitudes do you hold about teaching and learning with information and communication technologies?
14. What factors appear to be important in the development of this attitude?
15. What factors do you perceive as contributing to successful classroom implementation of ICT? (Granger et. al, 2002, p.480)
16. How do these factors act, and interact, to make their contributions? (Granger et. al, 2002, p.480)

17. Discuss the ways in which you use ICT to do your (non-teaching) work.
18. Discuss the ways in which you use ICT in the classroom.

Appendix 3

Research questions matrix

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.6 Leadership attributes	Q. 13 Obstacles
Principal	Academic vs. vocational Formal and traditional	Formal Traditional Collegial Pastoral	Strategic plan – school based and Board ICT great boon; facilitation of vision by email ICT is central to the vision	Assess IT skills of staff Measure and provide PD Modelling Supportive Appreciative	Budget – financing Separate administration system to school network system Speed of change Decision making – IT changes quickly – installation and provision Breakdowns affect confidence
	Change in communication – improving the transmission of the culture	My leadership – at the computer a lot; vigilant to emails and online communication – “email alert” There are positives and negatives to this	Intranet – will facilitate the vision Whole school approach – enhanced by Technology committee Infrastructure – DeltaLink is limited Org. Structure – unchanged but ICT has enhanced the efficiency		

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 & 7 Your attitudes & support	Q.6 Leadership attributes	Q. 7 Leadership support of ICT	Q. 8 Justification of ICT	Q. 9 PD
Deputy principal Pastoral		Consultative	Vision and school culture are critical in all aspects of pedagogy	I encourage through PD but I wish I were better	Open	Introduction of IWB – school has financed these and put these to Parents' Association as a desirable goal; employed a Primary Teacher with particular skills in this area	Introduced over time to school community – need to create momentum	Critical – collegial PD is one of the most effective modes
	Pedagogy has changed considerably Staff enthusiasm – more confident in using ICT Collegial engagement - consultative	Email has changed processes and mode of communication Email has made leadership more open and more accessible to staff, students and parents More accountable	ICT is an instrument of pedagogy – need to encourage – can't all be driven from top but needs to be encouraging from top Need a whole school approach Need finances to support infrastructure – strategic planning and Board plan needs to support this Org. structure – currently have a Network Manager and Technology Manager and will have an Intranet manager: structure needs to grow with growth of ICT Positive move to employ current Head of Library and Network Manager – these people are open and approachable Need to encourage collegiality and approachability – need this atmosphere > Cultural factor	I am responsible for PD – my biggest contribution is to appreciate the importance of ICT and factor this into financial planning Need to create space, time and culture of encouragement PDs prepared for 2009	Engage with suggestions even if not fully understood – listen – interest & curiosity Commitment to improving pedagogy and skills of staff Practical attitude in encouraging others – so something Supportive	Structure of leadership/administration has changed – there were structural and personality problems which resulted in poor communication Leaders running personal agendas as opposed to whole school agenda Networking points installed that had not been properly planned resulted in unsafe environment – had to be redone	Parent response to online newsletters – less hard copies in Senior school; receptive overall Online newsletter is a building block to introducing Intranet Online newsletter also ensuring that news is known by parents – accountability Resistance to technology should lessen as students grow and become parents as this generation are digital natives	Peer to peer PD – people use Professional in-service – only 10% used Peer to peer – people can ask questions of each other at school > more needed Integration of ICT is critical but need people to do it Openness of people is important: personnel + personality + structures allow it to happen Primary/secondary cross fertilization is positive

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q. 4 & 5 Your attitudes	Q.6 Leadership attributes	Q. 11 PD	Other
Deputy principal administration	Consultative Distributed	Facilitating PD provision Encourage Board & Parents Encouraging & acknowledging Affirming	Need a whole school approach to infrastructure - biggest limitation is money ICT strategic plan is vital	Facilitating staff presentations and PD Encourage Parents' Assoc to purchase IWBs etc By being encouraging of staff – acknowledging what people are doing and affirming what they are doing – that's really important	People who are up to date with currently educational practices Be willing to learn for themselves Flexible Innovative Forward thinking Lead by example	Most valuable PD is collegial – where staff who everyone knows provides PD and shared learning – far more powerful – pitched at right level Whizz bang PD can put people off and it's threatening – assume a level of knowledge that not all people have Give people what they are ready to do – can't force it We allow people to do PD here – we rarely say no Got to do PD – can't pick it up by themselves without some push PD after school sessions were successful	Discussion of recording interviews and use of podcasting; communication about new technologies Teachers using resources but not sharing knowledge
	Email – quick for communication	Older leaders are not that comfortable with ICT and so ICT is driven by next band of leaders including DP Administration The attributes are ideal – leaders are forward thinking, flexible, willing to learn but not up to date with all technologies Cohort of school – we do all right – we are mix of old and young - Age matters				Ideally – any ways in which we could get more time to do PD - how can more time be given to staff to play with the technologies? Currently needs to be done in free lessons or after school and need to find available rooms or use holidays Giving people time release costs money and other people's time to cover classes – can't afford that at the moment Constant tension – scheduling and calendar – what do we get rid of? We have fewer meetings now. The style of school – a lot of extracurricular events and this is expected Ideal PD is timetabled into loads – but what's the impact? Better off schools may be able to do that.	

