Technology Teachers' Perceptions of the Roles and Uses of ICT in Solomon Islands' Schools.

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ABSTRACT

Although the impact of ICT in teaching and learning is increasing, whether it will deliver its potential depends to a large extent on how teachers access and use ICT within the teaching and learning process (Balanskat & Blamire, 2007). Furthermore, teachers' understanding of how ICT contributes to teaching and learning can be invaluable to the decisions they make about the use of ICT tools to enhance or transform their teaching.

Therefore, this study investigates the perceptions of technology teachers on the use of ICT tools in Solomon Islands schools. It also explores technology teachers' views about the level of ICT resources in the schools. The study used semi-structured interview; a qualitative method of data collection that involved eight technology teachers selected from four schools in Honiara. I choose to do qualitative research because it helped to explain technology teachers' perceptions and beliefs of the use of ICT tools in Solomon Islands schools. The flexibility within the research process allows for an in-dept look at the issues pertaining to the views of the participants.

The study identifies a range of issues regarding teachers' perceptions and beliefs about the integration of ICT tools in the Solomon Islands schools. These included teachers' views on the issues of access and use of ICT tools in schools, teachers' beliefs about the benefits and roles of ICT tools, teachers' views on the infrastructures and resources in the schools, the need for ICT professional development (PD) for teachers and a national policy to guide and control the use of ICT tools in schools. The study also found that many teachers in the Solomon Islands also lack the basic knowledge and skills in using ICT tools.

Based on these findings, this study offers the following recommendations that can be used to improve and support the integration of ICT tools in the Solomon Islands schools. These included supporting teachers in developing their knowledge and skills in using ICT tools, providing a continuous professional development for teachers in ICT, the need to create a policy in education to guide the use of ICT tools in education and supporting schools to build their ICT resources and infrastructure. These will help teachers to effectively integrate ICT tools into teaching and learning.

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CHAPTER ONE

INTRODUCTION

1.0 Preamble

The Solomon Islands is in a restoration process to rebuild from the effects of the ethnic unrest that traumatised the country during the period 1998 to 2001, and brought the nation to a state of near collapse. After eight years of recovery, the government still struggles to provide support for all of its developmental needs, especially in education. Even before the ethnic unrest, educational infrastructures and resources were dismal and in a very poor state. Adding to the strain in the education sector was the government's priority for restoring law and order immediately after the ethnic conflict (Kudu, 2000). This limited funding to other sectors including education. The provision of equipment such as computers and other technologies has therefore, been severely affected. Consequently, teachers have few resources with which to teach subjects such as ICT (information and communication technology), making teaching and learning difficult. Despite these prevailing issues, some schools in the country have taken the initiative to integrate ICT into the teaching and learning process. They are buying computers, printers, photocopy machines and even connecting to the internet. This situation raised the question, so what do technology teachers do and think about these circumstances.

This chapter consists of:

- Section 1.1 the contextual background of study
- Section 1.2 my interest in ICT studies in Solomon Islands
- Section 1.3 ICT in Solomon Islands schools
- Section 1.4 research Aims

1.1 Context and Background of Study

The Solomon Islands is a country in Melanesia, south east of Papua New Guinea. It consists of nearly one thousand islands ranging from large, densely forested and mountainous volcanic islands to small raised coral reef and atoll islands and lagoons. Together they cover a land mass of 28,400 square kilometres (10,965m^2). The capital where the research was conducted is Honiara, located on the island of Guadalcanal. The islands, spread over a distance of 1,450 kilometres of water, make the delivery of

services such as education a continuous challenge for successive governments (infoplease, 2005).

Education System

The education system in Solomon Islands is governed by the 1978 Education Act (Laws of Solomon Islands, 1978). This Act provides the structure and functions of education in Solomon Islands. The functions of the Act were devolved through four main structures of the system:

- The Ministry of Education and Human Resources Development (MEHRD)
- Education authorities
- School boards
- The schools

It is through these educational institutions that educational services are delivered to the people. The education authorities include both the nine provincial governments and the churches. A school board (the governing body) is selected by the education authorities and is made up of people living in and around the schools. Decentralizing the powers and functions of education is necessary because of factors such as: geographical spread, cultural diversity, communication and transportation. These affect the delivery of educational services such as school materials, administration and professional visits to schools (Malasa, 2007; Sikua, 2002). Services and resources for schools such as curriculum materials, ICT tools and basic stationery are provided through the four levels of the education system (see list above). For example, MEHRD provides secondary schools with annual grants based on student enrolment. In addition, the education authorities also have budgets for schools which are based on the school fees collected by the school on students' enrolments. The schools also organise other fund raising activities which support the schools' running costs.

Secondary Schools in Solomon Islands

Secondary schools in the Solomon Islands include Community high schools (CHS), introduced in the mid 1990s, provincial secondary schools (PSS), introduced in the 1970s and national secondary schools (NSS) established by churches in the early 20th century (Sikua, 2002; UNESCO, 2004). Table 1.1 shows the three types of secondary schools in the Solomon Islands, their categories and the education authorities that the schools operate under. CHS run by churches are private schools while CHS run by the

communities and provinces are public schools. The provincial secondary schools (PSS) and national secondary schools (NSS) are run by the provinces, the city council and the national government and are public schools, while the NSS run by churches are private schools (Akao, 2008; Beuka, 2008; Malasa, 2007).

Table 1.1 the types of schools, the school authority and the categories they come under.

Type of Schools	**School Authorities**	**Category of Schools**
1. Community High Schools (CHS)	- Christian Churches, - Communities and - Provinces	Private schools Public school
2. Provincial Secondary Schools (PSS)	- Provincial Governments - City Council	Public schools
3. National Secondary Schools (NSS)	- Ministry of Education and human Resources Development (MEHRD) - Christian Churches	Public schools

The education system thus influences school leaders' decisions on what they prioritise in their school's development. Most teachers' classrooms are basic, like the ones seen in Figure. 1.1 and 1.2. The rooms contain basic furniture such as benches and stools. Often the only teaching aid is a blackboard. Most school are also in poor shape, needing improvements and refurbishment. The classrooms are not secure enough to be used for storing computers and other ICT tools. Figure 1.1 is a typical example of a classroom in Solomon Islands. As can be seen in the picture, it is typically furnished and has limited storage or resources. The physical context for Solomon Islands' teachers' work is thus likely to be an influence on teachers' perceptions of educational issues such as the integration of ICT in the schools.

Figure 1.1 A typical classroom in Solomon Islands

Photo: *Courtesy of Richard Edwards - 2007*

Figure 1.2 below is another typical example illustrating what happens when there is a lack of classroom storage or system of managing resources and shows that this teacher stores teaching materials (text books and teaching scripts) on the desk. Teacher- centered practice is also clearly evident in the way this classroom and the classroom in Figure 1.1 are arranged in relation to the only teaching aid, the black board.

Figure 1.2 Typical teachers front desk in a classroom

Photo: *Courtesy of Richard Edwards - 2007*

1.2 My Interest in ICT Studies in Solomon Islands

My interest in investigating the perceptions of technology teachers' use and belief of ICT in education began when I introduced a basic ICT training module for technology teacher trainees of the School of Education (SOE) at Solomon Islands College of Higher Education (SICHE) where I was a lecturer from 2004 to 2007. Teacher trainees were excited by their experience and expressed their desire to have an ICT course to learn more. The technology education teacher trainees' wish could not be easily achieved because of the lack of ICT development in education in the Solomon Islands, including the SOE. Even so, some schools in the country have acquired photocopy machines, computers and have connected to the internet (Leeming, 2003). Having taught for 18 years (10 years as a secondary technology education teacher and 8 years as a lecturer in technology education at the SOE in the Solomon Islands), I saw teachers were keen to integrate ICT in their teaching but they struggled because of the lack of technical, infrastructural, hardware and professional assistance. There is thus a need to investigate the use of ICT tools in schools, particularly how teachers integrate this into their teaching practices.

Additionally, I am also challenged by the findings of international research (BECTA, 2008a; Bonk, 2009; Cowie, et al., 2008) suggesting that ICT has the potential to enhance and transform teaching and student learning. I believe with the experiences I have in teaching, teacher education and ICT, I am equipped with enough knowledge of the processes and peculiarities of Solomon Islands secondary school education to carry out research centred on the perceptions and beliefs of technology teachers on the use of ICT tools in Solomon Islands schools.

1.3 ICT in the Solomon Islands Schools

Solomon Islands have undertaken various projects in order to provide access to education for all its people. Both the National Education Action Plan 2007 – 2009 and the previous Education Action Plan 2004 – 2006 were government initiatives intended to provide basic education for all (Ministry of Education and Human Resources Development, 2004; Ministry of Education and Human Resources Development, 2007).

These plans (Education Action Plan 2007 – 2009 and the Education Action Plan 2004 – 2006) allowed for educational innovations such as the use of ICT tools introduced and managed in schools by the People First Network (PFNET), the Distance Learning Centres (DLC) and the One Laptop Per Child (OLPC) projects. PFNET established email and internet access to some of the most remote communities in Solomon Islands. In its initial stage, the email system used radio wireless (VHF radios) to connect some rural communities in the Solomon Islands to email and opened the first internet café in Honiara. Through this (PFNET) initiative, communities had access to tools which could help them communicate with people beyond their immediate physical reach. One major achievement of this is the access people from rural communities now have to online courses at the University of the South Pacific (USP) (Leeming, et al., 2003; PFNET, 2003).

In the latest stage of its (PFNET) development, it collaborated with the government through the Ministry of Education and Human Resources Development (MEHRD) to establish distance learning centres (DLC) with broad band internet access to rural schools. PFNET also use these facilities to provide basic ICT skills training and ICT educational awareness programmes, now currently providing technical assistance and management personnel for the nine DLC (Leeming & Rapasia, 2008). The main

difficulties they faced were sustaining the running cost of the email stations and an inconsistent internet service - a country wide issue. The project continues to receive government and development partners' support and is backed up with technical support. The strategy of sustaining its operation was through an arrangement of shared management, established with the communities where the stations are based. This arrangement works on the user pays system and helps to support the running costs of the stations (Chand, Leeming, Stork, Agassi, & Biliki, 2005; Leeming, 2007). While the project is still running, its continuity depends on the support they get from stakeholders and the PFNET stations' capacities to be self sufficient.

DLC is funded by the EU (European Union) and provides full broad band internet access to people living near the DLCs. The centers are each equipped with five laptop computers, broad band internet connection, and teleconferencing facilities. The DLC allows students in rural areas to enroll in courses at universities and colleges in Solomon Islands and the wider Pacific region for a small fee. There are currently nine DLCs in the country. The OLPC project is a partnership between Secretariats of the Pacific Community (SPC), the One Laptop Per Child Association, Inc, an NGO based in the USA and the Solomon Islands government. They use the DLC internet facilities to link to schools' servers, allowing primary schools children in some parts of Solomon Islands to use the specially designed laptops for various classroom activities. The project is an on-going initiative started by the government in 2008 and supported by the South Pacific Community (SPC) and has since being trialed in 3 schools. While these projects (PFNET, DLC, OLPC) are still running, the challenges of continuous funding, providing enough computers for users, further infrastructure development, inconsistent internet access and continuous technical support need to be considered. Most ICT based projects that had no way of supporting their continuity, have tended to become a liability for the recipient countries. Therefore stakeholders in such projects should help devise a strategy that will support long term sustainability of such ICT projects, otherwise, the opportunities these projects offer in the development of ICT in education, will not go far.

The establishment of the projects discussed above has implication on my research because one of the main aims of the three projects (PFNET, DLC, and OLPC) is to provide people with access to education. The relevance of these projects to my study is also on the need to develop ICT infrastructure, provide ICT access to teachers and

students and the development of knowledge and skills for teachers who are the first group of people trained to use the ICT tools by the three projects. Therefore, these gaps need to be addressed before ICT can be widely used in schools in this country.

Level of ICT Access in Solomon Islands schools

Apart from the schools hosting the projects (PFNET, DLC, and OLPC) mentioned above which only represent a small number of schools, the levels of ICT resources in most schools are very basic and, in many of the rural schools, non existent. The few schools with ICT tools only use them for administration tasks. The challenges of the lack of basic power supply, technical expertise, economic capacity of the schools to acquire ICT tools, lack of access to communication technology, and insecure school buildings and infrastructure, hinder ICT both access and pedagogical uses in many rural schools (Leeming, 2007; UNESCO, 2004). Access by teachers, therefore, is not widely enjoyed. There are some schools in the rural areas where the People First Network (PFNET) and Distance Learning Centres (DLC) were established to provide ICT resources such as internet access, so people could use email, develop power point projects and use teleconferencing facilities. However, the majority of schools in the Solomon Islands is yet to have access to sufficient level of ICT tools. Leeming (2007) and UNESCO (2004) suggest there is a need to strengthen ICT development in the country. ICT will not be able to provide the expected outcomes if it is not supported. This argument also raises the issue of a national policy which should guide the development of ICT in Solomon Islands schools.

ICT Issues

The issues that arise as a result of ICT development in Solomon Islands are many. However, some important to this research and with wider implications in education include teachers' lack of access to ICT tools, the lack of sufficient knowledge and skills, the lack of professional development (PD), and the inadequate number of ICT tools in the schools. Leeming et al. (2003) found there is no data to verify the level of skills that teachers, students and other school staff have in ICT in Solomon Islands. Adding to this dilemma is the non-existence of any ICT policy in education to guide the use and integration of ICT in schools (Leeming, 2007; UNESCO, 2004). In the midst of all these issues, and despite of a lack of a coordinated process in ICT, the government and schools

are buying ICT tools for schools. Therefore, this research seeks to find out what teachers do and think about regarding the integration of ICT tools in their schools.

1.4 Research Aims

Because of the issues and context outlined above, I have three research aims:

- to investigate technology teachers' perceptions and beliefs of the use of ICT tools in their teaching and learning process.
- to investigate the realities of ICT tools in Solomon Islands schools.
- to identify the challenges technology teachers encounters when using ICT tools in their teaching.

This research should contribute to future research and development in ICT in Solomon Islands education, teachers' professional development programmes in ICT and should help identify what constitutes the ICT resource needs of schools in the Solomon Islands. Finally, the results may also contribute to the creation of a national education policy on the use and integration of ICT tools in Solomon Islands schools. It may even provide information about ICT in education to other sectors of the government.

The Solomon Islands is a specific context for research. As a developing nation, the Solomon Islands have economic and educational similarities to other developing countries. The next chapter, the literature review, will thus describe the issues for developing nations, and specifically the Solomon Islands, then focuses on the integration of ICT in schools.

CHAPTER TWO

LITERATURE REVIEW

2. 0 Introduction

Technological development has influenced and dictated the way we live and work both professionally and in our everyday lives. When we use a vehicle, watch movies on television, talk with a friend on a cellular phone, use a pen or read a book, we are using technological products. As new technologies emerge, the challenge for schools is to maximise the opportunities to enhance and transform teaching and learning. This means that teachers need skills and support to get the best out of these technologies. It is also important for schools to integrate ICT tools because ICT provides opportunities for students to engage in independent and meaningful learning (BECTA, 2008a; Webster & Murphy, 2008).

This chapter explores and guides the scope of my study on teachers' perceptions of their experiences with using ICT in Solomon Islands. There is very little literature on this topic in the context of the Solomon Islands. This gap may be partially filled by this thesis. In the meantime, research literature is examined from other countries. The chapter covers:

- Section 2.1 education in the developing countries
- Section 2.2 information and communication technology (ICT)
- Section 2.3 ICT in educational context

2.1 Education in the Developing Countries

For over four decades, world organisations and developed countries have joined in an effort to support the development of basic education throughout developing countries. They believe education will bring about "economic prosperity, scientific and technological advancement, the means to combat unemployment, the foundation of social equity, and the spread of political socialization and cultural vitality" (Chimombo, 2005, p. 130). However, many developing countries are yet to provide adequate and quality education for their people. They are hindered by factors such as lack of commitments to formulate laws and policies to mandate access for every individual, lack of educational infrastructure and resources, lack of funding to meet educational costs, the

lack of trained teachers and the severe level of poverty (Chimombo, 2005; Hardcastle, 2009; Nestvogel, 1995; Pigato, 2001; Unwin, 2004).

In response to the above problems, developing countries are using UNESCO's 'education for all' goals by the year 2015 to develop their education system (Pernia, 2008). One hundred and sixty four (164) countries made the commitment to work towards achieving the six universal goals of education (early childhood care and education, universal primary education, learning needs of young people and adults, adult literacy, gender parity and quality education) (The EFA Global Monitoring Report Team, 2008). "The challenge towards this drive is how to indeed make education available to all and in good quality" (Chimombo, 2005, p. 130). Achieving such broad goals is a difficult task for developing countries because they do not have the same capacity to address the various constraints they encounter in the process. UNESCO seems to assume that with aid from the development partners, developing countries will be able to address their educational needs despite the difficulties they go through. However, most of these countries have wider problems which affect the distribution and prioritization of aid money and other resources (Hardcastle, 2009). Education is not the only sector that needs support. A very good example of this is the case in the Solomon Islands where the education action plan 2001 to 2004 was not implemented because aid money and other resources were committed to restoring law and order (Kudu, 2000; Leeming, 2007; Sikua, 2002). What such broad goals of education failed to consider is that in order to provide quality education for all, other aspects of the social, economic and educational status of individual countries needs to be strengthened. It is therefore necessary to support countries with technical expertise, educational resources and funding to help them achieve these goals (Chimombo, 2005; Unwin, 2004).

Access to education in developing countries is also affected by the inability of such governments to enforce laws and policies that require parents to send their children to school (The EFA Global Monitoring Report Team, 2008). Such laws worked in developed countries because they have strong economic and social infrastructures. However, the enforcement of such laws in developing countries is over-shadowed by the inability of parents to meet the costs of their children's education. Most parents are so poor they can not meet the very basics of human survival. A legal process may be necessary to obligate parents to send their children to school, but convicting them will

only make matters worse for the families who are already struggling just to survive. In order for such laws to be effective, it is necessary to support the broader need of developing countries such as providing adequate educational infrastructure (school buildings, libraries, desks, ICT tools etc.) and general infrastructure to support people in accessing educational services like roads, bridges, transportation to schools and the alleviation of poverty. This is relevant to Solomon Islands as more than 80% of its population lives in rural areas that lack these basic services. Schools need resources such as ICT tools, furniture, building and trained teachers (Malasa, 2007; Sikua, 2002).

Although there are problems in education, progress has been made in various areas of education. For example, enrolment in schools has increased in many developing countries with national and international educational projects being implemented in the developing world to serve the universal goals of education. The One Laptop Per Child (OLPC), the Distance Learning Centre (DLC) and People First Network (PFNET) are examples of internationally (OLPC) and locally (DLC, PFNET) initiated ICT educational developments in the Solomon Islands (Leeming, 2007; The Secretariat of the Pacific Community, 2008). These initiatives have helped to deliver education to people living in the most remote areas of many developing countries. The development partners involved are the Solomon Islands government, the Secretariat of the Pacific Community (SPC), the United Nations Development Programme (UNDP) and the European Union (EU). However, there are still far too many children who do not attend schools. In 2007, 40% of 124, 000 school age children between ages 6 to 17 did not attend school in the Solomon Islands. The majority are girls (Leeming, 2007). The cause of such dilemmas is a matter for debate; however, it is important to note that developing countries experience different challenges therefore designing the approach to addressing such issues regarding individual country's needs may create a way forward in providing access and quality education to all.

The next section explores the nature and definition of information and communication technology (ICT).

2.2 Information and Communication Technology

Information and communication technology (ICT) have together, become a pillar of development, nation building, and growth in the developed and developing countries

within a very short time. It has become so important that many countries value it as a core aspect of education just like reading, writing and numeracy. ICT has also become a tool of development for many sectors of the world society. From large business corporations to schools, ICT has become an essential tool used in their daily operations. It has penetrated the economic areas and the very fabric of our social life (Rahman, 2008; Shih, Kraemer, & Dedrick, 2008; UNESCO, 2002).

The term information and communication technology (ICT) include many areas of information, communication, computing and technology. It covers many types of technologies, their functions and the fields in which they are being used. It includes technologies like the computer, photocopier, digital cameras, interactive whiteboards, mobile phones and facilities like the World Wide Web (WWW) and the internet (Tech Target, 2007; UNESCO, 2002).

There is no universally accepted definition of ICT because the concepts, methods and applications involved in ICT are constantly evolving. A good way to think about ICT is to consider all the uses of digital technology tools that help individuals, businesses and organisations access, use, manipulate and create information and products. ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. It is also about information literacy which is the combination of knowledge, understanding, skills, and attitude that individuals need to acquire and use (Ministry of Education, 2002; Tech Target, 2007).

Tech Target (2007) has defined information and communication technology taking into consideration hardware, software, functional and the conceptual nature it represents. Using a similar understanding of ICT, this study has defined information and communication technology (ICT) as a term that describes the nature of technologies, both hardware and software and the function of information processing and communication by electronic means, including transmission and display. It includes the use and understanding of the World Wide Web (WWW) and internet service and facilities such as social networking, e-commerce, e-learning, video conferencing, emailing, and the use and understanding of the interactive opportunities technologies offer in teaching and learning (Roberts, 2007; Tech Target, 2007).

The next section explores ICT in the educational context and reviews relevant issues relating to ICT use in education.

2.3 ICT in Educational Context

The use and integration of ICT into schools has become a priority in the educational reform strategies of many developed countries. In Britain, for example, over 600 million pounds were allocated for school ICT funding for the 2008 - 2011 period (BECTA, 2009a). Similar commitments were made by the Australian government with a budget in excess of $2.1 billion to improve current ICT for secondary schools until 2011 (Australian Government, 2008). While this level of commitment shows how important these governments consider ICT in education, there seems to be less consideration given to the perceptions and beliefs of teachers regarding their contribution to ICT in teaching and learning.

Much of the literature has suggested that when ICT was integrated into education, it was expected to be as successful as it had been in the communication, business, entertainment and health sectors (BECTA, 2008b; Johnson, Levine, & Smith, 2008; UNESCO, 2002). The advance achieved through technology in these sectors has made services accessible, cheap, fast, easily used and powerful. As Bonk (2009) reported, ICT is now at a stage where it can provide similar benefits in education, particularly the internet, which has opened up education to almost any one, any wherever in the world. Cowie et al. (2008), education.au (2008), Leeming (2007) and Watson (2001) also found ICT can contribute critical roles in developing teaching, curriculum development, broadening students' learning and "knowledge construction by making possible the creation, management, and sharing of knowledge" (Pernia, 2008, p. 1) through the use of the internet. These studies seem to suggest that the integration of ICT is a success story for education. However, Dieudonnés (2009) and Brin (2009) pointed out that while there has been progress made in the integration of ICT in schools, many teachers still believe that the traditional way of teaching and learning should not be replaced by ICT. The evidence of the impact of ICT in teaching "is scarce, inconsistent and does not allow for generalizations" (Claro, 2007, p. 5). This point is important to consider because for ICT to be effectively used in education, both the potentials and the challenges it offers need to be considered. Furthermore, teachers should understand the processes that will lead them to harness the

potential ICT offers and also understand its impact in teaching in order to use it effectively.

The Access and Use of ICT Tools in Teaching and Learning

Teachers' understanding of the use of ICT and the level of access they have significantly increases their confidence and skills level (Cowie, et al., 2008; Ham, 2008; McGregor Tan Research, 2009). Furthermore, it improves their "understanding of the roles of ICT in teaching and learning, and providing quality ICT-mediated learning experiences for students" (Ham, 2008, p. 1). Teachers, if given the resources and opportunities to integrate ICT tools in their teaching, will be able to explore ways of harnessing and enhancing their teaching pedagogies. The dynamics of enhanced learning through ICT can result in a variety of pedagogical practices (Grace & Kenny, 2003; Wheeler, 2000). For example, teachers can utilise opportunities in networked communication and use multiple ways of lesson presentation such as using interactive media to visualize learning materials and using model simulation to represent concepts and skills. ICT provides an opportunity to cross check tasks with a variety of related resources within easy access of teachers and students (Cowie, et al., 2008; Ham, 2008; McMahon, 2009). Learning is not limited to the classroom environment but is linked to rich online sources of information.