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q.7 How is ICT supported by leadership?	Q.9 PD	Q. 11 Support for staff
Director of Mission	Strong sense of community Strong sense of tradition and the Sacred Heart goals drive the school – all students know the goals Strong academic culture, success is celebrated, but not overly competitive Group approach	Strong leadership, sense of a strong vision – staff are happy with a strong leadership Not sure about the element of collaboration among executive leadership – each leader is quite strong in setting direction; empowering leadership – principal has professional trust in the leaders	Structure and school culture – electronic newsletters, website – make it more dynamic as opposed to it being fairly static Changes in infrastructure – pods in classrooms; wireless; laptops on trolleys Need to plan around it – manageable but requires forward planning; even group work can be difficult	Dynamic in attitude Good listeners – can't be experts in everything but need to listen Perceptive – be able to sort out various levels of truth Confident to be able to say 'please explain' – willingness to say they don't understand	Staff are compliant Leadership strength is not ICT Reactive rather than proactive Accept ICT but are challenged by constant change Not dynamic enough Haven't pushed staff enough Closer ICT management required	Need to encourage and open people's mind to PD opportunities People need to be pushed more to do outside PD – alerting people to the possibilities of particular programs; even targeting them – does it come from KLA, DOS? Does age reflect the amount of PD done by individuals? Need to spark enthusiasm in staff – set everyone a challenge to learn something new Do little bits and pieces to gain attention - but primary responsibility for PD is in the staff member Need to have the attitude that ICT is part of all the teaching areas and needs to be developed	No disincentive – but no overt encouragement: peer mentoring has been positive What part of the leadership team does ICT fall under? Whose responsibility? ICT person/manager accountable to DOS The person who should take responsibility is the Network Manager who is accountable to DOS who gives direction and guidance Employment of network manager – should be ICT professional – manager of not only the system but of ICT as well – has this been pushed enough? Role descriptions – do these provide info about where ICT responsibility lies? Role/position descriptions could be misleading
	Explosion of social networking raises pastoral issues and this has an impact upon the community of the school School community is more literate – Markbook, email are standard ways of communicating Generally – staff has a long way to go – due to average age of staff – some have embraced ICT but others have been less so School is still very illiterate in relation to technology –but this is improving Shared network has improved teaching dramatically but there are more opportunities	Communication is more efficient due to email Commitment to try and keep school up to date with ICT – constant revision of how to move forward Rely on expertise of staff in ICT Executive Leadership – basic level due of ICT skills to their age Other leaders on Leadership team have embraced ICT If key leaders were more familiar/aware of possibilities of technology such as Intranet we would have had it earlier – so their lack of expertise means they need to rely on others to provide them with information	Strategic plan for ICT – restricted by finances; technology committees are at work; ICT strategic plan is essential and lack of this has caused some of the current issues we face ICT strategic plan needs to be dynamic – not too long term – technology changes rapidly Novell OS – caused some restriction in terms of using some tools like tablets, personal organisers – compatibility issues	Usefulness of attitude – trying to tap into how students think and their ICT world – youthfulness – attitude of youth culture vs. disciplinary attitude Be brave - calculated risk taking – good communicators and sellers of programs – particularly to community (parents) Strong – manage change – prepare staff for change			

	Q. 13 Your attitudes towards ICT
Director of Mission	I like change – self taught Never enough time – sort out what you need – I use PowerPoint, video editing, You Tube, a lot of cloze used in Psychology – students are given a booklet and blanks need to be filled in from PowerPoint shows – visual perception of information and key terms – very efficient and engaging Excited by prospects of doing something new – open to ideas Lots of scope with Intranet – my creative streak is satisfied with the new Biggest difficulty – need to get over the hurdle of the initial learning phase – takes time I look for tools that will help me and there are a lot more out there I use Internet regularly for RE and resourcing Reality of today's students – visual learners and shorter attention spans Peer tutoring is good for showing the possibilities – but still need hard work – not everyone grasps this

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Other
Director of Studies	Academic yet still able to meet needs of students who aren't particularly academic – pastoral culture	Supportive of PD	ICT Strategic Plan currently being developed Strategic plan is required with time limits otherwise it gets lost	Good listener A learner Able to trust people Networker Open to learning Courageous	Email easier than phone calls and meeting face to face Ongoing dialogue through wikis
	Resources are more accessible to students at both end of intellectual spectrum Changes in curriculum delivery Students with severe intellectual disabilities can engage through IWB Students are used to ICT and are visual learners and digital natives Leadership drives school culture ICT has not been a part of the culture	Executive leadership (apart from DP Admin) do not embrace IT They are not aware of what it can do and so don't understand how important it is to embrace it and allocate funds Next level of leadership has understanding of how important ICT is in all areas P and DP Pastoral are not digital immigrant stage	Need vision otherwise get bogged down in tasks - really vital What is school culture – complex, what we do, what we have always done and where we go in the future. Leadership team drives this. ICT has not been a part of the school culture and this is evident in the school infrastructure – we don't have flexible learning spaces. If we are really serious about ICT integration – strategic plan discusses whole school wireless and class sets of laptops on each floor of the building Culture is changing but old fashioned – teaching in a way that we did when the school started and we don't want to lose the good stuff – but we are working within the structures we have to improve	Principal is a good listener and puts trust in others – empowering Learning – he's winding down Networking comes from next level down – Technology committee We do have people of courage	

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 9 PD	Q. 11 Support for staff	Q. 12 More support & what?	Q. 15 Factors for successful ICT	Other
Year Level Coordinator Year 8	Culture – strong traditional; academic culture – this is affected by the Principal's leadership style	Transparent and open	Understanding that change is stressful; needs to be overall strategic plan – otherwise get lost in the latest and greatest. Overall idea of how technology can fit into the culture – needs to be an overall approach and not with one or two change agents. Whole school needs to be involved and of course, school needs to be resourced.	Open to change – biggest stumbling block. Supportive and understanding of change process. Need structures in place to support people at whatever stage they're at. Allow people to go at their own pace and be hands on.	Small group and hands on. Time to play with the technology – ongoing – mindful of people's other commitments. Delivered in a time frame that suits people's deadlines. Peer training has been great and empowering and affirming for trainers. However it has been difficult to attend. Deliver PD on student free days. Concept is great. Peer training makes attendees feel comfortable. Experts can be intimidating for some. Small group is essential	Very well supported generally – PD is supported; Support staff – we are really well set up. Classrooms – set up time is an issue but the extra time is worth it unless the technology fails. Good support structures. For some, there is a tendency to call on support immediately as a problem arises and not personally troubleshoot – depends on the individuals' approach to technology and troubleshoot. Personality types	Moving forward - pods are under review – this is positive. Notebooks on a trolley – fantastic – however access can be a problem. Intranet – long overdue. Will make life easier. Sooner the better. We are currently behind other schools. Not much personal training required. Has previous experience with Intranets.	Limitations – physical size of the classrooms can make it hard; wireless in some areas is a real plus. Bookings of hardware and rooms can be difficult or to make swaps. Technology failing worries people and this is disruptive.	Hope that our vision is discerning – look at what we need and what would be worthwhile
	The leadership is transparent and open and email has facilitated this – staff is kept up to date and informed. Other technology – leadership and culture not necessarily changed.							Positives – students are digital natives and it is easy to do thing with technology; they are open to this.	

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 6 Leadership role	Q. 9 PD	Q. 13 Your attitudes	Other
Year Level Coordinator Year 9	Hasn't changed much Small amount of people are very proactive in implementing new learning styles and new learning opportunities with IT	Biggest change is use of email Leadership team moved with email trend Leadership are good at discerning what should be communicated electronically and what should be communicated personally	Technology committee – positive – really important Pods are difficult and problematic – Use of laptops from library – issues with Internet access Technology has been a priority over the last few years – desire to promote technology How do we engage and teach staff to use IT – enthuse staff	Talent identification – ability to identify who in the school can skill staff and motivate them to use ICT Delegation	Feels supported in wanting to pursue passions It is difficult to find opportunities DOS is fundamental – seeks ways in which ICT can be further implemented Support – time is the greatest inhibitor Leadership – handling recent boom in IT – very happy with leadership – they don't deny opportunities for learning by teachers but other limitations exist.	IT being phased out as a stand-alone subject – problematic. Quality of teaching might suffer. Teachers feel 'safe' that IT is taught to students as a separate subject Students' knowledge of technology can be assumed by subject teachers Hardware knowledge – lacking Staff – setting up hardware – plenty of support – some staff are reluctant to play with the hardware Troubleshooting – reluctant IWB has been a positive introduction	Practicality Is it convenient to use – can be dependent on knowledge and time needed to set up Finds that ICT readily engages students – gains their attention quicker Class mood/environment changes with the use of ICT IWB – practicality – need more PD Long term PD Staff have to use their own 'spare time' Hard to find time to set up equipment in between back to back classes. Love what technology does and how it engages students Extension – if use of technology is sophisticated then outstanding results are achieved.	Pods of computers – not very successful – decision to introduce these was made a long time ago and this has now been seen as something that needs change Technology has been a priority in the last few years and there is pro-activity in this area

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 6 Leadership role	Q. 9 PD	Q. 13 Your attitudes	Other
Year Level Coordinator Year 9					Staff teaching staff is optimal. DOS fundamental – looking for new ways to communicate in the classroom. DOS is of great enthusiasm – a curriculum leader who is supportive is the way to things growing. Finances are a great restriction. The greatest impediment is time – overall staff feel supported by leadership in pursuing new methods of teaching and learning.	Students don't know how to use the hardware –this is personal responsibility. But student use overall is very good. Though there are varying levels of sophistication between students. Staff and hardware – some staff have no problem with it; some don't want to do it; there is a lot of support staff. It's about empowerment. Number 1 concern for staff is troubleshooting. Setting up of hardware etc – not really taught. No sessions about how to set up a data projector. IWBs have reduced amount of bookings to be made for data projectors. Set up in some rooms is good and makes using the IWB really easy. However when the hardware needs to be set up – staff afraid and anxious – it takes time.	IWBs - need more PD and investigated through other areas. PD – need more; after school is hard. Have been practising on my own. Finding it hard to use all the features of the IWB.	