The interaction learners engage in through online experiences can create relationships with experts from different areas that raise their eagerness, encouraging them to become active in their learning (Bonk, 2009; Gura & Percy, 2005; Wiske, 2006). They can ask questions and be mentored by their teachers or others from the online learning communities they have access to (Bialobrzeska & Cohen, 2005; Cowie, et al., 2008; education.au, 2008; Gura & Percy, 2005). In contrast, teachers in the Solomon Islands are not at the stage where they can achieve such results; however, as John (2005) found in Britain, when teachers were given both access to ICT tools and training, they developed their understanding, competence and confidence in using ICT. They were also able to harness the potentials and opportunities offered by ICT tools in their teaching. Teachers who embrace ICT use the opportunity to enhance and transform their teaching pedagogies. Hence, the result could be similar for Solomon Islands teachers. The extent in which teachers use ICT tools such as the computer depends on the availability and access of the computers in schools (McGregor Tan Research, 2009).

Teachers in developed countries were also able to merge technology and curriculum content. In a wide range of subjects, teachers organise and integrate contents through the use of laptop computers, internet and the various resources available on the Web. According to BECTA (2008a) and Grabe and Grabe (2004), teachers who are competent and enthusiastic about the part ICT can play in teaching and learning will be more likely to adapt more constructive forms of teaching practices, emphasizing active learning and assisting students to construct personal meaning in their learning process. However, teachers can not just easily achieve these ICT competencies and outcomes if they are not given proper guidance and support (Cowie, et al., 2008). Teachers must also be prepared to rethink their own pedagogies and accept and make changes to their teaching that will help them adapt to the pedagogies that may bring about more effective teaching (Guba, 2003; Lim & Chai, 2008). This is relevant to the situation in the Solomon Islands because teachers are so familiar with their existing teaching practices that it will be a challenge for them to rethink and change the way they teach; especially in using ICT effectively in their teaching.

Teachers are part of the ecology of ICT integration in schools therefore the advantages and challenges ICT brings into teaching are very much part of their on going ICT experience. While there are many teachers embracing the advantages and potential ICT offers, there are others who are cautious about the challenges it brings to teaching and learning (Dieudonné, 2009; Gaible & Burns, 2005). Brin (2009) describes the negative perceptions of the critics of ICT who claimed ICT to be a distractive and shallow path to learning. ICT critics believe that technology deprive people of their civilisation, and limits peoples' capacity to think critically. The lack of focus in learning without ICT tools is one of the worrying aspects of learning today. The debate between the advocates and the critics of ICT use in education is complex and involves literature supporting both claims; however, it is crucial for teachers that they recognise both the advantages and challenges of using ICT in teaching. Although there is no literature to suggest that such debate has occurred in the Solomon Islands, the practice and perceptions of teachers in other countries on issues that challenge their existing beliefs in teaching will definitely bring out similar debates.

There is also a correlation between the availability and accessibility of ICT tools to schools in Britain and the behaviour of teachers in relation to whether they are interested

to use ICT tools in their teaching or not (BECTA, 2008b). The availability and accessibility of ICT tools to teachers have bearing on teachers' level of understanding and knowledge of using ICT. However, Balanskat, Blamire and Kefalla (2006) stated that "teachers are clear about the potential of ICT, but not always able to articulate what is being learnt as a result of its use" (p.37). The reason why such incompatibility occurs between teachers' realisation of the potential of ICT and articulating its contribution to learning lies in issues such as the lack of integrating ICT into concrete pedagogical goals, focussing on the use of technology than what was learned and teachers lack of reflection and enthusiasm in teaching (Balanskat, Blamire, & Kefalla, 2006). Similarly, teachers in developing countries like Solomon Islands, where ICT integration has just started, would not be able to articulate the contribution of ICT to teaching and learning as they may lack the ability to integrate ICT into pedagogical goals.

There are many studies (Balanskat, Blamire, & Kefalla, 2006; Cowie, et al., 2008; Dieudonné, 2009; Ham, 2008) claiming the merit of providing ICT tools such as computers and the internet for teachers in schools. In Australia, teachers appreciate the provision of ICT tools; especially computers and the internet in their schools. In this environment, teachers can work without pressure and interact with other teachers; developing their competence and confidence in using ICT (education.au, 2008; Newhouse, Trinidad, & Clarkson, 2002). Teachers involved in the studies were convinced that the changes were improving teaching and learning in their lessons. However, despite the enthusiasm, it remains unclear if this translates into effective and meaningful teaching (Balanskat & Blamire, 2007; Cowie, et al., 2008; Reynolds, Treharne, & Tripp, 2003). ICT sceptics argue that for ICT tools such as the IWB and laptops to be effective, they must be used in ways that exceed what other conventional teaching aides offers such as the normal whiteboard, provide (Brin, 2009).While these uncertainties exist, education.au (2008) pointed to a scenario where teachers can develop their skills and understanding of ICT's through an open environment where they can interact, providing support for each other and building each other's competencies and confidence. For teachers in Solomon Islands, this approach is ideal for their situation because ICT tools are scarce, therefore the need to share and interact with each other will provide support, learning opportunities and help raise their confidence in using the computer and the internet. This however, does not mean that the need to provide

sufficient ICT tools to schools is less important. While teachers may share and interact together, this interaction should be enhanced by a sufficient level of ICT tools in schools.

ICT has also helped teachers seek for new methods of teaching. Teachers who embrace ICT are able to explore the opportunities ICT offers in improving and diversifying their teaching. They can find and accumulate resources to make their teaching exciting and meaningful for learners. On the contrary, teachers who do not consider ICT important in their teaching will disregard the excitement of those who use ICT tools (education.au, 2008; McGregor Tan Research, 2009). They argue that effective teaching does not require the use of ICT tools, but depends on the ability of the teachers to prepare and present the lesson in a manner that is clear and meaningful to the learners. While there is merit in their claim, it does not eliminate the contribution of ICT in enhancing and transforming teaching and learning. In Australia and New Zealand, the number of teachers using ICT is increasing and those not using ICT are decreasing (education.au, 2008; Ham, 2008). The reason for this is more teachers acquire knowledge and skills with ICT tools through training and new teachers who enter the work force will have had prior ICT experience, therefore, it is natural for them to explore opportunities available through ICT in schools. It is difficult to identify similarities or contradictions of such findings in the Solomon Islands because there is no literature clearly identifying such cases. However, similar predictions can be assumed as ICT use in schools is new and developing in the country. There will be teachers eager to embrace ICT in their teaching and there will be those who won't use ICT because of their lack of knowledge and skills or the fact that they do not believe in it.

Furthermore, teachers' pedagogical perspectives are also important in how effectively they use ICT tools. Their pedagogical perspectives determine whether teachers adopt constructivist or traditional views of learning (Smeets & Mooij, 2001). Researchers such as Cowie et al. (2008) and Ham (2008) found decisions made by teachers based on their pedagogical beliefs have significant influence on the effectiveness of teaching and learning in most learning environments, including ICT aided teaching and learning. It is important for teachers to understand that quality teaching and learning can be achieved by establishing a strong link between "pedagogy within the subject area, the subject domain and culture and the artefacts within the learning setting" (John & Sutherland, 2005, p. 405). However, the studies above were carried out in an environment where

there was continuous support to teachers, therefore the positive results reported are more likely to occur. Conversely, the teachers in Solomon Islands have no support in their ICT interaction therefore, effectively using ICT to fully transform their pedagogical practices will produce mixed results because they are just beginning to integrate ICT tools into there teaching. The more likely outcome for them is enhancement of the administrative requirements of their teaching such as preparing teaching materials and accessing additional resources to support the curriculum contents (Chand, Leeming, Stock, Agass, & Biliki, 2005; Faggiano & Fasano, 2008). While there are teachers who have adapted ICT with their pedagogical practices, the confidence to reach this level takes time even in countries that have well established ICT resources in schools.

Although ICT has influenced changes in teachers' teaching practices, the changes do not represent a fundamental shift in teachers' beliefs about teaching and learning (Earl, 2002). The changes that have occurred have enhanced teachers existing practices in teaching approach, accessing resources and classroom presentation, such as using the PowerPoint presentation facilities. An increase in accessibility and practice by teachers has also raised the frequency of their use and level of interaction with various ICT tools. Teachers have also noted more time is "needed to practice skills learned, to consolidate understanding, trial and evaluate programmes and develop resources" (p.145). Teachers' use of ICT in New Zealand shows teachers need more time to build their competence and confidence in the effective use of ICT in teaching. This involves learning the skills for using the tools, learning how to integrate ICT into teaching and teachers buddying together to share their learning experiences. This is significant for teachers in Solomon Islands because as Leeming (2007), Mangal (2007) and USP (2005) pointed out, teachers need support and guidance as they begin to integrate ICT into teaching and learning.

Despite the positive impact the role of ICT has had on education in developed countries like Australia and New Zealand, much is yet to be understood about ICT in education in developing countries like the Solomon Islands. Most of the research mentioned above was conducted in developed countries with strong economic and technological positions and did not represent the contextual aspects and relevance of ICT in developing countries. As Bialobrzeska and Cohen (2005) observed in South African schools, Zamani (2010) observed in Iran and Pernia (2008) observed in the Pacific Islands, the economic ability of governments affects the support available to schools in integrating ICT into

teaching and learning. Schools in developing countries have big differences in the levels of their ICT integration because of limited funds, expertise and infrastructure developments such as broad band connections, limited numbers of ICT tools and secure buildings for computer labs. These issues have implications for this research because they affect how much ICT access and use teachers have. Schools with limited access to ICT tools often restrict uses to administration rather than teaching and learning (Bialobrzeska & Cohen, 2005; Pernia, 2008). In this environment, the possibility for teachers to develop their competency and confidents in ICT is very minimal.

Benefits of ICT in Education

There are many studies (BECTA, 2007; Condie, Munro, Seagraves, & Kenesson, 2007; Cowie, et al., 2008) extolling the benefits of ICT in education. Some of these benefits include those that enable teachers to prepare, save, and present their teaching materials, provide information and resources for teaching and allow teachers to produce quality work through tools such as word processing (Government of Western Australia, 2005). However, three areas that are commonly discussed include the enhancement of teaching and learning, administrative process and communication (Balanskat, Blamire, & Kefalla, 2006; Canada Council on Learning, 2009).

Many educational experts believe that ICT is important in enhancing teaching and learning. In Britain, this belief led to the provision and management of ICT tools in schools and the mentoring of teachers and students in its use in schools (BECTA, 2008a; Wheeler, 2000). The transformation ICT brings to secondary schools has profoundly affected their practices at all levels of institutional structures. Many countries now access education virtually, providing opportunities for those restricted by distance, cost, physical disability and other factors. ICT has shifted the responsibility of learning from the preserve of teachers and lecturers to a shared approach where the learners also take responsibility to access, analyse and create the knowledge or concepts they are learning. Schools can design distance learning approaches in order to reach people wherever they are (Bonk, 2009; Loxley & Julien, 2004). The opportunities that some of these ICT tools present, in strengthening conceptual understanding through visual presentation using concrete example, is very effective (Condie, Munro, Seagraves, & Kenesson, 2007). Cordie, Munro, Seagraves and Kenesson (2007) however, also argued that ICT cannot provide expected outcomes if it is not designed to encourage independent and

collaborative learning to meet the needs of the learners. Distance and e-learning provision therefore, must be well thought out and designed, otherwise, it will not effectively provide the required learning outcomes.

The potential of ICT tools such as video and animation and simulation software are beneficial in developing complex concepts in different subject areas (Grabe & Grabe, 2004; Gura & Percy, 2005; McMahon, 2009). Technologies such as Internet enable teachers and students to communicate with each other. Participants can ask questions about learning tasks and provide responses that may help them find answers to their questions (Condie, et al., 2007). However, Balanskat et al. (2007) stated that "despite the growing body of evidence on the impact of ICT use on learners, whether it will deliver its potential depends to a large extent on how teachers use ICT within the teaching and learning process" (p. 3). The impact of ICT on learners can not happen without the role of the teacher. Therefore, teachers' perspective of ICT in the schools is important in the enhancement of teaching and learning. It is not easy to change teachers' teaching practices. Many teachers could not easily integrate their existing teaching practices to the use of ICT tools. For some teachers, the process is slow and takes time (Balanskat & Blamire, 2007; Claro, 2007; Guba, 2003). Furthermore, Faggiano and Fasano, (2008) reveal that teachers who understand the difference between their previous teaching experiences and what ICT can do to improve their teaching, take advantage of ICT affordances. In most cases the use of ICT in teaching does not change what is taught and learnt; rather, it changes the way in which teachers deliver the contents and allow students to explore and acquire them (contents) in another ways.

Studies reveal that technologies are used to manage the enhancement of administrative processes that improve educational goals such as capacity, quality and efficiency (BECTA, 2008b; Bialobrzeska & Cohen, 2005; Cowie, et al., 2008). The most notable impact is in efficiency particularly, efficiency in teachers' use of time. Some of the teachers involved in one of the studies have significantly reduced the time they spend on administrative tasks such as organizing, preparing, planning and managing teaching tasks. The time gained in the process is invested back in improving other aspects of education such as assisting learners. In contrast to the increasing numbers of teachers who reported saving time when using ICT, BECTA (2008b) also found that the numbers of teachers claiming to have lost time are decreasing. Whether one gains time or loses

time when using ICT tools, depends on how the tools are used. Teachers who gained time are more likely to be those who understand how to use and interact with ICT well. However, teachers who lost time as result of ICT could be the ones who may need to get a better understanding of using ICT tools effectively. The loss of time in using ICT is also a result of a lack of planning of the task at hand. This is possible because teachers have different views of the integration of ICT into schools. Some teachers are excited about the opportunities ICT offers therefore, they keenly embrace them; others, however, are not quite sure about ICT's contribution, therefore, they tend to hold back and take time to adopt it. The significance of these findings to this study is that there is the possibility that teachers in developing countries like Solomon Islands will lose time because of their lack of experience, access and sufficient knowledge and skills in the ICT area. In this case one single task will take longer for them to complete compared with teachers in New Zealand who have the competency, access and support to use ICT effectively.

In the developed world the internet is a key method of communication. It has a major impact on education, especially in the communicative process between teacher and learner. (Bialobrzeska & Cohen, 2005; Bonk, 2009; Fredriksson, Jedeskog, & Plomp, 2007; Santhiveeran, 2005). Bonk (2009) and Johnson, Levine and Smith (2008) also pointed out that the number of emerging ICT communication facilities available today provide opportunities for teachers to build their understanding of the use of ICT in teaching. Furthermore, Santhiveeran (2005) found that students prefer to share their thoughts about learning issues through virtual means. Such environments allow students, who cannot openly contribute in a face to face classroom environment, to share their thoughts and ask question about their learning. Balanskat and Blamire (2007) and Healy (2003), however, found that although such opportunities exist, many teachers only use ICT to enhance their existing teaching practices. As Cowie et al. (2008) and Ham (2008) reported most teachers consistently only use ICT tools such as power point presentations for their teaching, which doesn't necessarily improve pedagogical practices or make learning more dynamic for the learner. However, there is an increasing number of teachers who use emerging ICT tools such as interactive whiteboards (IWB) in their teaching. For teachers in developing countries there is still some way to go before they fully embrace the communicative opportunities provided by ICT into effective teaching (Claro, 2007; Healy, 2003).

The influence of ICT in education in developed countries is in contrast with what happens in developing countries. Pernia (2008) and UNESCO (2004) in their study of the penetration of ICT in the Pacific Islands countries said that even though the internet is available, the application of emerging technologies such as described by Bonk (2009) and Santhiveeran (2005) is limited to, perhaps only multilateral organisations and universities. However, even in developing countries where the internet is not commonly accessed, "teachers can store material on a removable 'stiffy', USB memory stick or CD-ROM disk, and share it with others. This means that work can be saved, improved collaboratively and revised to suit different needs and purposes" (Bialobrzeska & Cohen, 2005, p. 25). The major influence of ICT in education is through the sharing of information and imparting of learning. The disparity in the effects ICT has on communication in the developed and developing countries occurs in the types of ICT tools used in schools (Grace & Kenny, 2003; Zamani, 2010). For example, developed world schools use more emerging ICT tools such as interactive whiteboard while developing countries use older technologies such as telephone, email, CD – ROM and radio. This disparity in the experiences of teachers in the developed and developing countries will also have implications on how teachers in these countries perceive the opportunities ICT offers.

Barriers of ICT in Education

One of the most significant indicators of teachers' levels of engagement in ICT is their level of confidence in using the technology (BECTA, 2008b). "There is a close relationship between levels of confidence and many other issues which themselves can be considered as barriers to ICT" (p. 3). Some of these barriers relevant to my research include those related to the view of teachers regarding their concern of the loss of control in teaching and achieving curriculum goals, infrastructure, skills and financing.

A major barrier for teachers in effective teaching and achieving curriculum goals using ICT is their belief that, as teachers, they should take control of the teaching and learning process. In considering the potential of ICT in effective teaching, teachers need confidence, competence and control (John, 2005). Teachers' perception of control emerges from the view that teachers should know most things. John stated that the "three conditions (confidence, competence, control) are necessary for teachers to use

technology effectively" (p. 483). Competence and confidence are necessary for teachers in order to use ICT effectively in their teaching. The lack of these three conditions puts teachers in a position of anxiety and causes them to feel that they have little or no control over the students and what is taught. Teachers having had these experiences tend to perceive themselves as not having the control in their teaching and would be less willing to use ICT tools in their teaching. However, instead of seeing ICT as a threat to their control, teachers should adapt ICT into their teaching and engage in constructive learning which can be developed from an open interaction with the ICT tool. This finding is relevant to the situation in the Solomon Islands where teachers assume absolute control over the teaching and learning process. Supported by a highly prescribed curriculum, teachers decide what to teach, how to teach it and deliver it. In order to overcome the barriers of ICT, areas of the rigidity of the curriculum, teaching programmes such as scheme of work, lesson plans and assessments should be reviewed so as to be compatible with the use of ICT tools (John, 2005).

Many teachers have not been confident to integrate ICT into their existing teaching practices because they lack the skills to use ICT tools competently. The lack of confidence results in teachers developing a fear of using computers or other ICT tools in their teaching (BECTA, 2007; Government of Western Australia, 2005). They do not want their students to see their inability to interact with the technologies. This challenges the classroom culture of the teacher being the expert in every thing, directly showing the teachers' incompetence level. Teachers' lack of skills (BECTA, 2008b; Bialobrzeska & Cohen, 2005) is due to the lack of access to ICT tools, lack of appropriate professional development and the inadequate numbers of ICT tools in the schools. While the lack of confidence is a characteristic of teachers not having ICT skills, it also affects teachers who have ICT skills, but who do not know how to use them for effective pedagogy. With teachers who have ICT skills, such barriers may occur from training, that focuses only on the use of the ICT tools and not on how they could be effectively applied in pedagogical practices. Although schools put emphasis on acquiring ICT tools and adopting them for school use in the developed world, only a small number of schools seriously incorporate teacher ICT professional development as part of their ICT package (Bosley, Krechowiecka, & Moon, 2005). This is a common barrier in the Solomon Islands because teachers only have very basic skills and no training on how ICT would be useful in effective teaching pedagogy. Therefore teachers in the Solomon Islands need

to be supported with access and training in ICT in order to gain the full benefit in their teaching (Leeming, 2007).

The lack of sufficient access to ICT tools in the schools also contributes to teachers' lack of confidence in using them. When teachers do not have easy access to ICT facilities, it limits their opportunity to develop the skills needed in using them effectively (Almaghlouth, 2008; Earl, 2002; Government of Western Australia, 2005). Even teachers with personal computers could be easily affected by access to ICT tools in the schools in terms of using it to enhance their teaching practices. In this situation, teachers would not fully embrace the potential of ICT and tend to perceive ICT in teaching and learning negatively. Australian, teachers said that the lack of sufficient ICT access in schools limits teachers' chances of using them in their teaching (education.au, 2008). Findings by Leeming (2003), Pernia (2008) and USP (2005) show that the majority of teachers in Solomon Islands still lack the skills needed to effectively use ICT tools in teaching and learning. This is further aggravated by the lack of any ICT professional development programmes. This is indeed a gap in the overall integration of ICT into education in Solomon Islands that could become a major part of ICT development in the country. The control of internet access and access arrangements such as booking schedules for use of computer labs is another limiting factor. While such control measures protect students from harmful materials such as pornographic sites, e-crimes and provide control on the cost of running the internet and the cost of sustaining the internet, it limits teachers from accessing teaching and learning materials in the schools at the time they may need to use it for their classes.

In the evaluation of the New Zealand 23 ICTPD School Clusters Programme 1999-2001, Ham et al. (2002) found that there was an inadequate level of subject specialized ICT tools in schools. This however has been somewhat addressed through the adoption of programmes such as the Laptop for Teachers Project and the continuation of the ICTPD cluster programme. These have helped to bridge some gaps in teachers' lack of ICT tools and skills (Cowie, et al., 2008). In the Solomon Islands, Malasa (2007) found the lack of ICT tools in the schools inhibits teachers and the school in functioning effectively in their assigned duties. The absence of ICT tools affects the delivery of "some of the components of the school curriculum" (p. 63). For example computers, photocopiers and printers would have provided much needed opportunities to produce clear teaching and

instructional resources. Students would then be able to receive well structured learning materials that will make learning more exciting. Although Malasa describes the lack of ICT mainly in the administration requirements of schools, nonetheless, the implication is also relevant to teaching. Many schools in the Solomon Islands have very basic ICT tools therefore; the effect of the lack of ICT infrastructure extends to all aspects of education. The lack of ICT tools in the schools also affects ICT resources stored in CD ROM and discs that could not be printed and assignment tasks which could not be photocopied for class distribution.

Management of ICT in schools is seen as a barrier when the management approach limits teachers' interaction with ICT tools. This issue may not carry much concern in a developed country like New Zealand because many teachers have their own computers and other ICT tools. As Cowie et al. (2008) and education.au (2008) found, teachers who are supported with ICT tools both in schools and their homes tend to use ICT more in their teaching. However, it is important to consider this in the Solomon Islands because with limit numbers and high costs of ICT tools, schools use control measures to control the use and cost of sustaining them. This is a very effective administrative and financial arrangement, but normally at the cost of teachers' and students' opportunities to access and use ICT tools. Bialobrzeska and Cohen, (2005) found, in South Africa, control measures such as keeping computers and photocopy machines in the principal's office does not help to develop teachers' ICT skills. Instead, it pushes the teachers' away from using ICT tools. In such an environment, it is possible for teachers to become frustrated and lose interest in using ICT tools in their teaching. Furthermore, Bialobrzeska and Cohen (2005) and Grace and Kenny (2003), in their respective reports of the cost of sustaining ICT in South Africa and some South American schools, found the continuous support for ICT tools is worth more than the initial cost of buying and installing them. In the case of Solomon Islands' ICT access in education, Leeming (2007) suggests a strategy must be devised to help sustain the long term cost of ICT in schools. This is because most schools are in rural areas and they lack reliable power, internet connections and access to ICT accessories (such as cartridges and toners for printers and photocopy machines). The management strategy must not only help save money, but also provide opportunities for teachers to merge ICT into their teaching.

Professional Development

Studies show that professional development (PD) programmes not only raise teachers' competence and confidence to use ICT tools but also increase the collaboration opportunities with other teachers (Cowie, et al., 2008; Earl, 2002; Ham, 2008; Jung, 2005; UNESCO, 2008a). In highlighting the need for a professional development programme for teachers, BECTA (2007) shows that promoting the awareness of the use of ICT tools is best done through creative approaches to integrating ICT in teaching. Furthermore, Almaghlouth (2008) and Okey (2006), in their studies in Saudi Arabia and New Zealand, found that professional development programmes most teachers participated in focused on ICT applications relating to their teaching needs. Although there are some professional development (PD) programmes on the use of hardware such as computer, printers and power point projectors, rather, teachers prefer to know how to use the software that directly relates to their teaching such as word processing, searching the internet, multimedia software and presentation software such as Microsoft PowerPoint. Cowie et al. (2008), Ham (2008) and Okey (2006) also showed that teachers became more competent in the use of word processing software, the internet and emailing when undertaking professional development. The result of the studies mentioned above is important for this research. While it is important to focus PD on merging ICT into teaching, Solomon Islands teachers need to know the very basics of ICT functions, therefore professional development programmes should begin from the basic knowledge and skills of ICT then build on to the level of merging them (ICT tools) into teaching and learning.

The evaluation of the 23 ICTPD clusters in New Zealand found that those who (coordinators and teachers) facilitated and participated in the professional development programme reported a high level of "goal achievement" (Ham, et al., 2002, p. 5) amongst teachers as a result of the programme. The benefit goes a long way in the teachers' experiences in "the sharing of professional expertise, increased confidence in relation to ICT, and developing understanding about both the practice of, and the professional rationale for, teaching and learning with ICT" (Ham, et al., 2002, p. 5). However, translating this success to the Solomon Islands will be a challenge for schools and the government. It requires ICT expertise in education and schools commitment to integrate ICT that seems to be lacking at the moment (Pernia, 2008; UNESCO, 2004, 2008a). The progress in teachers' ICT competency reported in the studies above requires financial

and political commitment by governments and schools which is unfortunately not available in the Solomon Islands because of the poor state of the economy, the schools' limited budgets, and the lack of focus on ICT developments in the schools. The Solomon Islands teachers would have difficulty in fitting into the ICTPD programme because of the unfamiliarity of ICTPD and the prevailing lack of knowledge, skills, access and the inadequate number of ICT tools in schools (Leeming, 2003; Mangal, Ali, & Tuqa, 2007; Pernia, 2008). This gap continues to widen because ICT training is not part of teacher education in the School of Education (SOE) - the teacher training institution in the Solomon Islands.

Teachers also believe that (Almaghlouth, 2008; BECTA, 2009b; Ham, 2008) in order to integrate more ICT into teaching and classroom practices, more ICT training is needed to develop teachers' capacity to understand and be able to use ICT tools comfortably in the classroom. Newhouse (2002) and UNESCO (2008a) suggest that a framework for an ICT professional development programme for teachers should begin with the school where the PD will serve. This framework should identify the teachers' skill level and other needs so that the planning of the PD could be made to address the real needs of the teachers in the schools. Similarly, BECTA (2004) argues that more often, institutions do not include professional development with their technology developments. When they organise one (PD), it often does not meet the teachers' immediate need and the timing of it is not right. Such inappropriate matches of PD programme to teachers results in teachers not being fully confident in using ICT tools to improve their teaching practices. Teachers need to be confident in using ICT in their teaching before they can apply it in their classes (UNESCO, 2008b). BECTA (2004) found that teachers who are confident to engage with the technologies tend to use ICT more than teachers who have little or no confidence in using computers in their work; these teachers will try to avoid them altogether. In this regards, it is important to identify teachers' perceptions in regards to their ICT needs before designing ICT professional programmes (BECTA, 2004).

Early studies in ICT by Jung (2005) and Newhouse (2002) showed that teacher education programmes in ICT focused more on ICT use such as content rather than on effective pedagogy. The programmes (PD) emphasise issues such as selecting appropriate ICT tools and supporting teachers and students to learn how to use ICT tools. However, recent works by Teachernet (2009) and Zake (2009) show ICTPD has since been tailored

to help teachers develop their pedagogical practices such as designing computer-based instructions and student-centred learning approaches. This is significant because it expands teachers' opportunity to use their current ICT skills for effective pedagogy. The challenge is whether teachers will effectively employ a constructive approach in using ICT in effective pedagogy. The changes in teachers' pedagogical approaches take time hence, a PD programme promoting ICT use in effective pedagogy must be supported, until teachers gain sufficient confidence in applying it. As Cowie et al. (2008) , Dewstow and Wright, (2005) and Ham, (2008) found in New Zealand teachers were able to make changes to their pedagogical practices using ICT tools with careful planning and continuously well mentored PD programmes. Earl (2002) also found that teachers in New Zealand use ICT more in their classroom activities to develop resources for class programmes and use it to examine and improve their teaching strategies. Tailoring PD programmes to suit teachers ICT needs provides the opportunities for teachers to adapt ICT into their teaching and changes their perceptions of the use of ICT, especially in enhancing and transforming their teaching practice (Chandra & Lloyd, 2008; Zake, 2009).

The areas that ICTPD should address are the curriculum, assessment and the delivery of learning instructions (Bialobrzeska & Cohen, 2005; Gaible & Burns, 2005). BECTA (2008b) and Newhouse (2002) suggested that ICTPD programmes would be best organised in two stages; the first stage should focus on ICT skills training and the second should focus on ICT pedagogical practice training. Teachers should be confident with the first stage before moving on to pedagogical training. This would be an advantage for teachers because the two levels will compliment each other in the overall teaching process - not only in just knowing how use ICT tools but also in using their skills to support their pedagogical practices (Newhouse, 2002; Snoeyink & Ertmer, 2001). As there are very few ICT tools in schools and limited professional programmes in the Solomon Islands, both stages of PD programmes, mentioned above, need to be consistently supported in order for teachers to benefit.

While professional development helps develop teachers' capacity to integrate ICT in their teaching and classroom practices, it is important that they are supported at the school level by ways of following up after doing a PD programme. A professional development programme that allows teachers to maximise their time to get a better grip

of the skills they learn without being pressured and one that allows continuous access and collaboration amongst other staff and the school will build teachers confidence and competence in ICT (Dewstow & Wright, 2005; education.au, 2008; Ham, et al., 2002). When teachers understand the basic use of ICT, they will be more likely to explore the other uses of ICT through personal experimentation. However, Balanskat and Blamire (2007) found that the lack of ICT support strategy in schools is decisive in determining teachers' level of ICT use. The findings from these studies help to "give important insights into the process in which teachers adopt the use of technologies" (p. 7). The success of any professional development programme also depends on the support given by the schools. Teachers who have support tend to show more positive attitudes in their adoption of ICT tools compared to teachers who have no support. This study has implications for teachers' adoption of ICT in Solomon Islands. Because teachers have not received support in their adoption of ICT tools, many lack the necessary skills to adapt it to their teaching and learning process, especially in harnessing the potential ICT offers into effective pedagogical practices.

Furthermore, Bialobrzeska and Cohen (2005) said that an ICT tool itself will not bring about the desired teaching and learning required. The ICT tools are just as good as the person using them. Therefore, teachers need to be assisted with relevant ICT professional development programmes to enable them to use ICT tools effectively. The level of ICT competence of teachers depends on the type of training and professional development (PD) they receive. The effectiveness of ICT in teaching will only go as far as the teacher's competency level (Bialobrzeska & Cohen, 2005; Maddux & Johnson, 2005). Therefore their understanding of how to use ICT and how to merge it with effective pedagogy is important in avoiding the focus on the technology, instead, shifting their focus on how to better understand the ways of integrating them into effective teaching.

ICT Policy Creation and National Strategy

Nations with strong ICT integration embedded in their education system have well set out policies and strategies. Pernia (2008), Gaible and Burns (2005) and Labelle (2005), in their reports to UNESCO and the World Bank about the use of ICT in schools in the Pacific and other developing countries, argue that ICT policies or action plans should consider how best ICT could benefit the user. In the case of education, national ICT strategies and policies must cater for teachers' and students' needs. Labelle (2005) also

stresses that ICT policy must include clear and well defined processes, the steps involved and how the process will be managed. The focus must not be on the technology but rather on the teachers and the students. Gaible and Burns (2005) said it is important to recognise the other roles that teachers perform and design ICT plans to support and respond to their needs. Therefore, in designing any ICT action plan, it is important to consider the human aspect of using ICTs rather than only focusing on what the technology can do.

In reference to the above measures, Pernia (2008) found that developed countries like New Zealand and South Korea "have ICT policies that go beyond the recognition of ICT's potentials and are already institutionalizing concrete measures that support ICT initiatives" (p.4). Although there are mixed impacts of ICT (Gaible & Burns, 2005) in education, those that are guided and supported by well defined policy and strategy yield positive impacts in teaching and learning. Studies by BECTA (2009) in Britain and eBest ICT Cluster (2009) in New Zealand show there is increasing evidence that ICT helps to improve teaching, learning and teachers and learners to be connected academically and socially. Such achievement is an attribute to a carefully designed strategy that is monitored, researched and continues to be reviewed for improvement, identification of challenges and problems (eBest ICT Cluster, 2009). Similarly, Bialobrzeska and Cohen (2005) suggest that as more schools acquire ICT tools, there is the need to design policies that provide support for the administration of schools, teaching and learning and long term support of ICT use in schools. These measures are required in all countries, therefore the Solomon Islands is no exception. Any policy should consider teachers' views on access to ICT, infrastructure, supporting teachers' skills and teaching and learning.

While the findings above reflect the progress that has been made in the developed world, much is yet to be achieved in developing countries. Pernia (2008) reported that the penetration of ICT in education in South Pacific island countries, including Solomon Islands, is very low. Most countries have drafted ICT strategies or policies and have begun ICT initiatives in education; however, the extent to which ICT access is provided to teachers and students is minimal. Studies on (Mangal, Ali, & Tuqa, 2007; UNESCO, 2004; USP, 2005) the integration of ICT in education and the impact of the PFNET (People First Network) project in rural schools in the Solomon Islands reveal a need for a

national ICT policy to guide the integration of ICT in schools. Furthermore, the studies also show that there is a gap in the national ICT policy in education in the Solomon Islands. According to Leeming (2007) and USP (2005), most teachers in the country lack basic ICT skills. One of the reasons for this is because there is no ICT policy to guide the integration of ICT tools in schools. Therefore, when schools in the Solomon Islands integrate ICT tools, there is very little opportunity for teachers to learn and develop their ICT skills because of the lack of guidance in how to integrate them with teaching. Although, there is some ad-hoc learning and adapting that takes place, most teachers have not had the opportunity to try because the number of ICT tools is inadequate or is restricted to administration staff only. Because of a lack of ICT policy, schools are not guided in the best ways for integrating ICT tools into teaching and learning. The lack of a national policy also results in the lack of guidance in acquiring relevant and appropriate ICT infrastructure, technical assistance and sufficient financial support in education.

The Curriculum

ICT has been made part of many curricula in the developed countries. For example in Britain ICT curriculum was set to address the various areas of learning such pupils' experience in using ICT, developing ideas and applying the knowledge they learn in different learning areas (Qualification and Curriculum Authority, 2007). It recognises that innovation and adaptation are very important in enhancing technological practices. Any quality outcome is the result of informed, critical and creative thinking and ICT is expected to contribute to these achievements (Fishman & Krajik, 2002; McMahon, 2009; Monteith, 2004). Furthermore, Ramos (2005) and UNESCO (2008b) said that the place of ICT in the curriculum is a matter of importance because more and more teachers are using it in their teaching. In contrast, Sade (2002; 2009) revealed that the Solomon Islands technology education curriculum still focuses on the traditional technical areas like materials, design graphics and electronics. There is a strand on information and communication, but its content puts priority on technical drawing and graphic design and not the use of ICT tools such as the computer and the internet (MEHRD, 2008). Therefore, ICT has not yet been included in the curriculum of Solomon Islands - not even as part of the technology curriculum or other subject curricula for that matter.

Sade's (2002; 2009) studies reveals that teachers perceive technology is about computers, scanners, radios, telephones, the internet and other modern technologies.

While teachers acknowledge the ICT components of technology education, there is still an ICT gap in both the technology and national curricula. Sade (2009) also found that most teachers in the Solomon Islands have yet to fully integrate ICT in delivering the recently reviewed technology education curriculum changes. The new technology education curriculum requires teachers to think more constructively, but most teachers are yet to make the transition in their teaching approaches. In many technology curricula, technological tools are used to deliver curriculum contents (Sade, 2002), while in others, it (ICT) changes the methods of delivering curriculum contents. Although technology has not yet totally reformed schooling and curriculum, the impact it has on curriculum has created new and innovative ways of delivering the curriculum (Dieudonné, 2009; Owen, 2004; Taffe & Gwinn, 2007). Jung's (2005) identification of "ICT as main content focus, ICT as part of content or methods, ICT as core delivery technology and ICT as facilitating or networking technology best describe how ICT is integrated and used in many curricula today" (p. 95). Although ICT has been made part of many curricula contents, teachers tend to focus more on learning the ICT skills rather than learning how to integrate ICT into their pedagogical practices. This is to be expected because ICT skills training can be addressed easily and quickly. However, the mastery of technical skills is not a sufficient precondition for successful integration of ICT in teaching. Teachers require continuous access, use and support in order to be able to understand and adapt appropriate resources for effective pedagogies (Trucano, 2005; UNESCO, 2008b). The three ways of using ICT in curriculum (ICT as part of content or methods, ICT as core delivery technology and ICT as facilitating or networking technology) seem to support teachers in building their competency and confidence in using ICT for effective pedagogies. These three ways do not provide skills training alone, but rather on-going ICT exposure for teachers through use of ICT tools and ICT programmes to enhance and support their teaching practices (Jung, 2005).

2.4 Summary

The literature explored in this chapter suggests that ICT tools have a role to play in education. As its definition portrays, it (ICT) includes a wide range of hardware, software, systems, programmes for teaching and learning, networks of people and the internet. While it is difficult to define, it would be best to see ICT as the uses of digital technology tools that already exist to help individuals, businesses and organisations use and access information. In developing countries, the integration of ICT into teaching is

not as extensive as it is in the developed countries. Although there is progress in some developing countries on teacher use and integration of ICT in effective teaching pedagogies (Bialobrzeska & Cohen, 2005) many are limited by the lack of infrastructure, finance, technical expertise, professional development and well set out ICT policies to guide the integration of ICT into education. Both the level of teachers' ICT skills and their knowledge are very low. While teachers in some developing countries have developed their ICT skills to enhance their teaching pedagogies, teachers in the Solomon Islands have just begun to use ICT and therefore have much to learn and explore about the integration of ICT into teaching and learning.

The perceptions of teachers on the role of ICT in education includes what they think about developing effective teaching, meeting curriculum goals, broadening students' learning and knowledge construction through using ICT tools. While the development of technological skills such as using video and word processing have a role in the teaching and learning process, ICT is more important as an enabler of other teaching and learning practices, rather than an important aspect of the technology itself (Trucano, 2005). The computer and the internet can improve teaching and learning and provide opportunities where teachers can enhance their pedagogical practices, especially in supporting learning through research, teaching resources design and delivery such as the laptop project in New Zealand (Cowie, et al., 2008; Ham, 2008). Some of these opportunities are networked communication, multiple ways of presenting learning tasks, using interactive media to visualise learning materials and using model simulations to represent concepts and skills. ICT tools are a means by which tasks can be cross checked against a variety of tasks with a variety of related resources within easy online reach of teachers and students. There are increasing numbers of teachers who, in the developing countries recognize the potential ICT has in teaching and learning, however, many are yet to articulate ICT's contribution to learning. Their problem is compounded by a lack of understanding of the use of ICT for effective pedagogy.

The perceptions of teachers in relation to the use, access, professional development and the benefits and barriers of ICT use in the schools are crucial to any successful ICT integration in the schools. These factors contribute to teachers' level of confidence in adopting ICT tools for their teaching. The level of access, use and PD programmes determine how much teachers may benefit from ICT in enhancing their teaching and

learning, administrative and communication process. The literature explored in this study also showed that despite the increasing number of teachers using ICT tools in their teaching in the developed countries, there are those who believe ICT tools have little to contribute to effective learning. While teachers' integration of ICT into their teaching is increasing in the developed world, much is yet to be achieved in the developing countries.

The next chapter discusses the methodology and the method used to collect data for the research centered on investigating Solomon Islands secondary school technology teachers' perceptions of the use and role of ICT in schools. The chapter also presents the ethical requirements that guide the research, particularly the treatment of participants and the data collection.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter discusses the design of the research and details the method used for data collection. There are eight (8) sections in the chapter:

- Section 3.1 the research questions
- Section 3.2 the research paradigm
- Section 3.3 the qualitative research methods
- Section 3.4 interview
- Section 3.5 ethical considerations and access to participants
- Section 3.6 research design
- Section 3.7 data analysis
- Section 3.8 summary

3.1 Research Questions

Drawing from the body of literature explored in Chapter Two, it is evident that teachers' perceptions play a major role in the integration of ICT with teaching and learning. Teachers' believe that sufficient level of access, use and professional development are important in enhancing teaching and learning. Balanskat and Blamire (2007) stated that "despite the growing body of evidence on the impact of ICT use on learners, whether it will deliver its potential depends to a large extent on how teachers access and use ICT tools within the teaching and learning process" (p. 2). Therefore, this research investigates Solomon Islands secondary school technology teachers' perceptions of the use and role of ICT in schools. It is guided by the following questions:

1) How do these technology teachers use ICT?
2) What are the challenges technology teachers encounter when using ICT?
3) What are technology teachers' perceptions of the role of ICT in education in Solomon Islands?

These questions were designed to allow the participants to express their perceptions and beliefs of the access, use, role and integration of ICT tools in Solomon Islands schools.

These questions were the basis on which other questions were asked to allow for an in depth and thorough expression of ideas, views and beliefs by the participants in the data collection process. The next section explains the interpretive paradigm which is the paradigm used in this research.

3.2 Research Paradigm

This section explains the interpretive paradigm and why it is the appropriate method for this research. Kuhn, known for coining the term 'paradigm', characterises it as: "An integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools" (Kuhn, 1970, p. 11). A research paradigm therefore is an organisation of carefully constructed assumptions and concepts or considerations that shape thinking in research (Bogdan & Biklen, 1998). During the past century, different paradigms have emerged due to the growth in educational research, for example: positivist, anti-positivist or interpretive, transformative, pragmatic and critical theory (Mackenzie & Knipe, 2006).

The interpretive paradigm emphasizes that social reality is viewed and interpreted by the individual according to the ideological positions he/she relates to. Therefore, knowledge is personally experienced rather than acquired from or imposed from outside. The interpretivist believes that reality is multi-layered and complex and a single phenomenon may have multiple interpretations (Cohen, Manion, & Morrison, 2007). Cohen, Manion and Morrison (2007) continue on to emphasize that the verification of a phenomenon is adopted when the level of understanding of a phenomenon allow for further probing into the various experiences the participants have of a researched situation rather than reducing the researched subjects (participants) to measurable terms, as happens in the case of positivism.

For the purpose of this research, the interpretive paradigm was chosen because it allows the participants to explain their views based on their individual understandings of ICT integration in relation to their teaching. Hence, the data gathered is something that the participants personally experienced rather than some enforced ideology from outside. Another benefit of using the interpretive paradigm in this research is that it enables the researcher to probe for further explanation of issues that were not clearly explained in the

initial stage of the interview. As Cohen, Manion and Morrison (2007) explain, it was possible to verify the responses of the participants by continuously probing into the various experiences they have had in relation to the researched phenomenon. The interpretive paradigm gives recognition to the participants as important contributors to the knowledge gained, rather than portraying them in some measurable terms. The methodology that best supports this belief and enables the researcher to explore the phenomenon is the qualitative research method.

3.3 Qualitative Research Method

Qualitative research is a field of enquiry cutting across disciplines and subject matters. As an instrument of the interpretivist paradigm it aims to gather in-depth understanding of human behaviour and the reasons that govern human behaviour. It is used to gain insight into people's behaviours, value systems, concerns, motivations, and aspirations of culture or lifestyles (Burns, 2000). Qualitative research relies on reasons behind various aspects of behaviour. It investigate the 'why' and 'how' of decision making, not just the 'what', 'where' and 'when'. Qualitative researchers typically rely on four methods for gathering information: participation in the setting, direct observation, in-depth interview and analysis of document and materials (Best & Kahn, 2006; Burns, 2000; Mutch, 2005).

I have chosen to do qualitative research because it will help explain technology teachers' perceptions and beliefs of the use of ICT tools in Solomon Islands schools. The flexibility within the research process allows for an in-depth look at the issues pertaining to the views of participants. Qualitative research will help provide an insight into technology teachers' attitudes and values (Cohen, Manion, & Morrison, 2007) that help shape their perceptions of the use of ICT tools. Since ICT is new in Solomon Islands education, it is important to gain sufficient insight into technology teachers' perspectives rather than making general assumptions of issues surrounding their experiences and beliefs. Qualitative research also gives the participants the opportunity to respond in their own words. This particular aspect of qualitative research is relevant in the Solomon Islands context because as Malasa (2007) stated that:

> Most traditional customs and beliefs are not written down or recorded but are mostly handed down from one generation to the next through an oral tradition. Therefore, it is important that any research carried out in the Solomon Islands be conducted within the participants' socio-cultural

> context. This is to ensure maximum participation and response from the research participants. (p. 50)

The next section offers an overview of interview, the data collection method used in this research.

3.4 Interview

Interview in research is an investigative dialogue between researchers and participants in the search for answers to question or problems that may exist in an institutions or organisation. It is like a tool in research that is used to find new knowledge or evaluates and develops existing knowledge. "A major advantage of interview is its adaptability" (Bell, 2005, p. 157). It encourages the participant to 'express their views openly, allows for cordial sharing and gives freedom to the researcher to adjust the nature of the interview in order to gather the kind of data that is anticipated. Burns (2000) states that interviewing is a verbal interchange between the researcher and the participant during a research in which the interviewer tries to collect data on values, beliefs and opinions from the participant(s). "The use of interview in research marks a move away from seeing human subjects as simply manipulable, and data as somehow external to individual, and towards regarding knowledge as generated between humans, often through conversation" (Kvale, 1996, p. 11). This view promotes humans as central to the process of interview. It also emphasises human interaction for knowledge production and reveals the social "situatedness of research data" (Cohen, Manion, & Morrison, 2007, p. 349). Interview allows participants to discuss details surrounding an enquiry that might require in-depth knowledge probing. In order to gather credible data on the views of the participants in regards to their perceptions on ICT use, and its role and integration into schools in the Solomon Islands, a semi-structured interview process was conducted.

The method of data collection in my research is semi-structured interviews, a type of interviewing. By using semi-structured interview as a research method, I can probe into the views, beliefs and perspectives of the participants to establish the reality of how they perceive the integration and use of ICT in the schools in Solomon Islands. While understanding human behavior and the reasons that govern it is essential, it is crucial that this research explore participants' views and beliefs with degrees of guidance and flexibility at the same time. As Bell (2005) pointed out that semi-structured interview provide freedom to respondents to talk about what is of central significance to them

rather than to the interviewer and at the same time allows for some flexible structure to ensure all topics that are crucial to the research are not left out. The three main questions used in the research plus further probing from the researcher provide the opportunity for participants to express themselves more.

The objective of semi-structured interview in this research is to provide an environment that will help to understand the respondent's point of view regarding ICT rather than make generalisations about the respondents' behaviours. In this context, the researcher probes for further information when the need to do so arises during the interview interactions. On a similar note, the semi-structured interview allows the interviewees to express their opinions, concerns and feelings on their perception of the use of ICT in teaching and learning rather than being confined in their answers by the researcher. The next section describes the processes undertaken to ensure that this research was conducted in an ethical manner.

3.5 Ethical Consideration and Access to Participants

The research was organised and carried out in relation to the School of Education of the University of Waikato Ethical Conduct in Human Research and Related Activities Regulation and the Solomon Islands Ministry of Education Ethics Regulations 1984 (Ministry of Education and Human Resources Development, 1984; School of Education, 2007).