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 9 PD	Q. 13 Your attitude	Other
Technology Key Learning Area Coordinator	School culture definitely a change with email – forced change. Get much more done People are more accountable with email. Presentation of work – improved Prepare work – more work done; efficient; less chalk and talk – teachers will do different activities and have students present work in different modes.	Open Leadership style has changed but there has also been a change in leadership personnel – open and friendly; approachable. Technology has enhanced communication with leaders. Current leaders do not use technology well – age; not digital natives.	Strategic plan – tied up with funding and finding solutions that work. Plan requires someone with vision. School infrastructure – there is a limitation here – money is an issue	Visionary – open to new ideas; forward thinking. In touch with what is going on in the classroom.	Hands-on Small group KLA based Peer to peer training – relaxed Timetabled PD – support yet costly and means extras for others People need interest and knowledge in order to do something. Purpose for doing something. Why bother if we can't do it better with ICT. Followed by training. Purpose is vital. Make the training relevant to what is being taught – it can be immediately used in the class and then teachers may branch out and modify. Who should provide PD – need someone who knows the school, another teacher	Retrained in IT and then got involved in robotics. Has always had access to hardware but there is a lot more variety of software with which to teach. Development of software is better and this has helped facilitate work as has improvement in hardware. Role of technology leader in promoting IT integration – support it but I don't want everyone to think that it's the be all and end all and should not be over used. Students need other skills. Role model for technology by default. Intimidating for others sometimes. Responsibility of working in Technology factor.	Leaders here are role models although they may lack skills in technology. People feel that they are on par with school leaders in their lack of skill/knowledge. This can be negative too. Support and encouragement is required from leaders. Acknowledgement. Praise.

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 11 Support for staff	Other
Science Key Learning Area Coordinator	Academic, small, girls, Catholic, supportive, pastoral General sense of everybody helping each other – shared culture Principal makes an effort to maintain the culture as the school sits under the 5 Sacred Heart Goals which drive the culture – underlying philosophy	Principal drives the agenda and is well informed of what's going on P very supportive – not autocratic style - makes decisions through collaboration though he has the final say Structure of leadership age related	Vision goes with strategic plan – so far not a long term vision regarding ICT other than to delegate responsibilities to others and issues have arisen from this Leadership hasn't taken it all on board – yet they are supportive of Technology committee even though they may not have the passion or expertise themselves, the Committee has been a good thing Horribly under resourced – but there has been enormous improvement – Infrastructure has improved over last two years which parallels Technology Committee formation though limited by finances Biggest hole has been lack of Intranet and bandwidth issues Issues with Intranet – teacher and student handling of ICT	Excitement and vision about ICT Don't have to have cutting edge skills yet they need to understand how the technologies can be used to improve teaching and learning –they should be at beginner level of technologies – that's essential – and this is leadership role modelling: need to be seen as using the technology at some level Doesn't have to be expert but have an appreciation and understanding of the technologies Principals should be required to retrain like staff members their age – should be part of the direction Need to make sure that our students leave this place and go to universities with these expected skills Leaders not role modelling has led to limited uptake of ICT tools – need to lead by example Need understanding of how ICT can be used	Science capital budget – leadership have little or no knowledge of details; leadership independent decision Data loggers partly came about by the requirement for KLACs to document their use of ICT – this was a key for launching better ways for doing things with technology and staff becoming involved Mandating of ICT use in all KLAS – did it come from CEO? DOS of the time decided that it was an area to get into – but the fact I don't know shows that there was no public strategic plan for ICT. The explicit push for ICT has gone away but it's still there in other ways – staff seeing things at PDs, other	Leadership team haven't really espoused a plan or vision of ICT but have been supportive – bottom up initiatives Another issue arises – deal with that /respond to that – reactive Other schools – principal has driven introduction of ICT implementation and process has been top-down – that situation not seen here ICT means dollars and maybe they are scared to look forward 'head in the sand' More of a commitment to Intranet currently – as seen as a higher priority as this is something that is expected by prospective enrolments and parents and students – more to do with impressions and keeping up with Joneses rather than recognition of its true educational value
	ICT hasn't changed the culture much – some minor shift Communication change – better through use of email	Style hasn't changed due to ICT – it's Principal + Leadership group ICT hasn't changed the leadership style Lack of change due to age of leaders without a doubt	A lot of issues with student competence of ICT – major issue – not in the culture of students to use ICT for school work Partly cultural – if they enter school and learn early on to access school resources they get used to it but senior girls here are not those students – we are in a middle period – we need to provide infrastructure and training to get them into that learning mode Students need a context for using technology - Context based teaching where IT is a tool Hardware and software are limited by budget			