Malasa (2007) found that the research culture in the Solomon Islands is not strong therefore the need to consider ethical issues and access to participants is important for this research. Hence, this research considers informed consent, potential harm to participants, confidentiality, participants' right to decline, conflict of interest, use of information and participants' social and cultural consideration as important ethical measures to up-hold. An application was made according to Section 9 of the *Ethical Conduct in Human Research and Related Activities Regulation* of the School Education, University of Waikato, in seeking informed consent from the schools and participants. I explained the issues to them via a letter with the research information sheets attached. I also verbally explained the research to them when I visited their schools. The participants were thoroughly informed and given chance to have any questions answered before they signed the consent forms. In regards to the potential harm to participants, confidentiality,

participants' right to decline, conflict of interest and the use of information gathered from the research, participants were thoroughly informed and advised of the implications.

The participants' cultural values and practices were considered in depth during the interviews. With more than eighty different languages and diverse ethnic groupings, the cultural difference of the participants is an important consideration of my research. In order to avoid possible conflict arising from cultural and social issues, important social virtues such as respect for participants' culture, beliefs, and values were considered in the research. Some of the participants were possibly influenced by the 'wantok culture' (a relational culture of sharing and support) that could challenge the confidentiality, anonymity and privacy of the research data. Solomon Islands as a society where knowledge is commonly owned by the tribes and people (Malasa, 2007), it is crucial that the participants were informed of this challenge of not sharing the information in the research with others. In this regard, the participants were advised not to disclose any information they provided to anyone. On the hand, some knowledge is not commonly shared and "is considered sacred (tabu)" (p. 49). Such cultural complexity might be a hindrance to participants' openness to share their views in the research. In this situation, I had to establish a good and trustworthy working relation with the participants in order for them to voluntarily and openly share in the interviews.

In the context where the researcher is seen has having preconceived views of traditional cultures which may influence the research (Bishop, 1997), as a Solomon Islander, my understanding of the socio-cultural context made me aware of such possible bias and helped me to work within the broader socio-cultural context when interacting with the participants. This is achieved through collective dialogue with flexible time limit on the interviews, the language used in the interviews, the manner in which questions were asked (politely) and the thorough probing of participants' views and beliefs rather than just taking their initial responses as the answers to the questions.

The participants were protected through a series of measures put in place to safely guard their identities. These measures were assurance of anonymity, confidentiality and protection from harm. This was accomplished by coding the interview scripts and pass-wording of electronic copies of interviews and interview scripts so that others could not identify them or access the information. For purposes of discussion in the findings and

discussion chapter of the thesis, the participants and their schools are given pseudonyms so that their identity is not known. The written transcripts of the interviews will only be used as agreed with the participants before they signed the consent form (see appendix 3). The next section describes the process involved in the research design.

3.6 Research Design

This section discusses how the research was organised and conducted. It describes the context of study, the research participants and the schools profiles.

Context of study

This study focused on secondary schools in Honiara. Honiara was chosen because it is the capital city of the Solomon Islands and most schools would have acquired or have some form of access to ICT tools. It is also where diverse cultural groups live and work therefore participants from different cultural groups could be easily reached. My research was not intended to be culturally comparative; however; the participants from the four schools I chose come from different socio-cultural backgrounds. While this scenario presents the opportunity for the researcher to gain broader perspectives on teachers' perceptions and beliefs of ICT integration, it also presents the challenge for the researcher to be culturally sensitive of the participants' culture, values and beliefs (Cohen, Manion, & Morrison, 2007). Furthermore, I chose to do my research in the city for the purpose of having easy access to participants, a limited budget and research time constraint.

The Research Participants

Selecting participants in any study is a very important step in the research process and requires careful thought. Indeed, it is something every researcher needs to think about early on in the process of designing their research. Cohen, Manion and Morrison (2007, p. 109) argue that "researchers will need to ensure that access is not only permitted but, also in fact, practicable". With this in mind, I have selected eight technology education teachers from four schools in Honiara. These schools have access to computers and other ICT tools. Technology teachers in Honiara would be more familiar with ICT tools used in the school than their counterparts in rural schools. The participants were also selected from public and private schools which has some implications regarding the level of ICT tools in the schools.

These technology teachers teach technology education in forms one to five and their teaching experience ranges from 2 years to more than 20 years. The participants are all male because there are very few female teachers teaching technology in the Solomon Islands and they (female teachers) did not teach in the schools I visited. Participants held positions of class teacher, heads of departments and deputy principal. Six of the eight teachers were involved in the review of the national curriculum which recently changed the industrial arts curriculum to technology education curriculum. Their knowledge of the curriculum review and years of teaching experience helped them to explain the issues affecting the integration of ICT tools in the schools. Two of the participants were fairly new and had been teaching for just over two years. All the teachers' ages ranges from 25 to 55 years (see Table 3.1 for participants' age and school).

Table 3.1: Teachers and their year of teaching experiences

Participants Profiles			**Schools Profiles**				
Names	**Age**	**Years of service**	**School**	**Levels**	**Enrolment**	**No. of Teachers**	**Types of schools**
Talis	35 -40	5	A	Forms 1 to 7	650 students	28 + 3part teachers	Church school (Private) coeducational
Rendal	32 -36	5					
Willie	29 -36	3	B	Forms 1 to 6	380 students	25 teachers	Church school (private) coeducational
Billy	29 -32	5					
James	50 -55	25	C	Forms 1 to 6	400 students	25 teachers	Church school (private) coeducational
Troy	25-30	2					
Gordon	38-40	9	D	Forms 1 to 5	340 students	23 teachers	City Council school (public) coeducational
Clinton	34-38	5					

Schools Profile

The eight technology teachers involved in the research were selected from four different schools. Three of the four schools are church schools (private) and one is a public school and all schools are day schools with coeducation enrolments. Private schools and public schools have the same status and were given support by the government in terms of teacher placements, resources and materials supplies and budgetary support. The four schools have school levels ranging from forms one (year 7) to form seven (year 13) (see Table 3.1 for specific schools levels). The schools were chosen because they had

acquired and use some ICT tools. In the context of the Solomon Islands, all the schools involved in the research could be regarded as medium to large schools in size, given the number of staff, student enrolments and school levels (e.g. forms 5, 6, 7). The next section describes the data collection process involved in this research.

3.7 Data Collection

This section outlined the data collection process employed in the research. It describes the transcribing of data, data analysis and data validity and reliability.

Transcribing the Data

All interviews are conducted in both English and Solomon Islands Pidgin English. The parts of the interviews that are in Pidgin English are translated by the researcher and transcribed into English. To make sure that the data were not lost in translation, the researcher returned the transcribed data to the participants and allowed them to check the meaning of their responses. With those who responded entirely in Pidgin English the researcher went back to cross check with them if the translation represented what the participants actually referred to. This was possible because all the interviews were transcribed while the researcher was still in the research field. Each of the eight interviews took more than 8 hours to transcribe. The researcher then went through each one of the interviews more than once.

Data Analysis

The data analysis in this research involved organising the data according to themes, trying to make sense of what the data was saying, taking parts of it apart, trying to see areas of similarities and contradictions and sometimes I returned to the data that I decided not to use and slotted them back into the themes again. The analysis of data however, was made easier by coding or indexing the data in relation to the research questions and the data collected. Coding or indexing the data provides a sense of systematic approach to data analysis. Such systematic approach towards data analysis allows for ease of referencing different parts of the data when writing them up. The interview data were best coded based on questions, sub-questions and other extended questions such as probing questions, categories and contradictory responses (Cohen, Manion, & Morrison, 2007).

Furthermore, data analysis in a qualitative study is also influenced by the kind of study undertaken. For example, in the case of an interview as the data collection method used, the data would be most appropriately written in a descriptive and narrative form, with the relevant issues raised throughout. The way the data is written must also show what the data analysis seems to illustrate; such as to describe, or to discover a pattern of a certain practice (Cohen, Manion, & Morrison, 2007). Bearing this in mind, I used themes to organise the data with so that, when describing the findings, the issues arising from the data are raised appropriately throughout.

After transcribing all the data, I organised them into common themes based on the three main questions of the research. The participants are identified by pseudonyms and the four schools are identified by the use of the upper case abbreviations A, B, C, and D as shown in Tables 3.1. Further, the data are organised into themes taking particular note of the patterns of responses and the contradictions and the similarities they present. All the data of each question are grouped under each participant - identified with their pseudonyms. The contributors of the data are identified by the pseudonyms written at the end of each quote as shown in the example below.

> We have good and bad things in the internet and students need to be guided. I believe that the students should be guided only to learn and use the good things about the internet (Willie).

Validity

Validity in qualitative research refers to credibility and trustworthiness of the data presented (Johnson & Christensen, 2008). For the purpose of this research, validity is viewed in terms of Sapsford and Jupp's (1996) definition that states that validity is best seen in "whether the evidence which the research offers can bear the weight of the interpretation that is put on it" (p. 1). The amount of thinking, designing, constructing and reviewing of the data collection methods and the details such as deciding the main research questions, creating an interview question guide, making sure ethical standards are met and the designing of the research information sheet are part of the process taken to enhance the validity of the data collected. Validity of the research was enhanced by the use of technology teachers' voices in answering questions using their own words through semi-structured interview. The ability of the semi-structured interview to target intended responses also keeps the intention of the questions in focus, as validity is the

"extent or degree to which an enquiry measures what it sets out to measure" (Willington, 2000, p. 201).

The validity of the researcher's reporting of participants' views was also obtained using probing questions and the return of participants' transcribed transcripts to them for verification and confirmation. The research questions were set to allow the participants to provide an account of their views and beliefs and really express how they see and feel about the integration and realities of ICT tools in their schools. The probing of statements made by participants, for further explanation of their responses which were not clear to the researcher, ensured that the data provided can be trusted and are the true reflection of the participants' responses. Giving copies of the interview transcripts back for participants to verify is also a way of upholding validity in the research.

Reliability

Reliability in relation to qualitative research data is the measure that the data provided is consistent with what previous research literature has said or if similar research with a different group of participants yields a similar set of data. Furthermore, qualitative data can be said to be reliable if it is stable. Stability in this regard is the ability of the data to be repeated (Cohen, Manion, & Morrison, 2007; Golafshani, 2003). Cohen, Manion and Morrison (2007) stated that a good qualitative data is data that helps us understand a concept that may not be very easily understood. Unlike reliability, which is perceived as a concept that evaluates quality in quantitative data, quality in qualitative data is the ability of the data to generate understanding.

The reliability of the data collected in my research is achieved through the processes undertaken in the research. As Cohen, Manion and Morrison (2007) suggests, the process involving semi-structured interviews, recording of interviews, the process of thorough analysis of data and the cross-checking of the transcribed transcripts with participants has enhanced the reliability of the research. The process of explaining the requirements and procedures of the research to the participants prior to the research, giving time for participants to understand what the research seeks to gather, also improves reliability (see information sheet, appendix 4A and 4B). The one to one session held with each participant to explain the requirements and procedures of the research along with the issuing of the semi-structured interview guides to each of them helped participants

respond to the interview questions with considered and independent answers that were less likely to have been influenced by good or bad experiences of the day. The returning of the interview transcripts to participants to check and make changes confirmed that the final data presented in this research are credible and accurate. Finally, my knowledge of the Solomon Islands secondary schools system and teaching environment ensured that the research was conducted with professionalism and the data gathered are trustworthy.

3.8 Summary

This chapter discusses the research paradigm and explains the methodology and data collection method used in the research. The method is semi-structured interview which seeks to explore the perceptions of technology teachers in the use and integration of ICT tools in the schools in the Solomon Islands. This chapter also explains the process put in place to guide the ethical requirements of the research. This includes issues of informed consent, confidentiality, participants' right to decline, potential harm to participants, use of information, conflict of interest, participants cultural social consideration and arrangement for participants to receive information. The research design section outlines the processes involved in the research such as data transcription, sampling and the role of the researchers. In the data analysis section, the chapter explained how the data are organised, coded and presented. The chapter concludes with the discussion of the validity and reliability of the data collection process. These issues are important because they establish the credibility and trustworthiness of the data. With this study, validity and reliability are maintained by providing and explaining research requirements to the participants before time, thorough cross-checking of the transcribed data by the participants and the thorough review of the data by the researcher during the analysis stage. Finally, the data is also verified by the fact that the responses of participants follow a similar pattern.

The next chapter presents the data gathered using this methodology and the method discussed in this chapter.

CHAPTER FOUR

FINDINGS

4.0. Introduction

This chapter presents the data collected from interviews conducted with eight technology teachers on their perceptions of the roles and uses of ICT tools in Solomon Islands secondary schools. Using semi-structured interview and guided by the three questions below, I engaged with the participants as they expressed, in their own words, their perceptions of the role and use of ICT in Solomon Islands schools.

The findings presented in this chapter are guided by the following research questions:

1. How do technology teachers use ICT tools?
2. What are the challenges technology teachers' encounters when using ICT tools?
3. What are technology teachers' perceptions of the role of ICT in education in Solomon Islands?

From the analysis of the interview transcripts, the following themes were organised to represent the beliefs and perceptions expressed by the eight participants. In the presentation of the findings, each theme is supported by relevant quotes from participants.

- The access and use of ICT in schools
- Teachers' beliefs about the benefits of ICT
- ICT infrastructure and resources in the schools
- The need for professional development in ICT

4.1 The Access and Use of ICT in Schools

The access and use of ICT tools in schools is an important aspect of the integration of ICT in teaching and learning. Schools with well developed ICT integration are often the ones that provide sufficient access and use to their teachers and students. On the same note, participants also raised the theme as one of the main issue in this research. Hence, this section presents the findings of the research question one: 'how do technology

teachers use ICT tools?' It outlines the perceptions of technology teachers in the areas of technology teachers' access to ICT tools, use of ICT tools, the level of ICT knowledge and skills in the schools, the control and guidance in the use of ICT and the need for policy to guide the integration of ICT tools for teaching and learning.

Access to ICT Tools

A major issue encountered by the technology teachers is that of access to use and interaction with ICT tools in the schools. Access arrangements in schools restrict teachers' use of computers. With some schools the limited number of days their schools allows them to access the tools increases the difficulty they already have with the limited number of ICT tools. In some schools, there is no organised time or access arrangement for teachers to use the computer lab and the internet. In another school, teachers and students have the same time allocation each week to access computers in the computer lab which restricts teachers' access to the tools. The teachers said that in most cases they would give priority to their students to use the computers in the lab. When they were asked why they would not use the lab with the students, they said that the 14 computers in the lab were not enough for all the students and teacher together at one time. Rendal explained this when he said:

> I think that the one day arrangement is not enough. The lab should be more accessible to all the staff. Another problem with the arrangement is that students are also allowed to use computer/s at the same time which makes some teachers reluctant to go in with the students. We would normally give priority to our students to use it. What I notice is all teachers just share the 3 computers in the staff room (Rendal).

Participants also said that because of the limited number of ICT tools in schools, teachers would have to queue to use them. Sometimes teachers just get frustrated about it and give up doing what they intended to do. This relates more to the use of the computer than other ICT tools. Troy said that he would normally use the computer in the afternoon or evening because most of the teachers would have gone home by then. In some schools, only the principal and deputy principal have access to ICT tools, especially the computer.

In Clinton's school, he said teachers cannot access the computers because they are kept in the principal and deputy principals' offices.

The scenario was different in School 'D'. Here, only the secretary had access to ICT tools. James believes that such an arrangement restricts teachers in effectively using the tools as they desire. He said that it will limit teachers' ability to design courses and teaching materials in the best possible way. When asked why the school did not give teachers access to the computers and photocopy machines, participants said that they believe the school did not want teachers to use the computers and photocopy machine because they are afraid that teachers might damage them due to their lack of knowledge and skills of using ICT tools. They go on to say that the school should allocate time each week for teachers to access the computers and arrange someone either from within the school or outside providers to come and train teachers on the basic use and care required.

Commenting further on the lack of proper management and organisation of the ICT access in his school, James said that the fear the school has in teachers damaging the equipment is not a strong one. He believes that if the school organises access and help teachers with training to use them (ICT tools), teachers will use the tools without damaging them. He concluded that the schools should let go of such concerns and provide access to teachers and students. He said:

> In cases where there are not enough computers as here at this school, we should be looking at how to manage and programme the timing for our students and teachers to have access to them. In one school I visited in Isabel province they programme six computers so that teachers and students have access to them and it works (James).

Within the schools that stipulate controlled access to ICT tools for its teachers and students, participant teachers reluctantly accept that the measure is appropriate, given the high cost of ICT support services, although it restricts teachers to very limited time to use the computer and the internet. They also acknowledged the initiative taken by the schools to provide ICT access to teachers and students. They said that in the Solomon Islands, where such innovation is rare, giving access to ICT tools to teachers and students is a bold step to take. Willie and Talis said:

> I think that the school should have some control over the access in order to manage its uses. It will cost money to repair and support an uncontrolled access arrangement (Willie).

> The arrangement may be too restrictive for some teachers, but I think that it is a good arrangement because the cost of running and maintaining the ICT tools and the internet is very expensive (Talis).

Billy, however, said that despite the limited number of ICT tools they have in the school, the teachers take turn to use the computer when it is available. Teachers were also encouraged by the commitment shown by the principal and deputy principal in trying to engage teachers to make use of the computers and the internet. When asked about whether teachers would like to have more access, he said that everyone who normally uses the computers seemed to be happy about the access they have to use them. He said that:

> I can say that teachers' access to ICT tools, especially the computer, is manageable. We have only 4 computers at the moment, but we seem to take turns to use them when we need to. I have not heard any teacher complaining about the access yet. Another important point to note in regards to this issue is the positive attitude our principal and deputy principal shows in dealing with the issue. They encourage us to use them (computers) when we are free and when the staff computers are all occupied, they even allow us to use their computers if they are not busy. It would be expensive for the school to buy a computer for each teacher (Billy).

Table 4.1 ICT tools the participants have used.

TYPES OF ICT TOOLS THE PARTICIPANTS HAVE USED	
Participants	**ICT tools**
Talis	Computers, printers, photocopier, mobile (personal) the internet
Rendal	Computers, printers, photocopier, mobile phone (personal) the internet, power point projector, fax machine
Willie	Computer, printer, mobile phone (private), the internet
Billy	Computers, printers, photocopier, the internet
James	Have not used any ICT tools
Troy	Computer, printer
Gordon	Computers, printers, photocopier,
Clinton	mobile phone (personal)

Use of ICT Tools

Technology teachers' use of ICT tools is very minimal in this study. As the findings show (see Table 4.1), their personal interaction with ICT tools ranges from participants who have not ever used ICT tools to those who have used computers to a certain level of personal confidence but are still in the process of learning. Talis, Rendal, Willie and Billy have indicated using the computer, printer, photocopier and the internet. The ICT tools used by the majority of participants are the computer, used by six of the participants, printer used by six participants and the photocopier, used by four participants. Troy has used only the computer and printer, Clinton only used the mobile phone for personal use, while James has not used any ICT tools at all. It appears that some of the participants have very little experience in using ICT tools. Although half of them use the computer, printer, photocopier and the internet, their experience is only limited to basic use such as word processing, direct copying of work and emailing.

In reference to their unfamiliarity with the use of ICT tools, Clinton and James said that:

> To be honest I do not use ICT tools in my work. What I do is I give my work to the secretary to type for me so she is the one who uses the computer to do my (James).

> I do not use the computer or other ICT tools at all; I do not even play games on the computer (Clinton).

The two quotes above represent a great number of teachers who have not used ICT tools in their work as a teacher. They are either teaching in a school where ICT has not yet been adopted or they are in a school that has ICT tools, but lack the knowledge, skills and opportunity to learn how to use them. This lack of knowledge and skills was made worse by the schools' lack of leadership in enabling teachers to learn how to use ICT tools. These teachers would have easily learned how to use the computers if there was an arrangement in the schools that allowed them to spent time experimenting with using them or learn from those who know how to use them.

The case in School C where twelve donated computers lay idle is an example of the lack of commitment by school leaders to organise their use or find out ways in which teachers could be assisted to use them. When asked about why they did not use the computers, the participants said that they were eager to use the computers, but no instruction was given by the principal on the status of the computers. They said that the schools should arrange for someone who knows about computers to set them up for teachers and students to use. As Clinton said:

> I think the school leadership at that time was not proactive enough to make use of the equipment (12 donated computers) when they arrived. They (school management) did not even think of other ways of setting the computers up and helping teachers learn about how to use them (Clinton).

The way technology teachers acquire knowledge and skills using ICT tools has occurred in a disorganised manner. The views of the participants presented below range from the desire to learn how to acquire skills and knowledge regarding use of ICT, to the challenges they encounter when learning how to use ICT tools through the trial and error method. Most of the technology teachers involved in the research stated that they learned how to use ICT tools when they got to their schools. They consistently said that they learnt how to use tools like the computer through the 'look and learn' method. Billy, Troy and Talis said they only started using ICT tools when they got to their respective schools. But because of the ad-hoc nature of how they learnt ICT skills, they are still not confident enough to fully exploit the benefits by using them in the schools. Their views were summarised by Troy:

> The first time I used a computer was when I got here to the school. I learned how to use the computer by watching my colleagues working. At the moment I can only use the computer to prepare my class notes and other curriculum materials. With regards to other ICT tools, I have no experience of using them (Troy).

From the quote above it can be seen that technology teachers' experience in using ICT is a new challenge in their teaching. The quotes also show that technology teachers lack sufficient knowledge and skills in using ICT tools. Furthermore, it demonstrates ad-hoc professional development where the teachers pursue experience themselves rather than being part of a systematic professional development programme.

Level of ICT Knowledge and Skills

The level of ICT knowledge and skills in the schools is very low. When asked about their level of ICT knowledge and skills, all the participants said that they needed ICT training in order to use them effectively in their teaching. The eight participants reported they learnt how to use the computer through the look and learn method and also by asking other teachers to show them how to use them. They all indicated that there is a lack of knowledge and skills in ICT amongst most teachers. The manner in which they acquired the basic skills in using tools like the computer and the photocopier was done on a somewhat ad hoc basis:

> I began by watching one of my colleagues working and then asked him to show me how to use it. He was kind enough; so he showed me how to open the software (Microsoft Word), how to type, how to save my documents and how to print (Troy).

> I learn how to use it by trial and error and look and learn methods. I watch others working and then tried it out for myself. Sometimes I would get it wrong at the first trial and would ask other teachers to show me how to do it right (Gordon).

Talis and Rendal from School ‘A’ however, said that their school provides some formal training for the teachers and students. When asked whether they first learned how to use the computer and the internet in they school, they said that they learned it from their friends, but when they got to their current school, the training the school provided for teachers helped them to further understand how to use ICT such as the computer and the internet in their teaching. They acknowledged the schools forward thinking and revealed that the school is planning to develop its ICT tools in the school:

> I think that the school has placed ICT as a high priority and is planning to acquire more computers in the near future. It also provides training for staff and students on how to use ICT tools and the internet (Talis).

> The school has taken the responsibility to assist teachers with their ICT skills by using the sessions in the computing clubs or classes that take place every Monday. Senior students are also allowed to join the training. The school encourages all teachers to attend these sessions. They organise trainers to assist teachers in their training and on the job kind of learning (Rendal).

Unlike School A, the majority of technology teachers in schools lack the knowledge and skills to help them properly integrate ICT into their teaching. This prevents them from fully maximising their potential as teachers. Willie, Talis, Billy and Troy indicated that they still did not feel competent in using ICT tools successfully. Also the need for organising training in schools is also not taken seriously by most schools. The basic skills and knowledge have mostly come from personal interactions of these individual participants with their colleagues. This is evident in what some of the other participants shared regarding how they feel about their own level of ICT knowledge and skills:

> At the moment we have two groups of people out there in the schools, one group is ICT literate and the other group is not (James).

> The ICT skill and knowledge level of our teachers here is very low. If I could measure it out of 10, then I would say it is 2 out of 10 because not every teacher is computer literate. The reason for a very low rating is because our teachers do not have access to any ICT tools at all (Gordon).

A Policy to Guide the Use of ICT in School

Most participants believed that when ICT is integrated into schools, there will be a crucial need to put in place controlling measures to guide teacher and student use. They believe that before any school acquires ICT tools, they must be provided with information about issues such as:

- The access, both to teachers and students
- The management of ICTs' use and long term sustainability in the schools
- The types of ICT tools that are appropriate and relevant for the schools

Table 4.2: Participants' view on the need to create a national education policy on ICT

Participants	Schools	Participants Comments
Rendal	A	**The government to create a policy guide the integration and use of ICT tools** I think that the government should create a policy and regulations to guide the use and integration of ICT tools into schools in Solomon Islands. Making sure teachers and students have access to appropriate materials and resources for educational purposes.
James	D	
Gordon	C	
Willie	B	
Clinton	D	**Policy to identify types and quality of ICT tools appropriate for schools use.** I think that before the schools receive the ICT tools, the school management should check the quality of the tools, whether they are working, brand new or reconditioned. This will help in guaranteeing the tools long term use and other management requirements.
Rendal	A	
Willie	B	
Talis	A	
Clinton	D	**A policy to guide PD programmes** There is a need for a policy that will be put in place to guide professional development (PD) for teachers and personnel who will keep and maintain the tools
Troy	C	
Billy	**B**	

Participants raise several issues as important for the policy to deal with. Rendal, James, Gordon and Willie highlighted the need for a policy to address the issue of integration and use of ICT tools in schools. They suggested that any policy must provide a guide in using ICT tools appropriately, especially for educational purposes. Clinton, Rendal, Willie and Talis focus more on the aspects of the ICT tools, suggesting the ICT policy in education must address issues regarding types, quality and ability of the tools to last a

long time. They believe that such a policy will provide guidance to schools in acquiring appropriate ICT tools and help them manage their use.

Another issue participants identified that policy must also deal with, is professional development. Clinton, Troy and Billy stressed the importance of having PD imbedded into a national education policy. They believe that a policy that addresses the issues of PD will help schools to ensure their teachers get proper ICT training. They said the policy will guide schools to develop their ICT support services either internally or arrange this through outside ICT providers.

Controlling ICT Access

The participants also see a need for control in the access schools have to the internet. Gordon said that access to the internet, if not controlled, will provide the opportunity for teachers and students to access undesirable materials and information like pornographic sites and also access resources not related to their official school work, such as movies, music and computer games. They suggested guidelines for accessing the internet should be put in place to control what users will have access to. Talis, James and Willie said:

> The school should make sure that proper level of access and interaction is put in place so that the students are properly guided in their interaction with the tools (Talis).

> This is a very critical area; I think there should be some control or guidance in how ICT is integrated into schools. This is important because ICT tools have both good and bad effects on people (James).

> We have good and bad things on the internet and students need to be guided. I believe students should be guided only to use the good things about the internet (Willie).

In explaining what they meant by the term good and bad effects, James and Willie said:

> Control and guidance is also important for teachers' and students' use. They must be guided on what they can and can not access. This is to protect them from accessing phonographic websites and other similar materials (James).

> What I refer to as the good things on the internet are things that support students' learning and the bad things are things like accessing the internet for pornographic materials or other materials that may not help their study (Willie).

Another participant suggested teachers should supervise students when they use the internet in order to control what they are accessing.

> In order to keep students from abusing access to the internet, they should have teachers or ICT specialists to supervise their access. The teachers are there to guide them in the topics they wish to research on the internet (Billy).

As a technical measure, a participant reveals that his school controls and manages the access students and even teachers have to their internet facility by barring all websites that may have sexual materials and information. He thinks that managing what students have access to, is a challenge for schools to address.

> One challenge is when students access the internet there are both good and negative information they could easily access. Our challenge is we need to manage the access we give our students. For example, here in the school, we bar all the websites that relate to any thing sexual (Rendal).

The participants also link the need for control of ICT integration to the need to 'plan' for any ICT development in the schools. Two of the participants indicated that before any commitment is made on buying ICT tools, it is important for a school to have a plan for their ICT development. They view the whole integration process as a major innovation in teaching and learning. Rendal suggested that the government should also help schools to create their ICT development plans.

Focusing on the school level, another participant raised the need for schools to devise ICT guidelines and rules. The guidelines should clearly outline all the requirements for access that teachers should follow. He claimed that such a guideline will help control the cost and the abuse of the access teachers have to ICT tools.

> I think that the school should set up some guidelines or rules for teachers to observe. For example, the school may only allocate certain times for teachers to use the computers or internet and outline what the computers can be used for and what they should not be used for. This guideline will also address the cost factor, the abuse factor and maintenance factor. All these guidelines should be clearly explained to teachers before installing the ICT tools in the school (Gordon).

4.2 Teachers' Belief about the Benefits of ICT

There are many benefits of ICT in education. When asked about what ICT would contribute to teaching and learning, participants believe that ICT has benefits for teachers and students both in teaching and learning. Therefore, this section presents the findings of two subsidiary questions of question one: (a) what are your views on how ICT tools have influenced your teaching?' (b) 'what do you believe you will achieve if you acquire sufficient knowledge and skills in using ICT tools?' From these questions, the section presents how participants perceive the benefits of ICT tools in their teaching, particularly in their planning, students' learning, curriculum and classroom management. It also presents what the participants believe will happen if they acquire ICT skills and knowledge.

Benefits of ICT

Most technology teachers stated that ICT tools had influenced their planning and as a result of their basic skills in ICT, they were now able to do their planning using the computer and save materials for future uses. As Troy and Willie said:

> ICT has influenced my work greatly because I can now use the computer to plan all my teaching programmes. All my planning is done and kept on the

> computer. I can easily access it and refer back to it for reference or for use later in the future (Troy).

> I have produced my programmes, work-plan and lesson plans using the computer. So ICT has some part to play in organizing my plans. The ability of the computer to store the files makes it possible for me to keep it all by filing it for future use. I can also store backup copies of my work in my flash drive (Willie).

The participants also said that ICT has contributed to the enhancement of their teaching through well prepared teaching materials. They also expressed their beliefs that ICT would raise the level of their teaching if they acquire more knowledge and skills in using the tools. The experience they have in using ICT for various tasks in their teaching seemed to have a positive impact on teachers' belief in the benefits ICT offers. This makes them believe that ICT can improve teaching and learning in the Solomon Islands. For example, Troy said that ICT has influenced most aspects of his teaching tasks.

> In teaching, the influence of computers is greater in the curriculum area. I use it to prepare curriculum materials, summary notes, diagrams, discussion papers and learning tasks or activities (Troy).

He further said that ICT has also helped to raise the quality of his teaching materials and lesson presentations.

> The influence of ICT has also raised the quality of my teaching materials and lesson presentation. It has raised my confidence in teaching and has enhances my teaching practices. I notice that the students' interest in the class activities increase as notes and materials are presented on well organized handouts (Troy).

This view is further supported by Willie who shared the same claim that ICT has had a strong influence on his teaching preparation. Furthermore, he highlighted that the internet has allowed him to get additional resources for the content of his lessons as described here:

> I can say that ICT has a very strong influence in my preparation of teaching and learning tasks. All my notes and teaching materials are done on the computer and photocopy machine before I deliver them to the students in handout form. The influence it has on my work is so strong. For example I can not write the exam on the chalkboard for students because it would take a long time and sometimes it may not be clearly presented. I also rely very much on the internet to find resources for the content knowledge of my courses (Willie).

Technology teachers were also aware of the benefits they could acquire if they had skills and knowledge in using ICT tools. They believe that if they have sufficient knowledge and skills in ICT, it will help them be more creative in their teaching. Two participants had this to say:

> I believe the use of tools such as PowerPoint presentation facilities will lift the level of teaching and learning and help the teacher to deliver the lesson with more clarity. Teachers can now store their work for future use and reviews (Rendal).

> I think that if we have more computers teachers will be able to produce quality teaching materials (James).

The participants also acknowledge the benefit they get from using other ICT tools such as the photocopier, the internet, email and the telephone. Gordon said:

> Some of the benefits of ICT tools that teachers can achieve are: it makes teachers' work easier, it raises the quality of teaching materials such as printed handouts, it gives the opportunity for teachers to create their data base and store their work for future use, keep records of assessments and allow teachers and students to have access to the internet for information and other relevant resources (Gordon).

Participants also make references to ICT tools helping students to understand lesson objectives and raising students' level of learning because the teaching and learning materials and resources are well organised and prepared as Talis and Troy said:

> The use of ICT has helped students to understand the lessons objectives easily because the materials and information they need to use to explore a learning task are prepared well and delivered in print and with clarity that makes their learning easier. For example teaching and learning instructions are given in handout form that the student keeps and refers to when they want to find out information of learning tasks. Students do not just rely on teachers' materials and resources but find additional information from the internet that provides a broader learning base for their tasks (Talis).

> In regards to students learning, the course outline and summary allows the students to foresee what they are required to do. Therefore when they are given well prepared materials, it raises their interest level in class participation and encourages them to read and explore what they are required to learn (Troy).

Participants from Schools 'C' (private) and 'D' (public) that do not have ICT access for students, express their belief that student learning will improve if students are given access. They also believe that by having access to ICT tools, students will have the opportunity to acquire resources that will broaden their learning opportunities. The participants believe that ICT can benefits students' learning through the access to computers, the internet and other types of ICT tools.

The participants also indicated the use of ICT tools has influenced their classroom management. They said ICT has contributed to the ease and clarity of lesson delivery, making it easy for students to follow and understand what was taught. Willie noted that:

> ICT has contributed to the management of my classes in terms of the ease of delivery and giving students easy access to information through the handout therefore, the delivery of lesson is more organised and the clarity of the instruction is easy to follow and students do not get too bored. On the

> contrary, writing the notes on the board takes more time and students do get bored easily during the process (Willie).

In relation to the influence of ICT tools on students' learning, the participants said that ICT tools have contributed to students' understanding of lesson objectives because of the manner in which the learning tasks are organised and presented. This perception needs further verification, since I did not ask participants to show evidence of students' understanding of specific lesson objectives. They also said that ICT tools have also contributed positively to the academic performance of the students. Talis and Rendal said that the academic results of their senior students after they were given access to computers and the internet was better than their previous results prior to access to computers and the internet. They indicated that ICT tools provide the opportunity for students to explore the resources prepared and handed out by the teacher and those that are available on the internet. They believe that this access has helped students increase their knowledge and understanding of what they are learning.

Barriers of ICT Tools

On the contrary, Clinton said that ICT has not played a major role in enhancing his teaching practices. The times he wants to get some of his worked typed, he gives it to the secretary to do it for him; otherwise, he still uses the traditional chalkboard presentation. The lack of ICT access in the school has denied teachers the opportunity to learn how to use ICT tools. However, he expresses his belief that if he has access to ICT tools, it will have a major influence on his teaching.

Participants also raised the concern that ICT may have a negative impact on students' learning. Those who share this concern believe that ICT have both good and bad effects. In raising their concerns, they stressed the need to provide management strategies that will help limit or confine the impact of ICT on students' learning. They identify supervision or guidance to access by teachers as a strategy for minimising these negative impacts. James made reference to what he meant by bad effect when he said:

> The bad effects are such uses as accessing pornographic materials and just using it to play games and not doing their professional and academic tasks (James).

Rendal however, focused more on students' learning where ICT has impeded learning, noting:

> Some were made more complacent by the ease of the environment in which they receive the materials (ICT), therefore are slow in completing and returning work. This may be due to the fact they think they can do it any time because they have the notes and materials with them. They do not see the urgency of doing their work quickly (Rendal).

4.3 ICT Infrastructure and Resources in the Schools

ICT infrastructure and resources include ICT tools such computers, photocopy machine, the internet, PowerPoint projector, television, video, printers and resources such as CD ROM, websites and other ICT prepared programme for teaching. This theme was prominently raised by participants in the research as one of the major constraints of the integration of ICT tools in schools in the Solomon. Therefore, this section presents technology teachers' responses on the question 'what ICT tools do you have in your school?', a subsidiary question of question one; 'How do technology teacher use ICT tools?' The section also presents the responses of question two: what are the challenges that technology teachers encounter when using ICT tools? This is necessary because there are similarities in participants' responses for these two questions. Furthermore, the section discusses the participants' perception of the state of ICT tools in schools and the responses of the research question three; 'what are technology teachers' perceptions of the role of ICT in education in Solomon Islands?' The resource, challenges and teachers' perceived roles of ICT reported in this section show that despite the constraints experienced by teachers in the integration of ICT tools in their teaching; teachers also believe that ICT has important roles to play in the enhancement of teaching and learning.

Types of ICT Tools in the Schools

The types of ICT tools in schools are limited in these schools. Though they may have computers, photocopy machines, printers, TV and video decks, digital cameras and were also connected to the internet, most schools only have one or two ICT tools of each type. Table 4.3 below shows the number of ICT tools in each of the schools. All the schools visited have computers, printers, photocopy machines, and TV and video decks. Other

ICT tools such as PowerPoint projectors, fax machines and digital cameras are not widely used by the four schools. Only three schools used the PowerPoint projectors and two schools used a fax machine and digital camera. When asked about their access to the internet, participants said that the internet is a new development in the Solomon Islands, therefore, not many schools are connected yet. As shown in Table 4.3, only two schools (private) out of the four schools visited have all the ICT tools outlined below and are also connected to the internet.

Table 4.3: The types and number of ICT tools teachers have access to in their schools.

ICT Tools	Schools				Total ICT Tools
	A	B	C	D	
Computer	17	14	2 + 1private	2	36
Photocopy machine	2	1	1	1	5
Printer	2	2	1	1	7
TV and video deck	1 set	1 set	1 set	1 set	4
Digital camera	1	1	1		4
The internet	broadband	broadband			2
Power point projector	1	1			2
Fax machine	1	1			2
Mobile phone	Personally owned/ not used for teaching and learning purpose				

As shown in Table 4.3, the participants only use the mobile phone for personal use and not for teaching purposes. Clinton said:

> I have a mobile phone, but I only use it personally, not for official duties (Rendal).

> I do not use my mobile phone for any official purpose; I only use it personally (Clinton).

Level of School Support on ICT

Schools 'A and B' are satisfactorily resourced with ICT tools. Technology teachers from the two schools said that the school managements supported the establishment of ICT tools and also provided leadership in making the adoption of ICT tools become a reality. There was also a continuous process of strengthening ICT as an innovation for supporting teaching and learning. This was evident in the support they (Schools A and B) have in meeting the operational cost of the ICT tools, such as the buying printers' toners and cartridges, making plans for the purchasing of additional computers for teacher and student use. Participants of School 'A' revealed that the school had sent a staff member to be trained in servicing and maintaining the ICT tools. The participants also said that the school organises time for teachers and students to access the limited number of computers and the internet. Talis said that:

> The school has committed itself in supporting the long term operation of ICT tools financially by continuing to purchase ICT accessories and also supporting maintenance work and its cost. I think that the school has placed ICT as a high priority and is planning to acquire more computers in the near future. It also provides training for staff and students on how to use ICT tools and the internet (Talis).

Challenges of the Insufficient Level of ICT Tools

While there seems to be a satisfactory level of ICT tools in Schools A and B, the number of each type of ICT tool may not be sufficient for technology teachers to have access at any one given time, let alone use for the other teachers. For example, a participant from one of the two schools highlighted this aspect when he said:

> I think what we have now is very basic; we should acquire more ICT tools. If the school can afford to buy more ICT tools, I would like to see them buy PowerPoint projectors for us to use to improve our lesson delivery. At the moment, we have one projector but it is not enough for all of us, only the science department has access to it, not all of us (Rendal).

Schools C and D, a private and a public school, have a markedly inadequate number of ICT tools available. The reality of the state of ICT tools in most schools in the country is

similar. Some schools, especially in the rural areas, may be worse off. The participants in these two schools show that there are serious issues arising because of lack of ICT tools. For example a participant in School 'C' (private school) stressed the need for their school to purchase more computers for the teachers because they would queue for a long period of time just to gain access to the couple of computers in their office. His comment was:

> There are not enough computers for all the teachers. Sometimes we have to wait a long time before we can access the few computers the school has. Teachers normally get frustrated about it. I think that the school should acquire more computers for the teachers (Troy).

Some schools may have one or two computers, a printer and a photocopy machine for every teacher to share. The number of ICT tools available is extremely low and teachers' access to them is very poor (see Table 4.3 above).

In School D; a public school, the ICT tools are controlled by the principal and his deputy and therefore, teachers' access is restricted. Two participants say the ICT equipment is kept in the principal's office. When asked why the computers were kept in the principal office, participants believed that the computers were acquired for the administration work of the school therefore were only used by the administration staff which includes the principal and the deputy principal. However, they said that schools should provide computers for teachers and students to use:

> We have two computers, a printer and a photocopier. These computers are with the principal and the deputy principal (Gordon).

> We have two computers and a photocopy machine, but they are used by the principal and deputy principal. I do not think we have any other ICT tools (Clinton).

Clinton also said that, because the computers are controlled by the principal, it is difficult for teachers to have access to them. The situation appears to be equivalent to no ICT access at all for teachers in this school. He argued that teachers want to learn how to use

the computer so that they can type their own teaching materials and programmes. He pointed out one issue that he said warrants the provision of access to schools. This issue is the delay in word processing of end of term exams for half of the teachers, because the secretary was on compassionate leave for a week. He said that:

> The computers are in the management's offices, so no one else can access them. In other words, the principal and deputy principal are the ones who have full access to computers, while the rest of the teachers do not (Clinton).

The claim made by the Clinton, above, is supported by Gordon who happens to be the deputy principal of the school. He said:

> The ICT skill and knowledge level of our teachers here is very low. If I could measure it out of 10, then I would say it is 2 out of 10 because not every teacher is computer literate. The reason for a very low rating is because our teachers do not have access to any ICT tools at all (Gordon).

What transpires from the case in School 'D' is that there was no arrangement made for teachers to access the two computers and a photo copy machine (see Table 4.3) at the school. However, some teachers may take the initiative to ask the principal or the deputy principal if they can use the computers. Because Gordon and Clinton also said that:

> Teachers are allowed to use this equipment if we (principal and deputy principal) are not using it (Gordon).

> Here in our school, only some teachers have access to ICT tools, especially the computer (Clinton).

Resourcing Schools with ICT Tools

The participants believe that in order to improve the state of ICT tools in the school, the government must become involved in resourcing the schools with ICT tools. Willie went on to say that if the cost is too high then the government should just provide at least a few computers for each school. Similarly, Talis said the schools must also take

responsibility in managing and organising ICT tools so that, not only do they have enough ICT tools, but they must make sure that teachers have sufficient access to them (ICT tools) as well. He explained this when he remarked:

> Another thing the school should address is the access to ICT tools by teachers. At the moment teachers in most schools do not all have computer and internet access and have to wait in queues just to access a computer. If schools can acquire some more computers then I think access issues will cease to be a problem (Talis).

He also went on to say that:

> I think that if teachers are provided with ICT tools they will be encouraged to use ICT more in their teaching and professional work (Talis).

Giving a glimmer of hope, Willie acknowledges that the government has seen the need to provide ICT tools to schools and has already distributed computers to some schools; one of the recipients is the participant's school. He said that the number of ICT tools in his school had been boosted by nine new computers donated by the government. Gordon also said that at the moment, the government is supplying computers to some schools. He thinks the government should continue to provide ICT tools to school, including schools in rural areas, as well as providing training for some teachers who will go back to their schools and train other teachers.

Other challenges the participants highlighted are the lack of training in ICT (also see section 4.4 that discusses the need for PD), the cost of supporting the use of ICT tools and the continuous power failures in Honiara. When asked whether the schools could afford the cost of supporting ICT use in the schools, participants said that only a few school could afford it, but most schools did not have the financial capacity to do so. Clinton said that power failure is one of the most distracting experiences to go through, especially if you are relying heavily on ICT tools for your work and he mentioned that the consequences were severe. It can result in loss of work, damage to ICT tools and incurs huge cost to the schools.

Teachers Perceptions of the Roles of ICT Tools

ICT has a role to play in education. Although some of these roles may not be immediately clear, the availability of ICT in schools plays a critical role in enabling effective teaching and learning to take place. When participants were asked about the role of ICT in schools, they believe that it has important roles to play in education. In their responses, participants highlighted the importance of ICT in education, the need for ICT development in schools and the role of ICT in the technology curriculum.

The Importance of ICT in Education

All participants in the research stressed that ICT has a very important role to play in the Solomon Islands education system. They stated that the need to integrate ICT into the school system is long overdue. Rendal said that:

> The role of ICT in education is very important and it should have been introduced a long time ago. It will lift the standard of education in the country. It will also raise the quality of education acquired in schools and assist teachers in becoming proactive and efficient in their work (Rendal).

Since the adoption of ICT into the schools, teachers have recognised the positive impact ICT has had on their work output. They see the role of ICT especially in its ability to enhance the administrative, teaching and learning processes. ICT in schools enhances teachers' work through planning, word processing of instructional materials and accessing of resources for teaching and curriculum innovation. One of the roles of ICT consistently discussed by the participants is its role in improving the quality of their teaching materials. Two participants said:

> ICT can be integrated into our education system. It (ICT) can raise the standard and quality of teachers' and students' work. For example, students and teachers still do technical drawing manually, but if they use drawing and designing software like AUTOCAD, the quality of the drawing will be better than drawing done manually (Rendal).

> Yes, indeed, it helps to improve teaching effectiveness in terms of teaching material preparation and presentation and also opens up or enlightens teachers' minds to see beyond their little world. What I mean here is that when the teachers come to use ICT tools it helps them to look higher than what they normally think of before they come to use the computer. The changing nature of technology will also challenge teachers to look forward to learning how to use new tools to raise their current job to another level (Gordon).

These quotes show that ICT has changed the way teachers prepare and present their lessons. Teachers are now using the computer to type their teaching materials compared to the old way of writing notes on the chalkboard for students to copy. For example most of the participants said that they now rely on using printed handouts for teaching, issuing students with learning activities and advising them about searching for resources on the internet, rather than writing all the work on the chalkboard for students to copy. Rendal also described his knowledge of the measurement of quality as he makes reference to the use of the manual drawing process in comparison to the use of the drawing software AUTO CAD. This shows the impact of ICT in raising the quality of the process and the outcome the drawing. The role of ICT in raising the quality of teachers' performance is a significance realisation towards teacher readiness to adapt to the use of ICT in their work. Teachers realise the potential ICT tools can bring to their work. They can use the video to show students stages of a construction process or use the internet to view various materials of any given task, which they can compare, discuss, make and write a report about. In reinforcing the views and beliefs shared above, Gordon went on to say:

> I believe that if we have access to these tools, it will broaden the way students learn. May be through PowerPoint presentations, students can follow the presentation easily and make good sense of what they are learning about. Or it may be through other interactive methods such as videos and the internet, students may come to learn more through these tools. I believe that these interactions will broaden the students' learning (Gordon).

Talis however, said that his school has already benefited from the integration of ICT tools:

> I can say that this school has already benefited from the roles of ICT tools. Our teachers have access to computers, a photocopier, printers and the internet to enhance their teaching and build resources and material for their classes. The students also have access to computers and the internet where they type their work, access emails and download information for their learning activities. I say that indeed, the roles of ICT in the school are very important (Talis).

The participants consistently agreed that ICT will enhance student learning through the improved teaching and learning materials and also the opportunity students will have in accessing other learning resources through the internet. By having access to ICT tools such as the computer and the internet, they will be able to conduct credible research and produce quality reports and assignments for their learning activities. This opportunity will also allow them to explore resources relating to their learning in schools and also to the wider world out there. Willie's comment was:

> I think it will really help a lot in their (students) research about topics and use it to access resources and information also related to their learning activities. Students use the internet to search for more resources related to the tasks that are given to them (Willie).