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 11 Support for staff	Q. 13 Your attitudes	Other
Network manager	Caring Generally, teachers want to do a good job and are eager to learn to do a better job	Principal – trusting of staff; doesn't challenge people in their assigned roles and he personally appreciates people for what they do' Flexible – supportive of ICT initiatives	School's strategic plan did not include ICT as a specific/separate entity - are currently working on ICT strategic plan to be finalised by end of year This provides a documented vision for the school in adopting ICT and the direction we wish to take with Vision is important – Sacred Heart goals determine the vision of this school – the goals are valid and don't need changing Need a whole school approach in the use of ICT – ICT used in every aspect of the school though not all are aware of this Whole school approach important so that all elements of the school can be integrated saving time and money. All is linked together – impacts on time, money and effectiveness of communication Centralized management with consultation required – the needs of all facets of the school need to be addressed and met	Need to be aware of the new technologies and learn about these Need to be learners themselves and lead by example – show that they are willing to take up anything – good for staff and students – important Need to have an open mind and allow staff to try new things – support them, provide incentive to try the new, encourage them and allow them to fail Openness and encouragement for innovation Observe classrooms so as to see what is happening and visualize what can be done Risk takers	Financially NM is supported by Leadership – decent budget that can be juggled to provide services and resources NM is the caretaker of the budget and the negotiator – allowed to bargain which allows more possibilities for new projects Would like Executive Leadership to more fully understand the possibilities and allow some pilot programs to run – need to take risks Do I need to be pushier	Need to raise awareness of teachers and leaders of possibilities with ICT – how – perhaps NM to do more presentations at Plenary though this is also a limited outlet I am more exposed to new technologies – what is possible and beneficial to the school Once awareness is raised, some money needs to be put into allowing teachers to access new technologies and trial these 'sand pit fund – this is costly and may sometimes fail – but is useful – school needs to commit to supporting trials Sharing between teachers	Teachers are busy people, so to encourage teachers to take up ICT need to support them: allow trialling, encourage sharing, provide a stable platform – currently it's reasonable; wireless to be achieved soon – this will minimise teachers worrying about the network or other being down Spend time and resources even if not all of it works – this will allow us to move forward productively

	Q.1 School culture	Q.2 Leadership style	Q.3 Organisational conditions	Q.4 Leadership attributes	Q. 11 Support for staff	Q. 13 Your attitudes	Other
Network manager	More Internet access so teachers using Internet as a resource more – quite a significant increase Office 2007 – staff reluctant at first, but now staff are more accepting Some teachers excited by IWBs as they can see possibilities of integrating many resources through this tool Culture is being slowly influenced	Leadership style – little change though they are using more technology for communication purposes	Infrastructure Currently, ½ of school network connections linked by fibre optic cable; 10 100Mb CAT 5B around the rest of the school – however modern trend is towards wireless to enable portable devices Wireless in some parts of the school – this is required to be expanded Physical security system is so so – this needs improvement and should be considered as we install more hardware and software; Data projectors/IWB in all classrooms – future?	Leaders are not really aware of new technologies; new DP better at this – older leaders not really aware; their time is not given to this and they are more concerned with daily running of the school, but perhaps some of their time does need to be given to learning about other technologies and talking to others such as NM NM has limited opportunities to discuss ICT matters with Leadership team – restricting			

Appendix 4

Questions addressed in Action Research

ICT Integration

- 1. Can you comment on the following by Margaret Haughey (2006):**

“Changes in leadership include a lessening of positional authority and a greater emphasis on professional expertise, collaboration among staff members and professional development”

- 2. How have each of the following aspects of school life contributed to or detracted from your uptake of this new technology: (Mumtaz, 2000)**

- The educator (you)
- The school
- The policy makers

- 3. Lawson and Comber (1999) conclude that the most important elements leading to a positive or negative response by teachers, to the introduction of new technology are:**

- “teachers’ attitudes prior to the innovation;
- the role of the IT coordinator;
- the attitude of senior management;
- the existence of appropriate support and training” (p.43).

Do you agree/disagree? Explain.

4. Out of the following which do you consider to be the greatest obstacles to or issues regarding to ICT integration across the curriculum?

<i>Gurr (2000, p.267)</i>	<i>Granger et al (2002, p.483-485)</i>	<i>O'Mahony (2003, p.308)</i>	<i>Toprakci (2006)</i>
• <i>Use of Technology: Software</i> • <i>Use of Technology: Hardware</i> • <i>Use of Technology: networks</i> • <i>Working with staff</i> • <i>Administration</i> • <i>Principal Professional Development in Technology</i>	• <i>Ways of learning about ICT</i> • <i>Individual characteristics of teachers</i> • <i>Educational background, experience and skills of teachers</i> • <i>Beliefs and goals concerning ICT of teachers</i> • <i>Resistance to technology</i> • <i>Environmental factors such as logistics and community</i>	• <i>Time</i> • <i>Quantity of classroom ICT resources</i> • <i>Quantity of ICT training</i> • <i>Quality of classroom ICT resources</i> • <i>Quantity of staff ICT resources</i> • <i>Quantity of ICT support</i> • <i>Quality of staff ICT resources</i> • <i>Quality of ICT training</i> • <i>Quality of ICT support</i>	• <i>Budget limitations</i> • <i>Paucity of educational software</i> • <i>Low level of training of teachers and principals</i> • <i>Low level of interest, drive and openness to change of teachers and principals</i>

School leadership

5. Can you comment on the following literature?

Hayes (2007) commented that “The commitment and involvement of the principal appears to contribute to successful integration of ICT, particularly when this process is tightly coupled to the school’s vision for learning” (p.393).

The Organisation for Economic Co-operation and Development (OECD) supports the need for farsighted school leadership, “Visionary school leadership is needed to bring about and sustain the dramatic changes enabled by ICT, to persuade and give confidence to all involved...” (OECD, 2001, p.16).

Sweeney (2005) contended that “Three essential qualities of a leader include: the ability to lead change; having a clear vision; and being information and communications (ICT) proficient” (p.49). And these terms are reiterated throughout this literature review as critical qualities required of educational leaders if they are to successfully administer and exemplify ICT integration.