ICT Development in Schools

The way in which ICT has been integrated into schools is not a planned initiative from the government or the education authorities, for that matter. In both types of school, private and public schools, any ICT development was an undertaking planned and carried out by school managements independently of any government expectations or mandates. In some cases, donors gave items to schools such as computers or photocopy machines to improve teaching and learning activities of the schools. The outcomes of such undertakings have had mixed results. The manner in which ICT was adopted into one school was evident in a statement made by Gordon:

> This was an internal decision taken by the school before I arrived at the school last year. I believe that the school actually acquired the two computers for

> administration purposes. However, they have now been used by both teachers and the school management. With this realisation, we recently agreed to purchase some more computers for our teachers to use. Our long term plan is to acquire some more computers and connect to the internet and give access to our senior students (Gordon).

Furthermore, Gordon mentioned that:

> In the development plan of the school, we will be establishing Form six in 2010. Within this plan is the establishment of a computer lab for teachers' and students' use. We are also discussing a training programme for teachers and students so they can use the tools effectively (Gordon).

Gordon's quotes above describe the manner in which ICT is being adopted into at least one school in the Solomon Islands. On the other hand, the quotes that follow suggest some of the difficulties in the schools in terms of organising and managing ICT tools uses, access, long term maintenance and even difficulties in supporting the daily uses of the tools. They encounter issues relating to the lack of knowledge and skills in using ICT tools. This problem is similar in both private and public schools. In one school, donated computers were left in storage for more than 2 years. This is an example of the unpreparedness and the lack of leadership in schools. When being presented with ICT tools, staff did not know how to use them. For example, Clinton explained that:

> In 2007 the school was given 12 computers. Since then, all the computers have not been working and are covered with dust in the room that they are stored in and no one knows how to fix them. These computers are old and out of date; there may be no spare parts available in the market today (Clinton).

Expressing another difficulty that schools encounter with ICT development, Willie, from a private school, discusses the financial difficulties encountered, when he said that:

> Another challenge is to financially support the running cost of ICT tools in the schools. Many schools in Solomon Islands do not have the financial capacity to meet the cost of ICT accessories such as toners, cartridges, repair to ICT

> tools if they break down and other costs that may arise as a result of integrating ICT into the school (Willie).

Schools A and B show commitment in their integration of ICT tools. In doing so, they have put in place proper plans for managing the ICT development in their school. The outcome was evident in the support they (teachers) have received from the school management as Talis said:

> The school has committed itself to supporting the long term operation of ICT tools financially, by continuing to purchase ICT accessories and also supporting maintenance work and its cost. I think that the school has placed ICT as a high priority and is planning to acquire more computers in the near future. It also provides training for staff and students on how to use ICT tools and the internet. While they are keen on developing ICT in the school, they are also controlling the use of the internet by allocating certain hours of one day only to staff and student (Talis).

Willie also highlights the commitment made by schools that have set out to undertake ICT development in their schools. Even though the way in which schools go about adopting the use of ICT tools is not guided by any government policy, the support they provide shows the commitment and belief the schools have in the use and integration of ICT in their schools. The support teachers have from school leaders is strong and produces results not only in providing ICT access to teachers, but also in up-grading the infrastructure that supports the establishment of a proper and well managed ICT facility in the school. Willie said:

> I think that the school treats ICT as priority because when our computer lab was under repair, in the mean time the principal and the deputy principal allowed teachers to use the computer in their offices to access the internet and also put priority in completing the computer lab. The school is also up to date in meeting the cost of the internet access and also is prompt in buying ICT accessories, like we have just acquired a new modem to replace our old one (Willie).

Willie talks of a special situation as general experience would suggest that most principals would put more control over the access of scarce resources rather than provide open access to every teacher. However, this statement shows that far-sighted principals can make ICT integration successful if they are committed and believe in its contribution to education.

In reference to the role of ICT tools, the participants were asked the significance of ICT in education in Solomon Islands. The technology teachers all shared the view that ICT is significant for education in Solomon Islands, but they had different expectations and understandings as demonstrated in the comments below.

> I think that ICT has a role to play in the schools but there is more work needed to be done before we can achieve the uses that may be effective for the schools' work (James).

> ICT is very important for teaching and learning so I think that the government should help in developing ICT integration into schools. They should help in planning, training teachers how to use ICT tools and how the school should manage and organise its use. This will help our teachers and students to begin to learn how to use it. We are in a technological age and every one should learn how to use ICT tools, especially in schools. This applies to any other ICT tools, not only computers (Billy).

The above quotes present an acknowledgement of a positive role of ICT tools in education, but it also highlight the current inadequacy of ICT tools in schools. James said that if the role of ICT tools is to be fully realised in Solomon Islands, then more work needs to be done in order to make it happen. Billy highlighted a need for ICT development planning which would involve financing, ICT training and management for teachers and students.

Troy emphasises the importance of ICT tools in education in relation to the accomplishment of school work. He said that the use of ICT tools in preparing and producing teaching notes and instructions has now taken the place of traditional chalk

board teaching practice. He makes reference to the use of computer for preparing teaching materials when he said:

> I think ICT has a very important role in Solomon Islands education. The importance of ICT, especially computers in school work, is crucial as most of the work from preparing class notes and materials to other school programmes is done on the computer. Gone are the days when teachers have to write their work on paper and pass it on to the secretary (Troy).

On a similar note, yet thoroughly outlining outcomes, Willie said that:

> The role of ICT in Solomon Islands schools is to enhance teachers' work so that they can carry it out effectively. ICT helps them to plan their teaching and prepare their resources. It also provides a data base where all the files of the school are kept and managed. In the past, schools just kept physical files; sometimes they were not kept properly, but with the computer, files can be stored and backup copies can be made for support when it gets lost in the software (Willie).

Talis, however, presents ICT as an international phenomenon that has finally reached Solomon Islands. He said that educational and school officials must accept it and integrate it into the schools. He alluded to the notion that we are living in a computer age and believed that there was a need to integrate ICT into Solomon Islands education:

> I will say that ICT is an international phenomenon that has now reached us and its influence is something that we cannot stop. Like many new technologies that have come our way, I see its impact in our school as being very strong. This is the influence of the computer age or ICT age, therefore educators and educational policy makers have to accept its integration into schools. I think that ICT integration into the school system is taking place but slowly and not in an organized way (Talis).

The Role of ICT in the Curriculum

The participants were also asked what they thought of the role of ICT in technology education. They reported that ICT is a part of technology education and has a role to play

in the technology education curriculum. However, they associate it with different outcomes and activities. For example Talis makes reference to the hope that ICT integration will make technology students become more innovative problem solvers. Gordon on the other hand said that ICT is part of technology education and can be used as a tool for teaching and learning and also as content of technology education to be learned.

Rendal, however, relates the role of ICT tools with the change of the curriculum from industrial arts to technology. He said that:

> The shift from industrial arts to technology education is new and for most of us teachers, it is a new area that we venture into. The importance of ICT in the technology education curriculum is unquestionable. It can contribute to a wide range of work in both teaching and students' learning (Rendal).

While they all agreed that ICT tools have many roles in technology education, the majority of them also share the view that ICT is a large area and cuts across all subject areas. Therefore, they said it should be developed into a separate subject in the national curriculum which all students should take and apply to their respective subject needs. Some of them believe that if ICT is made part of technology education, the curriculum will be too big to be delivered effectively within an academic year. Their views are clearly shown in the statements of two participants who said that:

> I agree that ICT should be a separate subject from the rest of the subjects because it is a big area of its own. If it is combined with technology then it will create a very big curriculum that will not be easy to teach satisfactorily. It will create a lot of work for technology teachers (Willie).

> I think that it is a good idea. As I say earlier, ICT is a big area of itself, therefore it is appropriate to make it a separate subject in the curriculum (Billy).

James, however, was a bit more cautious and said that before ICT is made a separate subject in the national curriculum, there are issues such as the cost that must be considered. He said that:

> If we make ICT a separate subject in the national curriculum, then I think that management and cost should be considered (James).

Clinton said that ICT tools have many roles in technology education. For example the computer is used for designing, modelling and drawing; it can also be used for searching for information on the internet. ICT can contribute a lot to teaching and learning in technology education.

Participants also believe that ICT should be made part of the national curriculum. They acknowledge the absence of ICT in the curriculum document and suggest that any future curriculum review must include ICT as an innovation in the curriculum because not only is ICT new, but it is dictated by the world we are living in; a technological world. Gordon said:

> I think that if there is a review now of the national curriculum, they should include a component of ICT in it. We are living in a technological world and it is appropriate for it to be included in the national curriculum. The old curriculum was produced more than 10 years ago and the way it was designed was appropriate for that time, but now it is much more different, there are ICT tools every where you go; in the work place, schools, in churches and even in the villages. So the inclusion of an ICT component is such an important part of the national curriculum (Gordon).

Focusing more on the inclusion of ICT in the curriculum, Clinton said:

> I think that it would be good to include a statement that will allow the integration of ICT into the various subject areas. This will create space for the integration of ICT by all subjects in students' learning and also in teaching as well (Clinton).

He also identifies that the national curriculum has not made any provision for the integration of ICT into teaching and learning.

> The trend of buying and equipping schools with ICT tools is something that is done without any policy to guide its development and the curriculum does not even provide directive for its inclusion into schools' teaching and learning processes (Clinton).

4.4 The Need for Professional Development in ICT

A well designed professional development programme in ICT can help teachers acquire ICT skills and adapt them into their teaching. Some professional development programmes also allow teachers to learn about ICT tools while they are still working. In this way teachers can develop their skills directly on the job. In reference to this research, participants believe that the most effective way to help teachers in Solomon Islands to acquire ICT knowledge and skills is through PD programmes. Therefore, this section presents the findings of the question 'What do you think the school or government should do to help teachers like you learn ICT skills and knowledge? A subsidiary question of question two is: what are the challenges that technology teachers encounter when using ICT tools? In their responses, the participants expect the government, schools and education authorities to organise professional development for teachers. They believe that professional development will help teachers acquire the knowledge and skills needed to integrate ICT tools into their teaching. They identify the following areas as reasons for this:

- The lack of knowledge and skills in using it for teaching and learning.
- The changing nature of technology in the world today.
- The buying of ICT tools by schools without any prior training for teachers.
- For accessing information for teaching and students' learning.

The Lack of ICT Knowledge and Skills

The participants said there is a need for professional development (PD) in schools because most teachers lack sufficient knowledge and skills in using ICT tools. They suggested the need for PD because schools are continuously acquiring ICT tools. Willie said:

> I think that all teachers both primary and secondary should undergo ICT training before they go to schools to teach. Because if they do not, they will struggle when they start teaching as schools are buying and using ICT tools in the schools now (Willie).

Table 4.4: Participants views on the need for professional development

Participants	Schools	Participants Comments on the need for a PD
Billy	B	**Government to organise PD for Knowledge and skills training** The government should organise a professional development programme for teachers, learning the technical skills and knowledge required for using these tools for teaching.
James	C	
Clinton	D	
Willie	B	**Lack of ICT training at the SOE** Lack of training at the School of Education (SOE), where most teachers were trained, contributed to teachers' incompetence in using ICT tools for teaching.
Rendal	A	
Billy	B	
Clinton	D	**The need for national ICT educational policy** The government should create a national education policy in ICT that will guide the integration and use of ICT in Solomon Islands schools.
Rendal	A	
Billy	B	
Talis	A	**PD for specialised tasks** Yes, the lack of ICT training is a challenge, especially when it comes to the need for using ICT for special tasks such as assessment standardization, PowerPoint presentations and subject specific skills such as designing in technology.
Gordon	D	

The lack of knowledge and skills contributes to various difficulties experienced by teachers in the process of adapting the use of ICT tools in their teaching. Participants also associate the difficulties teachers encounter in their attempts to incorporate ICT tools in their teaching, with the lack of PD. Table 4.4 show the views of participants regarding the effect of the lack of PD for teachers. They said that the government should provide ICT training as part of the integration of ICT in schools. Willie, Rendal and Billy also associate the lack of ICT training in the Solomon Islands College of Higher Education's (SICHE) School of Education (SOE) (which educates the majority of teachers in the country) with the need for professional development for teachers. They suggested that ICT should be included as part of the teachers' training programme at the School of

Education (SOE). Clinton, Rendal and Billy also highlighted the need for a national education policy that will guide the integration of ICT tools into schools. They stated that the policy will include important areas such as professional development programmes and ICT management in the schools and provide the basis for conducting professional development programmes. Furthermore, Talis and Gordon said that teachers need PD in specialised tasks (see Table 4.4) to assist them in their teaching. PD in specialised areas should address common tasks such as using assessment standardisation software and subject specific knowledge and skills such as design software in technology education.

On another note, Gordon identifies the education authorities as the body that should be responsible for organising professional development for teachers. He said that:

> All schools are under various education authorities, therefore, the authorities are responsible for organising training for teachers in all their professional development. They (education authorities) must be given power to conduct such training by the Ministry of Education (Gordon).

Troy, however, suggested that it is the schools that should organise PD programmes for teachers. He said that:

> I think that the school should organize some workshop or training in ICT for teachers. Some of the teachers in the school have ICT skills and knowledge. The school can use them to be resource persons in any internal ICT training programme. This will really help those of us who do not have ICT skills and knowledge. Another option is to use ICT specialists to conduct training for teachers and students in the school. This will depend on money but it is a good thing to do (Troy).

The Changing Nature of Technology

Rendal and Clinton said there is a need for professional development (PD) because technology is continuously changing and teachers need to be made aware of the changes that are taking place. They said that teachers need to update themselves with changes in ICT in order to understand how to use it well and provide better guidance to their

students. The participants are also concerned about the way in which the ICT is easily accessed outside of the schools. They said that many students have access to ICT tools outside of schools and if the schools do not provide ICT access for them. Student will not be properly guided when they use ICT such as the internet for their learning:

> I think that professional development for teachers is very important. There are a lot of things about ICT that we still do not know about. Another important reason for a continuous professional development programme is the fact that ICT tools continue to change almost every day. A good example is the continuous updating and development of major software such as Microsoft Windows' software (Rendal).

> This is a very real thing that we should think about. We are a bit behind in technology development or awareness. But I think that we should try and catch up with the technologies that matter to us such as computers, the internet and other educational ICT resources (Clinton).

The next chapter discusses the findings presented in this chapter and the implications ICT integration has on technology teachers in the Solomon Islands schools.

CHAPTER FIVE

DISCUSSIONS OF FINDINGS

5.0 Introduction

The aims of this research are to investigate technology teachers' perceptions and beliefs of the use of ICT tools in their teaching and learning process; secondly, to investigate the realities of ICT tools in Solomon Islands schools, and thirdly, identify the challenges technology teachers encounter when using ICT tools in their teaching.

The focus of this study was directed and guided by these three research questions:

1. How do technology teachers use ICT tools?
2. What are the challenges that technology teachers encounter when using ICT tools?
3. What are technology teachers' perceptions of the role of ICT tools in education in the Solomon Islands?

This chapter is divided into six sections:

Section 5.1 teachers' perceptions of the access and use of ICT in schools
Section 5.2 teachers' beliefs about the benefits of ICT
Section 5.3 teachers' perceptions of ICT infrastructure and resources in schools
Section 5.4 teachers' perception of the need for professional development
Section 5.5 summary

5.1 Teachers' Perceptions of the Access and Use of ICT in Schools

This section discusses teachers' perceptions of the access and use of ICT tools in schools. The discussions are presented under the following headings

- Teachers' access of ICT tools
- Teachers' use of ICT tools
- Teachers' perception of the levels of ICT knowledge and skills.

Teachers' Access to ICT tools

The types of ICT tools technology teachers have access to in this study are very limited. Most of them reported only having access to the computer, printers, photocopier, mobile (personal) and the internet. The computer is the ICT tool most of the participants have

access to and is used by six participants (see Table 4.3 in Chapter 4). The other ICT tools are the printer used by another six participants. This is due to the fact that a printer is mostly connected to the computer, therefore, teachers are bound to have access to it if they use the computer to print their work when they are carrying out word processing or downloading of resources from the internet. The photocopier was accessed by four participants. The internet was only accessed by four participants. This indicates that schools in the Solomon Islands have not yet all connected to the internet. The photocopier was only accessed by four participants. Despite the fact that it was one of the first ICT tools introduced into schools, participants did not seemed to have more access to it. The reason for this may be due to the fact that access was designated to a select few especially the secretary and the principal. Troy has only used the computer and the printer, while Clinton did not have any ICT experience with ICT tools except for a mobile phone that he uses for personal purposes.

Teachers' level of ICT access is influenced by the availability of ICT tools in the schools and how the schools organise the access. Many teachers did not have access and lack the knowledge and the skills to use ICT tools because there are very limited numbers of ICT in the schools. Those who do have knowledge and skills may either be restricted by schools access arrangements or may have only limited access due to the insufficient supply of ICT tools in their schools.

It is evident in the findings that access to ICT tools in the schools is major a problem. There are a couple of issues that affect teachers' access as the findings show. Participants said that the inadequate number of ICT tools and the lack of proper arrangements put in place contribute to teachers' lack of access to ICT tools. The first issue is undoubtedly the reason contributing to a large number of teachers not having access to ICT tools. While the four schools visited have basic ICT tools like computers, photocopier and printers, the number of these ICT tools is limited therefore not all teachers have easy access to them. In such situations priority for using and accessing ICT tools would normally go to administrative staff. This is the case in School D. Teachers are supposed to be assisted through the secretary. When viewed in relation to giving everyone a fair chance to get their work done, one would say that it is a good administrative decision. But when seen in relation to the need for teachers to exploit ICT tools for preparing teaching and learning materials, then such an arrangement is not helping teachers to

accomplish their work or develop their skills in using ICT tools. This argument is consistent with Almaghlouth (2008), BECTA (2004) and Earl (2002) who found that the lack of adequate ICT tools and access to them had prevented teachers from developing their skills.

The second issue emerging from the finding is the non existence of an organised time or arrangement for teachers to use ICT tools in three of the schools visited. In this situation, teachers did not have clear direction on any integration process at all. Their chance of using ICT tools seems to depend on the demand for the particular ICT tool on that day. The access that teachers should enjoy is not guaranteed and it challenges teachers' desires to embrace ICT in their teaching (Guba, 2003). What is also evident in the findings is that teachers who have a strong desire to learn and use ICT tools have had to endure such a restrictive environment just to have a chance to use ICT tools by either negotiating access with their colleagues or just being patient until the ICT tools are available for them to use. This is clearly seen in Troy's experience when he said that he had to wait until everyone left for home in the afternoons before he uses the computer. ICT resources must be set up with programmes that will allow ease of access for teachers, ICT training, and ICT leadership in both use and development (BECTA, 2007).

Talis and Rendal, both from School A said that their school had an arrangement where they could use the computer lab and the internet once a week. They acknowledged that such limited access is necessary because of the cost of the internet. However, they also pointed out the restrictive nature of such arrangement to teachers and said that teachers would normally get frustrated by the limited access they have. The situation was made more difficult by giving access to senior students at the same time. Most of the teachers were reluctant to use the opportunity and they would normally allow their students to take the opportunity than themselves. This reluctant attitude came about because teacher lose hope of having access to ICT tools free from student disturbance. Teachers need a space of their own where they can work freely and easily interact with their fellow teachers (education.au, 2008). The scenario described in School A where teachers and students share the computer lab and the internet can create fear in teachers that they may be seen by students as not being competent enough in using ICT tools. Most times teachers resort to the ad-hoc process described in the first issue where they queue up for the few computers they have in the staff room (education.au, 2008).

While Schools A and B reported leadership commitment from the school principals to ICT integration, these principals could do more in their capacity as leaders of the schools to provide a satisfactory access strategy to the limited ICT resources they have. For example School B receives about nine new computers, but no one was creative and energetic enough to open the boxes and get some body who knows how to install them to set them up for teachers to use. Similarly, School A's one day access could easily be separated for teachers and students rather than allocating only 3 hours to both groups to share the fourteen computers in the computer lab. Or the school could easily allocate two separate days; one for teachers and one for students to have access to the facility. Such constraints will not create the opportunities described by Cowie et al., (2008) and Ham, (2008) who said that sufficient teachers access to ICT tools in the schools increases their confidence, understanding and skills of using ICT tools.

Schools C and D were far removed from any form of a satisfactory leadership in terms of access for teachers and students with the limited ICT tools. Coupled with a very minimal number of ICT tools, there seemed to be no initiatives put in place to give teachers the access they need to the few computers, the photocopy machine and the printers they have. What transpires from the principal's action was the easy option of channeling everyone's work through the secretary rather than organising an arrangement that could give teachers the opportunity to have access to ICT tools. James described the lack of leadership in initiating an arrangement for accessing the two computers, a photocopy machine and a printer they have. He made a comparison with a school he visited some time earlier in Isabel province. The school there organised an access plan so that both teachers and students had a satisfactory level of access to their six computers. Similarly, Clinton also described the inability of School D's leadership to organise the twelve computers donated to them for teachers' use. A forward thinking leader in the school would have organised a technician to check the computers and set them up for use.

This lack of leadership in integrating ICT tools in schools in the Solomon Islands is consistent with Balanskat et al. (2006), Earl (2002) and Healy (2003) who said that teachers are inhibited in developing ICT skills and knowledge because of factors such as unclear expectations and unclear roles and responsibilities in the integration of ICT tools in the schools. For a school to satisfactorily integrate ICT tools, it would require a

forward thinking leader(s) to provide leadership in setting clear expectations, roles and responsibilities for ICT development.

Teachers Use of ICT Tools

The research shows that technology teachers use ICT tools more for administrative tasks. Teacher use ICT tools to plan, prepare and word process curriculum materials, learning tasks and assessment instruments. These are the frontline tasks teachers normally carry out in their teaching preparation. When ICT tools are made available and teachers begins to learn the basic skills, the first and more likely tasks teachers will use them for is administrative work. In the findings, technology teachers highlighted administration work more prominently. This is consistent with BECTA (2007; 2008b) who said that teachers' views and practice have helped shape school planning that is in teaching, learning and curriculum delivery. The software most are a familiar with is Microsoft Word. According to Smeets and Mooij (2001), teachers use word processing more for their programmes, teaching materials, lesson instructions and learning tasks and activities. Other literature also suggests that the influence of ICT tools amongst teachers is limited by their competency level. The lack of competency influences how teachers use and interact with ICT tools (Ham, 2008; Spector & Anderson, 2000).

It is clear from the research, teachers in this study did not fully understand the difference between the effect of ICT tools in the enhancement and transforming of teaching practices. They use the two terms interchangeably. In their discussion they refer to the ease of work they experience in preparing, producing, and delivering of curriculum content topics as the change to their teaching practices. This is a change, but only in the enhancement of their existing pedagogical practices. The level of interaction they have with ICT tools enhances their teacher centered and content driven practices such as teachers taking charge of the entire classroom session. The functions of the computer and the internet allow teachers to produce more teaching handouts, give more content activities and allow the teacher to present the lesson from the word processed notes produced with ICT tools to his students. The extent to which students participate in the learning process is very much determined by what the teachers know, hence, making the use and integration of ICT tools just another tool for teaching. There is yet to be an understanding and practices of ICT use in teaching that encourages a more constructive and independent learning amongst students. This scenario is unfortunately not up to the

level described by Cowie et al. (2008) and Ham (2008) who found that if teachers are given sufficient access to ICT tools, they will be able to explore ways of harnessing and enhancing their teaching pedagogies.

Another measure of the influence or effect of ICT tools integration consistently expressed by the participants is the issues of quality of teaching. They believe that the basic knowledge and skills they have in ICT tools had raised the quality of their teaching. This belief emerges from what teachers were able to achieve in the accomplishment of teaching and curriculum tasks when using ICT tools. It ranges from the use of the computer to type notes for class activities to the various resources they were able to gather from the internet. The comparison was made on activities such as using the chalkboard to present written instruction compared to using printed handouts; and also using limited text resources compared to open access through the internet to supplement the class organised resources such as text books. The measure of quality teaching in this context was seen in terms of the clarity, variety and interactive nature of the materials they present; whether curriculum, teaching or class instruction materials.