6. To what extent do you think each of the following are fulfilled at this school in order to effectively integrate ICT across the curriculum:

- School climate (as that which encompasses a school vision for ICT implementation, commitment to the implementation strategy and working together in teams to achieve the common goals)
- ICT management (of budget, teacher training, technical support, the implementation plan and ICT maintenance)
- ICT knowledge (of equipment, pedagogy, curriculum and assessment using ICT tools)

7. Can you classify our executive leadership into one of the following categories?

- i. equitable providing – the principal as the provider of hardware, software, other related resources and technical support
- ii. learning-focussed envisioning – the principal as the person who ‘kept’ the school ICT vision and who kept student learning at the centre of ICT decision-making
- iii. adventurous learning – the principal who was also an ICT learner and unafraid to be experimental with new technologies and learning strategies
- iv. patient teaching – the principal who was willing to teach and to create adaptive learning environments and who encouraged professional development
- v. protective enabling – the principal who created shared leadership tasks for staff and students, removed ‘red tape’ and advocated the use of ICT and the school’s ICT vision
- vi. constant monitoring – the principal who ensured that ICT was being used in accordance with the school’s ICT vision
- vii. entrepreneurial networking – the principal who was a skilful “partnership builder” with different elements of the community and hence created a support network
- viii. careful challenging – the principal who was an inventive educator yet understood risk-taking

8. To what extent do the following apply to your uptake of a new technology?

- i. Do personal views of school leaders about the importance of ICT to the curriculum shape its successful implementation into classrooms of all disciplines?
- ii. Do the knowledge of and skill in the use of ICT tools of school leaders influence the extent to which it is embraced by staff of all disciplines?
- iii. What are the obstacles to ICT integration and what should school leaders do to overcome these obstacles?

Wiki

- i. How did you learn about the wiki?
- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the wiki?
- iii. How much student involvement is there in the wiki?
- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

IWB

- i. How did you learn about the IWB?
- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the IWB?
- iii. How much student involvement is there in the IWB?
- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

Appendix 5

Responses to questions given in Action Research phase (Teacher 1)

ICT Integration

1. Can you comment on the following by Margaret Haughey (2006):

"Changes in leadership include a lessening of positional authority and a greater emphasis on professional expertise, collaboration among staff members and professional development" This isn't always the case. Sometimes changes in leadership can lead to a more authoritarian and restrictive approach. My renewed interest in ICT is certainly not due to any change in leadership in any pejorative sense. The previous Director of Studies had a mandate that was followed through which led to the current D.O.S who has, as a result of the previous work, been able to pursue ICT in a different way.

2. How have each of the following aspects of school life contributed to or detracted from your uptake of this new technology: (Mumtaz, 2000)

- The educator (you)
- The school
- The policy makers

I have had to re-organise my priorities in order to include research and application of technologies. The school seems to expect this as part of our own professional development as we only really formalise such activities at the end of each year. Policy makers at a senior level only have a minor say – it seems to me that KLACs are more responsible for decision that affect my use of technology.

3. Lawson and Comber (1999) conclude that the most important elements leading to a positive or negative response by teachers, to the introduction of new technology are:

- "teachers' attitudes prior to the innovation;
- the role of the IT coordinator;
- the attitude of senior management;
- the existence of appropriate support and training" (p.43).

Do you agree/disagree? Explain.

I agree that the above could all be contributing factors in a general sense, but not necessarily in my personal experience. The role of the I.T. Coordinator for instance has no bearing on the response in our school. I certainly agree that teachers' attitudes are vital – they are generally motivated by time – do they have time to learn and reinforce the skills necessary?

4. Out of the following which do you consider to be the greatest obstacles to or issues regarding to ICT integration across the curriculum?

<i>Gurr (2000, p.267)</i>	<i>Granger et al (2002, p.483-485)</i>	<i>O'Mahony (2003, p.308)</i>	<i>Toprakci (2006)</i>
• <i>Use of Technology: Software</i> • <i>Use of Technology: Hardware</i> • <i>Use of Technology: networks</i> • <i>Working with staff</i> • <i>Administration</i> • <i>Principal Professional Development in Technology</i>	• <i>Ways of learning about ICT</i> • <i>Individual characteristics of teachers</i> • <i>Educational background, experience and skills of teachers</i> • <i>Beliefs and goals concerning ICT of teachers</i> • <i>Resistance to technology</i> • <i>Environmental factors such as logistics and community</i>	• Time • <i>Quantity of classroom ICT resources</i> • <i>Quantity of ICT training</i> • Quality of classroom ICT resources • <i>Quantity of staff ICT resources</i> • <i>Quantity of ICT support</i> • <i>Quality of staff ICT resources</i> • Quality of ICT training • <i>Quality of ICT support</i>	• <i>Budget limitations</i> • <i>Paucity of educational software</i> • Low level of training of teachers and principals • <i>Low level of interest, drive and openness to change of teachers and principals</i>

See BOLD

School leadership

5. Can you comment on the following literature?

Hayes (2007) commented that “The commitment and involvement of the principal appears to contribute to successful integration of ICT, particularly when this process is tightly coupled to the school’s vision for learning” (p.393).

The Organisation for Economic Co-operation and Development (OECD) supports the need for farsighted school leadership, “Visionary school leadership is needed to bring about and sustain the dramatic changes enabled by ICT, to persuade and give confidence to all involved...” (OECD, 2001, p.16).

Sweeney (2005) contended that “Three essential qualities of a leader include: the ability to lead change; having a clear vision; and being information and communications (ICT) proficient” (p.49). And these terms are reiterated throughout this literature review as critical qualities required of educational leaders if they are to successfully administer and exemplify ICT integration.

Certainly the attitude of the leadership team influences technology. The word ‘visionary’ I think is a bit much in the context I am in. Perhaps in schools where resources are more

limited a visionary, that is, wise and shrewd approach must be vital in the choices made. Otherwise, I think that it is a given now that educators in first world countries must continue to develop their knowledge and use of ICT.

6. To what extent do you think each of the following are fulfilled at this school in order to effectively integrate ICT across the curriculum:

- School climate (as that which encompasses a school vision for ICT implementation, commitment to the implementation strategy and working together in teams to achieve the common goals)
- ICT management (of budget, teacher training, technical support, the implementation plan and ICT maintenance)
- ICT knowledge (of equipment, pedagogy, curriculum and assessment using ICT tools)

I am unaware of the existence of documentation that shares the ICT vision. That is not to say that it doesn't exist. The second dot point is the interesting one as it is perhaps handled in a piecemeal fashion; at least this is the perception I have. For example...should I really be the staff member teaching people how to use a wiki? I would argue best practice would mean a devoted staff member to run such programs.

7. Can you classify our executive leadership into one of the following categories?

- i. equitable providing – the principal as the provider of hardware, software, other related resources and technical support
- ii. learning-focussed envisioning – the principal as the person who 'kept' the school ICT vision and who kept student learning at the centre of ICT decision-making
- iii. adventurous learning – the principal who was also an ICT learner and unafraid to be experimental with new technologies and learning strategies
- iv. patient teaching – the principal who was willing to teach and to create adaptive learning environments and who encouraged professional development
- v. protective enabling – the principal who created shared leadership tasks for staff and students, removed 'red tape' and advocated the use of ICT and the school's ICT vision
- vi. constant monitoring – the principal who ensured that ICT was being used in accordance with the school's ICT vision
- vii. entrepreneurial networking – the principal who was a skilful "partnership builder" with different elements of the community and hence created a support network**
- viii. careful challenging – the principal who was an inventive educator yet understood risk-taking

What troubles me about this question is that it seems to assume that the Principal is the major figure in ICT. I feel that, although this could be the case, our Principal's leadership style is to allow those below him to make decisions and build a vision that he oversees.

8. To what extent do the following apply to your uptake of a new technology?

- i. Do personal views of school leaders about the importance of ICT to the curriculum shape its successful implementation into classrooms of all disciplines?

Yes, but not just the Principal.

- ii. Do the knowledge of and skill in the use of ICT tools of school leaders influence the extent to which it is embraced by staff of all disciplines?

No. They just need to support the use of it.

- iii. What are the obstacles to ICT integration and what should school leaders do to overcome these obstacles?

Money and time. Solution: more money and more time. I don't think that staff motivation is necessarily a major factor, in that, a majority of staff acknowledge the need to investigate technology.

Wiki

- i. How did you learn about the wiki?

P.D.

- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the wiki?

Just need to ensure that one period was spent registering. The tool is more about outside of class.

- iii. How much student involvement is there in the wiki?

Heaps! My entire class are compelled to use it.

- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

The fact that it was formalised in P.D. gave me the confidence to conduct research.

IWB

- i. How did you learn about the IWB?

P.D.

- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the IWB?

Documents have to be altered.

- iii. How much student involvement is there in the IWB?

Not much at this stage.

- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

The implementation of the IWBs compels us to use them – or at least try to.

Responses to questions given in Action Research phase (Teacher 2)

ICT Integration

1. Can you comment on the following by Margaret Haughey (2006):

“Changes in leadership include a lessening of positional authority and a greater emphasis on professional expertise, collaboration among staff members and professional development”

I agree that changes in leadership does rely more on professional expertise and staff collaboration rather than any concept of hierarchical authority structure (although positional authority is important in so far as people need to know WHO is responsible for WHAT). As for professional development, vitally important providing it is hands-on and relevant.

2. How have each of the following aspects of school life contributed to or detracted from your uptake of this new technology: (Mumtaz, 2000)

- The educator (you)
- The school
- The policy makers

I think the school encourages the use of new technology and the policy makers imbed this into their documentation. As an educator although sometimes daunted by the new technology. I am willing to learn. However, despite the above, it is pretty much learn the job and at the mercy of who is available to teach you.

3. Lawson and Comber (1999) conclude that the most important elements leading to a positive or negative response by teachers, to the introduction of new technology are:

- “teachers’ attitudes prior to the innovation;
- the role of the IT coordinator;
- the attitude of senior management;
- the existence of appropriate support and training” (p.43).

Do you agree/disagree? Explain.

Yes, I do. I think the existence of appropriate support and training is essential! Whilst there has to be a well thought out IT strategy for implementation, there also has to be time for peer group learning.

4. Out of the following which do you consider to be the greatest obstacles to or issues regarding to ICT integration across the curriculum?