The use of the internet has been a big step for teachers in Solomon Islands. As the participants highlighted, the internet has been embraced by the few who have used it to access the much needed resources, especially in gathering related written content topics of curriculum documents. It is indeed a booster at a time when curriculum related materials are scarce in the school libraries and other educational facilities. With regards to the four participants who frequently use the internet, they said that it has helped them to find resources that provide a deeper understanding of the curriculum and to provide better resources for students learning. None of the teachers, however, has used the internet for any organised student learning sessions.

Teachers' Level of ICT Knowledge and Skill.

While the study did not expect to find a high level of ICT knowledge and skills amongst teachers since ICT is a new development in schools in Solomon Islands, what was expected was to see a scenario where teachers are supported and beginning to develop their skills in using ICT tools in their teaching. What transpired was a mixed result where commitment made and measures taken were approached in a very ad hoc manner in supporting teachers in developing their ICT knowledge and skills. The teachers' level of

ICT knowledge and skills in the four schools visited was very low. As discussed above, one of the reasons for such a prevalent lack of ICT knowledge and skills is largely due to the lack of sufficient ICT tools in the schools. This problem was confirmed by the overwhelming agreement expressed by these technology teachers about the way in which they acquire their basic knowledge and skills in ICT tools through the look and learn approach. Teachers, whether technology or others will definitely be lacking in sufficient knowledge and skills to help them effectively integrate ICT tools in their teaching in Solomon Islands.

While there was general consensus amongst participants on the low level of ICT knowledge and skills in all the schools, School A had taken some measures in trying to address teachers low level of ICT knowledge and skills through internal ICT training and the hiring of ICT personnel to help develop the teachers' skills in ICT. Participants from School B also reported that their school would organise computer and internet training for their teachers as soon as the computer lab is completed.

There is a link in the level of ICT knowledge and skills of teachers and the availability of ICT tools in the schools (education.au, 2008). Teachers who are not provided with the opportunity to either use or have access to ICT tools in their schools are more likely to be lacking in ICT knowledge and skill (Pernia, 2008). The basic knowledge and skills the teachers have comes from their own personal interaction with each other. Proper coordination of ICT integration in the schools could bring about positive ICT knowledge and skills development for teachers.

Leeming (2003) said that teachers in Solomon Islands are not provided with training in ICT tools which is consistent with what the participants said in relation to their teacher training at the Solomon Islands College of Higher Education (SICHE)'s School of Education (SOE). In this situation teachers will certainly struggle to adapt to the use of ICT tools in teaching when schools decide to integrate ICT tools. Most of the teachers trained in SICHE's School of Education (SOE) will be using a computer for the first time if they go to teach in a school with ICT tools.

The Need for Control and Guidance in the use of ICT

Effective ICT integration requires an effective method for using and managing ICT tools in schools. More often, ICT guides or control deals with the infrastructure aspects of ICT tools such as the hardware and software. However, schools also need to focus on the way they use and manage ICT tools. This includes enabling teaching and learning, supporting and guiding information management and supporting and guiding students' ICT interaction

All participants involved in the research believed that before any schools begin to integrate ICT, they need to put in place a framework or plan that will guide the use of ICT in schools. For example, School A has taken steps to support its ICT programme. Their system gives both teachers and students some access to ICT tools and provides guidance on what is to be accessed on their computers and the internet. Their concern was based on the need to control ICT in regards of the following issues:

- Control as a students' issue
- Control as a teachers' issue
- Control as a schools' issue

Students' Issue

The need to protect students from accessing pornographic materials was seen by teachers as very important in the integration of ICT in school. They believe that if there is no control or guide put in place, students may abuse the access they have to the internet. This issue is important to consider because ICT integration in schools should provide the appropriate kind of learning where students learn about their subject related contents. For example, in School A, teacher and student access to the internet was controlled by their system administrator. Rendal revealed that they bar websites that may have pornographic materials on. Filtering out pornographic materials from school internet access or the web is a necessity of ICT integration into schools. An internet safety policy must include technology protection measures to block or filter internet access to all kind of images that are obscene, promote pornography, and are harmful to minors. Filtering school ICT access is also necessary because of the increase in internet crime amongst young people (Grace & Kenny, 2003). Being a highly culturally sensitive society where sexual issues are still a taboo, pornographic material is the last thing parents would expect their

children to be exposed to, especially in a school. Such a measure is necessary for the protection of students. Schools could achieve an ideal ICT setup through a consultation process that should involve ICT specialists, designers, builders, parents, teachers and educational policy makers.

Teachers' issue

Controlling ICT access should be considered so that educational information related to sexual issues that are important for students to learn, are not filtered. This relates to subjects in the Solomon Islands curriculum that teaches sexual health, human reproductive systems, maternal health and others. In this situation, access must be supported with written guidelines and teachers' supervision so that students are guided in exploring resources related to these areas of learning with ease. Control over what teachers can access from the web must not carry the same restrictions put on students. This is in respect of their professionalism and also in support of their status as teachers, in providing guidance to students.

Teachers' access should not compromise security to the ICT tools. Since the tools are expensive, it is very important that they are kept in a secure room. The location of ICT tools should be based on the teaching and learning needs of teachers (Bialobrzeska & Cohen, 2005). Some schools may be capable of providing more ICT tools for their teachers and students. All the schools involved in the research indicated that they have a plan to acquire more computers for their schools. This is evident in the developments in Schools A and B. The principals of both schools made commitments to increase the number of computers for both teachers and students. School A had already built a proper computer lab that is used by both teachers and students. However, the control they put in place was based on cost factor. Teachers have only one access a week to the lab. This arrangement may be too restrictive for teachers. While School B's computer lab was under construction when this research was conducted, teachers have unlimited access to the few computers they have. The only issue for them is to provide enough computers for their teachers. This development has implications for the degree of access teachers have to ICT tools and the level of control put in place by the school's ICT administrator. Hence, in these schools, there are two approaches to control teachers' use of ICT tool - one more defined and restrictive, and the other was more open and depending on trust.

Neither school, however, could provide access to all their teachers at one given time because there were not enough computers in their schools.

School issue

Deciding where to put the computers once they are purchased requires planning. Bialobrzeska and Cohen (2005) said that "whether a school has one computer or one hundred, the question of where to put it or them is equally important. Computers need to be installed in places where they are accessible to the people who can benefit from using them" (p. 84). The case in Solomon Islands schools is one that needs some form of centralising the location of ICT tools for teachers' access. This is because there are not enough ICT tools like computers for everyone. A central location where teachers can easily have access is the staffroom. The arrangement in three of the schools visited shows that computers and printers are located in the staffroom where teachers take turns to use them. The photocopy machine however, was located in the secretary's room which in some cases may restrict teachers' access, especially when teachers work late at night. A central location in the school will also provide easy access to all teachers. It will provide a place where they can work and interact easily and share their skills and knowledge and also learn from each other (Earl, 2002).

5.2 Teachers' Beliefs about the Benefits of ICT Tools

Teachers believe that the benefit of integrating and using ICT tools in schools is huge. Rendal said that the PowerPoint presentations have enabled him to deliver clear and easy to follow lessons. Technology teachers said that the benefit of ICT tools in teaching is that it makes their work easier and more efficient. The term easier does not refer to the lessening of work done by the teachers as a result of the use of ICT tools; rather, it reflects the more organised and systemic way in which teachers conduct their job. For example teachers use the computer to prepare their curriculum notes and create files to store them, and he / she can print the document when they want to use it, or make changes to it. Efficient work on the other hand is when teachers become at ease with their work, being able to access ICT tools when they want, producing meaningful and clear teaching materials and are able to deliver or facilitate lesson instructions for their students. ICT can be beneficial to teachers in the development of their teaching tasks, curriculum work, instruction presentations and resourcing of students' learning (Leeming, 2003; Watson, 2001).

Furthermore, technology teachers also believe that the integration of ICT tools has helped students understand the curriculum related materials given to them as printed learning materials presented with teaching outlines. This could be presented in handout form or through PowerPoint presentations. The participants said that the clarity of the materials raises students' interest level in the subject area. Billy and Gordon from Schools B and C believes that student learning could be broadened by giving them the opportunity to interact with ICT tools. They said that the use of interactive ICT tools like video and modeling of learning task with computer and the internet has positive consequences for students learning. This is consistent with BECTA (2008b), Bonk (2009) and Gura and Percy (2005) who said that the technologically connected environments we live in enable learners to consult and enquire about meanings of what they are learning and use them to verify and construct knowledge.

Participants of School A believe that the integration of ICT tools in their school boosted senior students' academic performance in 2008, when the majority of them achieved higher passes in their external examination results. While there may be other factors contributing to the results, one which was not there previously, was ICT tools access to both the teachers and students. Teacher and student access to the computer lab and the internet widens learning opportunities through the different resources they acquire to support the prescribed learning materials and activities of the curriculum. With regards to students work, they were able to produce quality school based assessment activities using the computer and the internet where they could access related resources that support the required learning areas.

5.3 Teachers Perceptions of ICT Infrastructure and Resources in Schools

This section discusses technology teachers' perceptions of the challenges of the integration of ICT tools in the schools. It also discusses the challenges encountered by teachers in their interaction with ICT tools and their beliefs on the roles of ICT in teaching in Solomon Islands.

The Challenges of the Insufficient Level of ICT Tools

None of the schools visited have enough ICT tools for their teachers to use at one time. Many teachers share the few computers that are available in the schools. Such scenarios cause frustration and loss of confidence for teachers. There are very few teachers who can use ICT tools in schools. However, others are beginning to gain interest in learning about how to use them and such an environment does not encourage teachers to pursue this. The lack of ICT tools in schools is a big problem one that schools, the government and other stakeholders should work together to alleviate. The challenges cannot be solved within a short period of time. They need a concerted effort, planning and costly commitment. The current status of many school budgets is inadequate to meet the cost of purchasing sufficient ICT tools for teachers. The government, schools and stakeholders need to devise ways to support schools in their effort to integrate ICT tools.

The lack of sufficient ICT tools in the schools also restricts teachers in learning how to use ICT tool through the look and learn process. The challenge limits the opportunity for teachers who are learning how to use the tools to practice the skills they learnt. Because of the demand for the few available ICT tools, many teachers would not have enough time to spend on the ICT tools. Even teachers wishing to do their work on the computer would have to wait for the opportunity which can take along time. The effect of the lack of ICT tools in schools can lead to ineffective teaching and learning.

School D's case is one that totally alienates teachers from accessing ICT tools. Although the school has two computers, they are only used by the principal and the deputy principal. As Clinton indicated, teachers did not have access to the computer, photocopier and printer. They either give their work to the secretary or just resort to the good old chalkboard and textbook approach. There may be reasons for not providing ICT access to teachers, but in today's context, those reasons have to be better than the need to empower teachers to use ICT tools to bring about effective teaching and learning to students.

The Challenge of Resourcing Schools with ICT tools

It is clear that most schools in Solomon Islands do not have the resources to enable them to acquire enough ICT tools for their schools. The few principals who started ICT integration in the country only represent a small group of like minded school leaders. The majority of school leaders in the country are already overwhelmed with routine commitments such that they could not engage with additional commitments like ICT integration. The challenge is a big task for many schools to address alone. This is consistent with Pernia's (2008) reports highlighting the struggle most developing countries face when they integrate ICT tools in education. Schools can easily appreciate the potential ICT tools offer, but they do not have the capacity to support the provision of ICT tools because of severe social and economic constraints. Schools may continue to buy ICT tools depending on their affordability. How effectively they integrate it into their schools will be a challenge for a while longer until support is given in resourcing schools with enough ICT tools.

The technology teachers suggest that the government should provide ICT tools for schools. They said that since the government started providing computers to some schools, they should extend it to other schools through a national ICT strategy. The national ICT strategy should not loosely allocate ICT tools to schools, but should be coordinated by the government through the Ministry of Education and Human Resource Development (MEHRD) to monitor how ICT is being used and managed by schools. Particular focus should be placed on how it affects teachers' work and students' learning. This approach should be organised in a similar manner as the ICTPD initiative of the New Zealand government that funded laptops for nearly half of the primary and secondary school teachers for three years. This project provided laptop computers to schools and supported teachers, through various research, by monitoring how the laptops were used and how they have contributed to the work of the teachers throughout the three years duration of the project (Okey, 2006). Other challenges expressed by technology teachers are: lack of training in the use of ICT tools (see section 5.4 discussion on PD), the high cost of supporting continuous use and access to ICT tools, and the issue of an inconsistent power supply.

Finally, the issue of an inconsistent power supply is a challenge affecting all sectors of Solomon Islands society. In relation to ICT integration in the schools, it has two drawbacks. The first is the continual power failures in all urban centres in Solomon Islands. The worst is in Honiara, the capital city. This challenge is serious because it causes damage to ICT tools and incurs additional costs for schools. Power failure also affects the school's use of ICT tools. There may be disruption to classes, preparation of lessons and other administration requirements of schools. It is an ongoing problem in Solomon Islands and responsible authorities still cannot find a solution. In the meantime schools in the urban areas will still be affected by this until a tangible solution is found.

The second part of the challenge is how to support schools in the rural areas to get consistent power supply for their ICT tools. In the People First Network (PFNET) project and the Distance Learning Centre (DLC) project where computers and the internet were supplied to some rural schools, solar power was supplied to power the computer and internet service there (Chand, et al., 2005; Leeming, 2003; UNESCO 2004). Because the two projects are donor funded, their long term success will be measured by the abilities of the schools to sustain the cost and maintenance of the facilities. If schools have the capacity to set up their own power supply, they can either buy a standby generator to use in the event of power failure or they could switch to a renewable power source like solar power which is now common in many rural communities in the Solomon Islands.

Teachers' Perceptions of the Roles of ICT in Schools

Despite the challenges discussed above, teachers believe that ICT has a critical role to play in teaching and learning.

Teachers' Perceptions of the Importance of ICT in Education

All the technology teachers involved in the research acknowledged that ICT tools have a very important role to play in Solomon Islands education. Although most teachers use ICT tools in administrative tasks such as word processing and photocopying of teaching materials, they also believe that ICT has a role to play in effective teaching pedagogy. The roles of ICT tools will be able to improve the standard of education in the country in terms of raising the quality of teaching and learning. They said that if teachers become knowledgeable and skillful in using ICT tools, they will become active and efficient in carrying out their work. The basic experience they have helps them to prepare teaching

materials, teaching plans, learning activities, emailing, accessing resources on the internet and delivering them to their classes.

This finding is consistent with earlier literature. For example education.au (2008) stated that ICT tools can be used for "research, finding learning resources, professional development, interacting with colleagues, teaching and communicating with students and administration" (p. 7). Many studies of the impact of ICT tools on teaching and learning have concluded that ICT tools have important roles to play in schools at all levels, early childhood, primary, secondary and tertiary (Bialobrzeska & Cohen, 2005; Grabe & Grabe, 2004; Norton & Wiburg, 2003).

One of the roles of ICT tools consistently discussed by the participants is its role in improving the quality of their instructional materials. In their terms (participants), the quality of instructional materials was achieved through the word processing of instructional materials such as teaching notes and handouts. The quality of teachers and students work can also be enhanced through the use of ICT tools, both hardware and software, in executing activities such as drawing using AUTO CAD, either administratively or pedagogically. The participants who had used ICT claimed there was a marked improvement in the delivery, clarity of instruction to the students and eagerness shown by both teachers and students in their work and learning. What transpires here is a link between the role of ICT tools and the enhancement of current teaching practices. A study sanctioned by Ministry of Education in 2008 in New Zealand reveals teachers can enhance or even transform their teaching practices if they have sufficient ICT access and are guided in how it can be used to achieve such outcomes.

The participants believe that ICT tools make their work easier. Their perception of their improvement in teaching is basically the change from using the chalkboard and the text book to using ICT tools. This change has not altered the teachers' style of teaching. The potential of ICT to transform their teacher centered practices to students centered practices is slowly being realised. Gordon and Rendal said that when students are given sufficient access to ICT tools, they will collaborate and learn more independently. This is consistent with the report by Cowie et al. (2008) who said teachers can use ICT tools in many ways to enhance their teaching practices or even transform their teaching styles and beliefs into new and innovative ways of teaching.

All participants believe that ICT tools provide a broader learning opportunity for students. This perception from teachers was supported with by talking about the vast possibilities created by the internet and other ICT tools such as videos, DVD's and students using the computer to prepare their assignments and reports. The internet allows students to search for additional information for their learning tasks and do research for assignments and school projects. The opportunity the internet provides for students and teachers was seen as huge and allows students to explore the vast body of knowledge that is available in the world out there. Rendal and Talis from School A also said that the access students have to the computers and the internet has expanded their knowledge of the subjects they take in school. They claim that their students' excellent academic result in 2008 was a result of the access they have to computers and the internet.

Teachers Perception of ICT Development in Schools

The integration and adoption of ICT tools in schools in the Solomon Islands is an initiative undertaken by far-sighted school leaders (Leeming, 2003; UNESCO, 2004). It was driven by the impact of technological development that has swept the world in the 20th and 21st centuries. The effect of the approach is experienced in two ways. One is that schools may have prepared well for ICT adoption therefore the challenge it brings were managed appropriately and the schools are making gains in the process. The second effect is that schools may not be well prepared and may encounter difficulties in ICT use, access and long term sustainability. Schools in the Solomon Islands acquire ICT tools through donation from aid donors; either through bilateral donors or non government organisations (NGO) or church groups from overseas. Though the intention behind such gifts was genuine and intended for enhancing the schools' work efficiency, the schools state of readiness was often not considered. A good example is the case in School D. This school received twelve computers but teachers lacked the knowledge and skill to use them; the computers were stored away unused. USP (2005) and Leeming (2003) also reported that a few schools in Honiara received donated computers from a number of sources. The findings discussed above were similar to the case in South Africa where schools of all levels encountered a shortage of skills to properly use ICT tools (Bialobrzeska & Cohen, 2005).

Despite the challenges teachers encounter, the participants believe that the time is right for schools in the Solomon Islands to integrate ICT tools in their teaching and learning. The participants recognized that the schools, government and education authorities need to harness the integration of ICT tools so that it delivers the potential improvement to teaching. There was evidence in Schools A and B that the development of ICT tools in schools could also be adopted successfully by the schools themselves if they have a well thought out plan that considers all the issues that may arise in the integration of ICT tools. Schools A and B were able to organise training for staff, put in place control measures for the use of ICT tools and support its ongoing budgeting requirements.

It can be said that both the private and public schools share a similar pattern in their ICT development. Although, the two private schools visited seemed to embrace ICT tools better than the other two, they may be two exceptional cases in comparison to most schools with a similar struggle to sustain their operational and budgetary constraints. Adopting ICT tools is a big step in most of the schools and all schools will require support to be able to achieve full ICT tool integration. The success of ICT integration in the two private schools (Schools A and B) happened because their principals took the necessary steps to integrate ICT tools into their schools. This is not to say that they did not encounter difficulties in their integration of ICT tools, rather, the principal had the will to address the challenges when they arose. The development of ICT in schools in the Solomon Islands has occurred on an ad-hoc basis and relies on the commitment of school principals.

Another aspect of ICT development in schools also noted by participants is the need for infrastructure development in the schools. Because most buildings in the schools are not designed to accommodate ICT tools, they pose a risk of the possibility of such tools being stolen or damaged. The cost of renovating rooms, or in some cases buildings – or building totally new premises to accommodate ICT, would be huge. Furthermore, the installation of electrical facilities such as switches, UPS (uninterruptible power supply), power surge fixtures, wiring and air conditioning is undoubtedly one of the major costs schools will incur in the integration of ICT tools. Though power failure was discussed earlier in this section under challenges faced by teachers, it is also important to mention here that most break downs with ICT tools in schools and other sectors in Honiara and

Solomon Islands as a whole, are due to power failure. The schools have no choice but to meet the cost of fixing ICT tools damaged by continual power failures.

Teachers Perception of the Role of ICT in the Curriculum

Technology teachers said that even though ICT is part of technology education, it is a very big subject in itself, therefore it should be considered as a separate subject in the national curriculum. They also believe that ICT has roles common to all subjects such as enhancing teaching and learning and encouraging students to become problem solvers and critical thinkers (BECTA, 2008b; Grabe & Grabe, 2004; UNESCO, 2002). This, they say, is possible because ICT tools provide a wide range of opportunities to make students think more. By exploiting the interactive nature of ICT tools, students will be able explore ways in which they can construct knowledge and concepts related to the content of the technology curriculum. Furthermore, the technology teachers also believe that ICT has specialised roles in the subject area. For example, teachers could use the computer to make models of structures, plans for products and artifact designs, and produce reports and evaluation of given tasks for students. These findings are consistent with Sade (2002; 2009) who said that technology curriculum focuses on what to teach (content) and how to teach it (pedagogy); the nature and role of knowledge and creativity in technology education and how technology education relates to other subject curricula and to the outside world.

Regarding the place of ICT tools in technology education, some of the participants made reference to it both as a tool for teaching and learning and also as a curriculum content of technology education. They believe that both aspects of ICT tools are important in technology education. In this context, teachers will use it to prepare teaching and instructional materials and for class presentations as a tool for delivering instructional materials on various content topics of the technology curriculum. As a content topic of the technology curriculum, it involves the formulation of ICT as topic that will cover what ICT is, the importance of ICT tools in society, the use of ICT tools, the socio economic effects of ICT tools, the internet, the World Wide Web (WWW) and the implications ICT has for wider issues such as development and the environment.

The views and beliefs of participants were also influenced by the change of the curriculum from industrial arts to technology education. Most participants were part of

the industrial arts curriculum and saw the changes to technology education as shifting from learning and using conventional technology to learning and using high-tech technologies like computers, the internet and other interactive ICT tools (Sade, 2009). Though the findings show that technology teachers did not have a clear understanding of the pedagogical area when using ICT tools, there seemed to be a belief shared by most of them that the changes will now take teachers and students away from the practical nature of industrial arts. Only one participant believes that the change from industrial arts to technology education will further strengthen the technical nature of the curriculum through the learning and enhancement of quality knowledge, skills and practices. This is possible through the use of advanced tools and access to more information about learning tasks they would otherwise be limited to in the industrial arts curriculum. Similarly, Owen (2004) said that curriculum innovation in ICT incorporates ways in which students can explore their ideas when working in the environment that suits them. Participants also believe that the absence of ICT in the national curriculum has denied the opportunity for Solomon Islands students to learn about ICT tools. Participants further suggest that the total absence of ICT in the national curriculum has contributed to the vast ICT illiterate status of both teachers and students in the country (Leeming, 2003; Mangal, Ali, & Tuqa, 2007). This is indeed a setback to ICT integration.

There is also the view that the curriculum currently being used was developed more than ten years ago; therefore, it is not relevant to what is happening in the Solomon Islands society today. The findings suggest that we are living in a technological world therefore the need for ICT to be included in the national curriculum is long over due. Students need to learn about technology and how it impacts their lives, their community, and the world we live in. This is also consistent with Ramos (2005) who said that ICT's influence in education and society is now a matter of importance that must not be ignored. There are ICT tools every where you go in Solomon Islands. A curriculum review therefore, must consider including ICT whether as a separate subject or included as part of the existing subjects currently in the national curriculum. This will provide students with the opportunity to learn about ICT tools. The school is the best place for young people to learn about ICT tools because learning is organised and presented in the best possible way. Though, ICT tools are effective and flexible to enhance and transform teaching and learning, it is its integration into the curricula that impacts teachers and students the most (Ramos, 2005). The school can play the role of preparing students

with skills and competencies in ICT that will allow them to adapt to the continually changing technological age we are living in (Qualification and Curriculum Authority, 2007).

The absence of ICT in the national curriculum also means that schools which have adopted ICT tools in their schools do so without any curriculum guidance regarding how it will be used for teaching and learning, and in relation to the aims and purpose of the curriculum. Teachers just use ICT tools for their needs and purposes which are not curriculum driven. The way they use ICT tools for their teaching depends entirely on how the teachers make sense of the curriculum contents. Sometimes there may be challenges in teachers making effective use of ICT because they lack the guidance to make appropriate and meaningful use of them. Leeming et al. (2003) confirms that there is a gap in the national curriculum in Solomon Islands concerning ICT. They stress that schools have not been provided with any form of guidance by the curriculum when it comes to ICT integration in schools.