<i>Gurr (2000, p.267)</i>	<i>Granger et al (2002, p.483-485)</i>	<i>O'Mahony (2003, p.308)</i>	<i>Toprakci (2006)</i>
• Use of Technology: Software • Use of Technology: Hardware • Use of Technology: networks • Working with staff • Administration • Principal Professional Development in Technology	• Ways of learning about ICT • Individual characteristics of teachers • Educational background, experience and skills of teachers • Beliefs and goals concerning ICT of teachers • Resistance to technology • Environmental factors such as logistics and community	• Time • Quantity of classroom ICT resources • Quantity of ICT training • Quality of classroom ICT resources • Quantity of staff ICT resources • Quantity of ICT support • Quality of staff ICT resources • Quality of ICT training • Quality of ICT support	• Budget limitations • Paucity of educational software • Low level of training of teachers and principals • Low level of interest, drive and openness to change of teachers and principals

Frustration with the technology not working!

Having to set up lap tops in rooms where there is no computer and the time it takes to set up and unplug etc

The fact that you have to arrange a room swap if you want to use an IWB (not always easy)

School leadership

5. Can you comment on the following literature?

Hayes (2007) commented that "The commitment and involvement of the principal appears to contribute to successful integration of ICT, particularly when this process is tightly coupled to the school's vision for learning" (p.393).

The Organisation for Economic Co-operation and Development (OECD) supports the need for farsighted school leadership, "Visionary school leadership is needed to bring about and sustain the dramatic changes enabled by ICT, to persuade and give confidence to all involved..." (OECD, 2001, p.16).

Sweeney (2005) contended that “Three essential qualities of a leader include: the ability to lead change; having a clear vision; and being information and communications (ICT) proficient” (p.49). And these terms are reiterated throughout this literature review as critical qualities required of educational leaders if they are to successfully administer and exemplify ICT integration.

The principal needs to support the ICT initiatives but doesn't necessarily need to be that individual – providing he/she has excellent leadership in curriculum and technology.

I agree leadership needs to be far sighted! Stop gap measures can be quickly outdated and not cost effective. A 5 year plan needs to be in place.

I agree. A curriculum coordinator needs these qualities.

6. To what extent do you think each of the following are fulfilled at this school in order to effectively integrate ICT across the curriculum:

- School climate (as that which encompasses a school vision for ICT implementation, commitment to the implementation strategy and working together in teams to achieve the common goals)

If there is a school vision, I am not aware of it.

- ICT management (of budget, teacher training, technical support, the implementation plan and ICT maintenance)

Poor

- ICT knowledge (of equipment, pedagogy, curriculum and assessment using ICT tools)

Needs development.

7. Can you classify our executive leadership into one of the following categories?

- i. equitable providing – the principal as the provider of hardware, software, other related resources and technical support
- ii. learning-focussed envisioning – the principal as the person who ‘kept’ the school ICT vision and who kept student learning at the centre of ICT decision-making
- iii. adventurous learning – the principal who was also an ICT learner and unafraid to be experimental with new technologies and learning strategies
- iv. patient teaching –the principal who was willing to teach and to create adaptive learning environments and who encouraged professional development
- v. protective enabling – the principal who created shared leadership tasks for staff and students, removed ‘red tape’ and advocated the use of ICT and the school’s ICT vision
- vi. constant monitoring – the principal who ensured that ICT was being used in accordance with the school’s ICT vision
- vii. entrepreneurial networking – the principal who was a skilful “partnership builder” with different elements of the community and hence created a support network
- viii. careful challenging – the principal who was an inventive educator yet understood risk-taking

I can't classify in these terms. I think our executive has a school vision (the 5 goals for example) but ICT vision??? Can't see it.

8. To what extent do the following apply to your uptake of a new technology?

- i. Do personal views of school leaders about the importance of ICT to the curriculum shape its successful implementation into classrooms of all disciplines?

School leaders' personal views re ICT, in itself is not enough. They need to communicate their vision and inspire.

- ii. Do the knowledge of and skill in the use of ICT tools of school leaders influence the extent to which it is embraced by staff of all disciplines?

Not necessarily. Many staff here have become ICT proficient, from outside sources.

- iii. What are the obstacles to ICT integration and what should school leaders do to overcome these obstacles?

A lack of reliable technology – spend money to ensure it works!

A lack of equipment – e.g., need computer and IWBs in all classrooms.

A lack of time to learn – create time release for small groups.

Wiki

- i. How did you learn about the wiki?

Through a conference and through a colleague.

- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the wiki?

I posted questions for discussion on the wiki and let it run its course (with some supervision) I found it quite liberating in terms of letting go.

- iii. How much student involvement is there in the wiki?

Lots. Even students who do not normally speak in class are excited by the use of the technology.

- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

NONE whatsoever.

IWB

- i. How did you learn about the IWB?

Through a conference outside the school.

- ii. How did you adapt your lesson plans and teaching styles/practices to allow for use of the IWB?

Did similar things but in a more visually interesting way.

- iii. How much student involvement is there in the IWB?

Increasing as I become more confident. But really, not a lot at present. Depends on how I set up the lesson.

- iv. What influence if any, did the school leadership/school culture/school infrastructure have on your decision to implement this technology?

Well I guess because they were introduced into the School meant that I felt obliged to learn how to use them.