5.4 Teachers' Perception of the Need for Professional Development

This section discusses technology teachers' ideas of the need to use and integrate ICT tools**.** The discussion will focus on the following areas:

- The need for professional development
- The changing nature of technology in the world today

The Need for Professional development

Since the integration of ICT tools is an internal initiative of schools, only some schools have organised professional development (PD) programme for their teachers. Teachers now using ICT tools acquired ICT knowledge and skills from either the universities or colleges where they did their training, or as most of the technology teachers said, they learnt their skills through the look and learn method when they first used the computers in their respective schools. This scenario shows the reality of the situation teachers experience in the process of integrating ICT tools in the schools in Solomon Islands. All the technology teachers involved in the research acknowledged there was no nationally coordinated PD programme serving teachers' ICT needs. When schools began buying ICT tools, teachers resorted to the ad-hoc approach of learning how to use ICT tools by

watching and asking the 'how to use' questions of their colleagues. This practice is evident in the basic level of ICT knowledge and skill acquired by six of the eight participants in the use of the computer, printer, photocopier and the internet.

Through the look and learn method, teachers were able to use the computer, printer, photocopier and the internet. The method has its advantages and disadvantages. Some of the advantages are, it is cheaper, addresses specific learning needs at specific times and does not put pressure on learners or the colleague on what to learn and on the learning time. However, the disadvantages seemed to outweigh the advantages this ad-hoc approach provides. Despite being cheaper and learner based, its nature is not coordinated therefore; knowledge and skills learnt do not always give teachers the depth they need to fully utilise the ICT tools potential in their work. The consistency of training acquired is not guaranteed and the learner-teachers may not be given the information they need at the time they really need to know it. This can cause frustration and discouragement to teachers who are learning. Because it is an ad-hoc way of learning about ICT use, it does not provide step by step instructions that allow the learner to progress from one part of learning to another. Learning progress depends on the number of times the trainer-teachers are available.

A professional development programme will give teachers the chance to learn proper knowledge and skills in using ICT tools in teaching. Earl (2002) said that teachers will learn knowledge and skills of ICT from a programme (PD) and they can also learn from each other on the programme. Teachers need to have a realistic idea about what ICT tools can do. For example, they need to know how a computer could be used to support teaching and learning. In such a situation, relevant professional development programme is essential in assisting teachers to develop the skills and knowledge involved in using the computer for teaching and learning (Bialobrzeska & Cohen, 2005).

As it is seen, in the basic knowledge and skills teachers have, it is only enough to assist them to carry out limited tasks, but not sufficient to support the full integration of ICT in teaching and learning. Teachers need ICT training even in using common software such as Microsoft Word, Microsoft PowerPoint and just searching the internet. This is consistent with Almaghlouth (2008) who said that teachers are eager to know how to use the software that directly relate to what they do, such as word processing, searching the internet, multimedia software and presentation software such as the Microsoft

PowerPoint. In his research in New Zealand, Okey (2006) also said that teachers involved in the ICTPD programme consider themselves as competent in using word processing software and emailing. This makes sense because these two ICT tools (word processing and email) are the frontline software that teachers need to be familiar with. All of these can be thoroughly learned in a PD programme. Any professional development programme for teachers must address the needs of teachers in relation to their work in the schools. Similarly, Newhouse (2002) suggests that a PD should begin with the school where the PD will serve and the teachers' needs identified so that planning can be made to address the real needs of the teachers in relation to teaching and learning. He identified two stages of teacher ICT PD - skills training and pedagogical practice.

Another avenue the government could use to provide ICTPD for teachers is through their institution - the School of Education (SOE) at SICHE (Solomon Islands College of Higher Education). A course in the use of ICT tools could easily be created and provided for all teacher trainees. SICHE, as the highest tertiary institution in Solomon Islands, must take the lead in providing ICT training for teachers. The absence of an ICT course at the SOE has not assisted teachers in their preparation for teaching in this technological world we are living in. Leeming (2003) said that the lack of ICT skills and knowledge in Solomon Islands could also be attributed to the fact that educational institutions like the SOE and the curriculum development centre (CDC) have not provided for it in their training and curriculum framework. Furthermore, Talis and Gordon said that teachers need PD in specialised tasks (see Table 4.4 in Chapter Four) to assist them in their teaching.

Professional development however, should be an on going activity of the school. The changing nature of ICT tools requires teachers to keep updating their skills and knowledge of ICT tools. It will also help teachers to understand the technological issues that arise as a result of the integration of ICT tools and also build the capacity of teachers to use ICT tools confidently in schools (Almaghlouth, 2008). This is best integrated in an ICT school strategy that will provide ongoing support for the development of ICT tools in schools. A PD programme run by the schools, as seen in the example in School A, is limited only to the basic skills and administrative purposes like entering records rather than providing training in effective use in teaching and learning. An ICTPD that

addresses the need of teachers is needed. This is consistent with Gaible and Burns, (2005) who said that schools should be supported in the administrative, management, technical, financial and continuing collaborative processes between the school communities and other stakeholders.

Cowie et al. (2008) shows that a well supported ICTPD programme such as the laptop for secondary school teachers in New Zealand, where teachers are given maximum opportunity to use the laptop in their work, has far reaching benefits for teachers. The report revealed that teachers gain confidence in using the laptop, and ICT tools that can be used along with it, such as the internet, emailing and class practices. A professional development programme should incorporate areas of knowledge and skill training, teaching and learning practices and support through providing access to actual ICT tools to teachers. As Bialobrzeska and Cohen (2005, p. 9) state, "ICT is only as good as the person using it. If a teacher does not understand how to teach well, then ICT cannot, on its own, solve the problem".

Teachers Perceptions of the Changing Nature of Technology

Rendal and Clinton highlighted the need for a PD programme to be made part of ICT integration in schools because they believe teachers need to know and be aware of the impact of the changes in technological tools. The challenges that technological changes have on education are huge. The challenges have implications for schools in terms of their finances, infrastructure development and the teaching and learning processes. Because the schools in Solomon Islands have limited funding, an unplanned ICT integration that does not take into consideration sustainable management of ICT tools in terms acquisition of new ICT tools, updating of software and hardware, supporting of operational cost and maintenance of ICT tools can be a real burden for many schools. In light of this challenge, school principals need to create plan and realistic targets in their ICT innovation.

The changing nature of technology can have a dramatic impact on teaching and learning in the Solomon Islands. There are now new ICT tools developed that enable more interactive teaching and learning. The likes of the interactive white board (IWB), electronic education materials such as DVDs, and educational websites that provide tutorials and many more have impacted on education in many developed and developing countries in the last decade. These ICT tools enable teachers and students to take

teaching and learning to a stage where concepts and knowledge can be meaningfully investigated, explored and created. A learning task can now be thoroughly researched, discussed and reported on with very rich resources through new and emerging ICT tools.

5.5 Summary

Technology teachers believe that ICT tools have a role in education in the Solomon Islands. However, In contrast to the growth and development of ICT in teaching and learning in the developed world, it does not translate into the same progress in developing countries like the Solomon Islands. This is due to the social and economic situation of the country. The technology teachers revealed that all teachers in the country have not yet fully integrated ICT into their teaching. There is very little ICT access for teachers in the schools because there is not enough of them. As a result most teachers lack the knowledge and the skills to use ICT tools such as computer and the internet to enhance their teaching and students learning. Teachers just use ICT in administration task such as word processing and browsing the internet for teaching resources rather than on pedagogical applications. The research revealed that teachers in Solomon Islands learn how to use ICT tools like computers through the 'look and learn' and trial and error methods. This method gives teachers the opportunity to learn how to use the computer, but it does not give them a well coordinated and structured programme to learn about how to integrate ICT tools effectively into their teaching.

The poor state of ICT in schools in Solomon Islands is made worse by the lack of a national ICT policy in education, the lack of ICT professional development for teachers, the lack of sufficient funds to support the establishment and running costs of ICT in schools, the lack of skills amongst teachers and the lack of sufficient ICT infrastructure such as computers, videos, photocopy machine and the internet. The integration of ICT tools in the schools has been undertaken by far-sighted school principals rather than a nationally coordinated effort. The areas of great need in ICT integration in the country are the creation of a national ICT policy in education, the resourcing of ICT tools in schools, the design and implementation of a professional development (PD) programme for teachers and providing nationally coordinated support for schools so that they can appropriately integrate ICT tools into teaching and learning.

CHAPTER SIX

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

6.0 Introduction

This research set out to investigate the perceptions and beliefs of technology teachers on the use, roles and the realities of ICT tools in Solomon Islands classroom. What was unveiled was that ICT was integrated into schools in an uncoordinated way. As a result, a number of issues relating to the use of ICT tools in the schools arose. By way of summarizing my study, this Chapter offers a brief reflection of the issues surrounding the integration of ICT in Solomon Islands as perceived by technology teachers.

This chapter outlines the conclusions of this study; recommendations, limitations of the study and suggestions for further research.

6.1 Conclusion

ICT integration in Solomon Islands schools is not being undertaken as a well planned initiative by the government, education authorities, school boards or the schools themselves. There is no education policy that guides the integration and use of ICT tools in education in the country. The country does not have a national ICT development strategy. Although there were workshops held by the different sectors of the government to share ideas for setting up such a plan, there was still no ICT development strategy put place. The integration of ICT tools in schools in Solomon Islands, to date, has been due to the initiatives undertaken by far-sighted school principals. While there are only a few schools in Solomon Islands that have adopted the use of ICT, the trend (ICT integration) is gradually growing as schools are planning to buy ICT tools such as computers, photocopy machine, digital camera, and connect to the internet.

The research also highlights the need for a national policy for ICT use in education. This policy will help in directing requirements such as professional development for teachers, provide guidance for schools to integrate ICT tools properly and appropriately provide guidance in the management of ICT use in the schools. A policy will also help provide the guideline for what the computers will be used for in the schools. As technology is changing constantly, a policy will also help schools identify which ICT tool is appropriate for what purpose.

ICT tools have very important roles to play in teaching and learning in Solomon Islands. Teachers use ICT tools in their administration work such as planning their teaching, setting up school and subject database, word processing curriculum materials, accessing teaching resources on the internet and enhancing existing teaching practices. These tools also provide a wider learning base for students. Some teachers and students have been able to access information relating to their courses on the internet, use the computer to word process their teaching and student related tasks such as assignments and reports and use the internet to collaborate with others by sharing ideas and information about their work. ICT tools have also raised the quality of teaching materials through word processing, PowerPoint presentation and printed materials of curriculum content topics to give to their students. The clarity of materials helps students to understand what they are learning.

The lack of sufficient numbers and access to, ICT tools in schools, teachers' lack of ICT knowledge and skill, lack of professional development programme for teachers and the schools' lack of leadership in integrating ICT tools are issues that impede the integration of ICT tools. Despite these issues, teachers currently learn how to use ICT tools such as computer through the ad-hoc approach of 'look and learn' and 'trial and error'. The strategy teachers use in the schools is basically sharing the limited number of computers they have. In this situation teachers sometimes became frustrated by the lack of sufficient access to the computer and just lose interest in using ICT tools and revert back to the traditional way of teaching in using text books, chalkboard and dictating curriculum materials in the delivery of their lessons.

There were some concerns regarding the negative impact ICT poses to students and teachers. Two of these risks are the possibility for students to access undesirable materials such as pornographic materials and the other risk technology teachers fear is that ICT tools will make students rely on them rather than students being able to think for themselves. This concern suggests there must be control and guidance over the use of ICT tools in Solomon Islands schools. Control and guidance is also needed in managing the cost and long term support ICT tools require.

The challenges making the integration of ICT tools in schools difficult are high cost of buying and supporting the use of ICT tools, the insufficient level of ICT tools in the schools and the continual power failures in Honiara which can damage ICT tools and

disrupt school work. These challenges can be resolved with support from the government, education authorities and the schools working together to address them. The government has begun the process of supporting schools with ICT tools by supplying computers to a number of schools through out the country. Technology teachers suggest that this kind of support must be continued and extended to other schools, especially in the rural areas

6.2 Recommendations

Based on the literatures and findings of this study, I offer the following recommendation for the integration of ICT in teaching and learning in the Solomon Islands.

1. Support for Teachers

Teachers must be supported in the integration of ICT tools in schools so that they can develop their knowledge and skills in using ICT tools. They must be encouraged and presented with opportunities and working environments where they can have sufficient access to ICT tools. The environment should allow teachers to use ICT tools freely and collaborate with their peers, working and learning from each other. The schools need to create ICT plans to include maximum access for teachers and the development of proper ICT infrastructures.

2. Professional Development

Professional development (PD) should be organised to help teachers develop their level of ICT tool proficiency. Teachers' level of ICT knowledge and skills is very low therefore the need for professional development (PD) is urgent. The absence of a course at the School of Education (SOE) at SICHE (Solomon Islands College of Higher Education) and the increasing numbers of schools that have adopted ICT tools makes the need for profession development more urgent for all teachers. A PD is also needed to support the look and learn approach teachers takes to learn how to use ICT tools. Professional development should be designed to meet teachers' needs focusing on basic ICT knowledge and skills and then focusing on effective use within sound pedagogical practices. The funding, technical and professional expertise needed for PD must be provided and supported by the government through the Ministry of Education working with the education authorities and schools. The professional development programme should be offered to all teachers.

3. The need for a National ICT Policy in Education

A national policy on the use of ICT in education should be drawn up to guide the integration of ICT in schools. This gap in policy has not helped the practices of the schools that have been integrating ICT tools. A policy will help provide guidance to schools on ICT developments in areas like professional development, ICT management, ICT use and funding. The need for a national education policy in ICT is also necessitated by the current unfiltered access students have to ICT tools like the internet outside the school environment, which could easily lead to students abusing or being abused through internet crimes such as bullying, child pornography and other forms of e-crime. In order for schools to provide a strong ICT policy that promotes teaching and learning, they need support from the government which can be achieved through a national policy. Since the government is supplying computers to schools, it should also create a policy to guide the integration of ICT tools in schools.

4. Supporting Schools to Acquire ICT Resources

The schools should be supported by government to acquire ICT resources such as computers, photocopy machines, digital cameras, PowerPoint projectors and connect to the internet. The schools need support to build their ICT resources. What was revealed in the research was that most schools were not in a position to buy sufficient ICT tools in order to provide a satisfactory level of access to their teachers and students. The level of many school budgets is inadequate to meet development costs. Since the government has started to provide computers to some schools, it should extend the project to the rest of the schools in the country. The support schools need should not solely be the responsibility of the government but must also be shared by the school authorities (education authorities) and the schools themselves.

6.3 Limitations of the Study

On reflection, the following are some of the limitations of this study:

1. The samples of four schools and eight participant technology teachers used is small, thus may not be generalisable across the whole population of technology education teachers in more than140 secondary schools in the country. Furthermore, since the participants were based in Honiara, an urban setting, their views and circumstances

may not be representative of the majority of schools in the country that are located in rural areas. This is another potential area for further research.

2. Technology Education in Solomon Islands is still dominated by men and the data collected may not represent the views of women teaching in other parts of the country.

3. The selection of technology as the subject of choice for the study may also not fairly represent the majority of teachers teaching in other subject areas. It is possible they may yield a different set of data because they may have different ICT knowledge and skill levels. This is a potential area for future research.

6.4 Suggestions for further research

ICT in education is a new phenomenon in the Solomon Islands and offers a wide scope for research. This research was conducted to investigate the perceptions, beliefs and experiences of technology education teachers on the use of ICT tools in the schools. Further potential research areas include:

- Types of PD likely to be appropriate for Solomon Islands.
- Students' and parents' perceptions of the use of ICT in teaching and learning.
- School principals' perceptions of the use of ICT tools in the schools and their role in implementation as school leaders.
- ICT use and gender participation in Solomon Islands schools.
- Suitable processes for the development and implementation of ICT policies and planning at government and school levels in developing countries.
- The effects on learning when ICT tools are used regularly in classes.
- Infrastructure requirements for schools wanting to embed the use of ICT tools, and the implications for policy, practice, and finance.

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APPENDICES

APPENDIX 1

Interview Guides and Questions
Semi-Structured Interview Guide 1

1. What are your perceptions of the role of ICT in education in Solomon Islands?

   Probes:

   a. On your personal ICT experiences?
   b. On ICT tools you have used?
   c. On ICT at the following levels
      i. Education
      ii. Teaching
      iii. Learning
      iv. Technology education
      v. The curriculum
   d. The importance of the role of ICT in technology education
   e. How the school see its role in ICT?

2. **How do you use ICT?**

   Probes

   a. Personal Uses of ICT
   b. The influences of ICT in
      i. Your Planning
      ii. Your Teaching
      iii. Students' Learning
      iv. The curriculum
   c. On classroom management
   d. On the importance of having ICT skills and knowledge
   e. The advantages and disadvantages of ICT use in schools
   f. ICT as a separate subject

3. **What are the challenges technology teachers' encounters when using ICT?**

   Probes:

In relation to:

a. The challenges of using ICT in Solomon Islands schools
b. The effects of the challenges on
    i. Planning
    ii. Teaching
    iii. Students' learning
    iv. Teaching materials
c. Measures taken to address ICT challenges
d. The school response to ICT challenges
e. ICT resources in the school
f. The development of ICT in the school

APPENDIX 2A

Invitation letters to participants
2/542 Grey Street, Hamilton East, Hamilton 3216, New Zealand

Date: 20 / 05 / 2009

Dear Technology Teachers:

Ref: Letter of Invitation to Participate in a Research to Examine the Perception of Technology Teachers on the use of ICT (Information and Communication Technology).

My name is Solomon Pita and I am a post graduate students currently studying for a master degree in technology education at the University of Waikato in New Zealand. I am writing to invite you to participate in a research that I am conducting to examine the perceptions of technology teachers, including yourself on their use of ICT in their classroom. This research is being undertaken as a requirement towards my master's studies which I am currently pursuing at the Centre for Science and Technology Education Research, University of Waikato.

The aim of my research study is to collect data on the perceptions of technology teachers in order to determine how they perceive the use of ICT in teaching and learning in the Solomon Islands. I would like to obtain information about how technology teachers use ICT from six technology teachers, including yourself, if you agree to participate during the course of the research. The research will be conducted during the month of June-July this year and may take up to six (6) to eight (8) weeks.

You have been chosen because your school has access to ICT tools such as computers, PowerPoint presentation equipment and facilities as well as have access to the internet. Your participation in this study will help me to gather the data I require for my study. It will also be used to make recommendations that will hopefully contribute towards the effective use of ICT in teaching and learning in our country.

If you agree to participate in the research, you will be interviewed on two occasions. Each interview session will last for an hour. I will inform you about the interview schedules when I visit you at your school. Please note that the interviews will be audio recorded. All ethical requirements will be followed closely in order to safeguard your state of privacy, confidentiality and anonymity. All the data that you provide will be transcribed and sent back to you to check its accuracy.

Details of your rights and risks during the research can be found in the research detail attached. You are asked to participate voluntarily and your consent of whether to participate or not will be respected. If you agree to participate in this research, please sign the consent form attached and return it to me by email attachment to my email address, which is; sp99@waikato.ac.nz. Alternatively, you can keep it until I visit you at your school when I come over to conduct my field work.

A letter seeking permission to conduct this research in your school has been sent to your principal.

Please see the information sheet attached for further details about the research. If you have any queries or questions regarding my research, please contact my supervisors; their email addresses are as follows: Kerry Earl: kearl@waikato.ac.nz, Dr. Noeline Wright: noelinew@waikato.ac.nz. You can also write to them using the addresses given in the information sheet attached.

Thank you for your cooperation and I look forward to your response at the earliest possible time.
Yours faithfully

Solomon Pita

APPENDIX 2B

Letter seeking permission from the chairman of the research committee

2/542 Grey Street, Hamilton East, Hamilton 3216, New Zealand

Date: 20/ 05 /2009

To The Chairman
Research Committee
MEHRD
P.O. Box G28
Honiara
Solomon Islands.
Dear Sir / Madam

Ref: Request for Permission to Conduct Research in Three Secondary Schools in Solomon Islands.

My name is Solomon Pita and I am a postgraduate student currently studying at the University of Waikato in Hamilton, New Zealand.
I am writing this letter to seek your authorisation to conduct research with six technology teachers whom I am going to select. I will identify the secondary schools in consultation with their respective school principals.

The title of my research topic is '*Technology Teachers' Perceptions of Information and Communication Technology* (ICT) *in the Solomon Islands*. This research is being undertaken as a requirement towards my masters' studies, which I am currently pursuing at the Centre for Science and Technology Education Research, University of Waikato, New Zealand. The aim of my research study is to explore selected technology teachers' perceptions of how they currently use ICT (or its potential) as a tool for teaching and learning technology in the Solomon Islands. It is my belief that the study I am conducting is a new area which has not been explored in the past. Therefore, the data that will be generated from the study would contribute immensely towards understanding of teachers' ideas, beliefs and views about how best they can possibly use ICT as a tool for enhancing teaching and learning in the school system.

The information generated from the six teachers will be kept confidential and used only for the purpose of my study. I can assure you that the necessary ethical considerations and procedures stated in the Solomon Islands Research Act (1984) and the University of Waikato Human Research Ethics Regulations will be observed throughout the study. Please refer to the research information sheet provided for more details about my research study. I understand that my request to conduct the research in the selected secondary schools will need approval from the Ministry of Education Research Ethics Committee. Please find attached is a completed Solomon Islands Research Application Form, including the relevant documents that I am submitting for your perusal. I would appreciate it if you could inform me of the Research Ethics Committee's decision as soon as possible, via e-mail, so that I could make the necessary arrangements to begin my fieldwork in June/July 2009. My e-mail address is: sp99@waikato.ac.nz. I look forward to your response.
Sincerely,

Solomon Pita.

APPENDIX 2C

Letter Seeking Permission to Conduct the Research in the Schools.

2/542 Grey Street, Hamilton East, Hamilton 3216, New Zealand

Date: 20 / 05 /2009

The Principal _____
P.0. Box
Honiara
Solomon Islands

Dear Sir/Madam

Ref: <u>A Request for Permission to do my Research at Your School</u>

My name is Solomon Pita and I am a postgraduate student currently studying at the University of Waikato in Hamilton, New Zealand. I am writing this letter to seek your permission to conduct research with your technology teacher at your school. The title of my research topic is ''*Technology Teachers' Perceptions of Information and Communication Technology* (ICT) *in the Solomon Islands.* This research is being undertaken as a requirement towards my masters' studies, which I am currently pursuing at the School of Education and Centre for Science and Technology Education Research, University of Waikato, New Zealand.

The aim of my research study is to explore selected technology teachers' perceptions of how they currently (or its potential) use ICT as a tool for teaching and learning technology in the Solomon Islands. It is my belief that the study I am conducting is a new area which has not been explored in the past. Therefore, the data generated from the study will contribute immensely towards understanding of teachers' ideas, beliefs and views about how best they can possibly use ICT as a tool for enhancing teaching and learning.

In order to gather the data I require for my study, I will need to interview the teachers. Your teacher will be interviewed twice. However, the teachers will be allowed to participate in the study, only if they agree and have signed a student consent form. The interviews will be organised in consultation with the teachers so that they do not disrupt the teachers' official responsibilities. All ethical requirements will be followed closely in order to safeguard the school's and the participant's state of privacy, confidentiality and anonymity. Please refer to the information sheet provided for more details about my research study. An invitation letter seeking the teachers' permission will be sent to them as soon as permission is obtained from your office. I will also discuss details of my research with you and your technology teacher during my initial visit to your school in June 2009. The information generated from the technology teachers will be kept confidential and used only for the purpose of my study. I can assure you that the necessary ethical considerations and procedures stated in the Solomon Islands Research Act (1984) will be taken into account throughout the study. I would appreciate it if you could consider my request and grant me permission to conduct research with your technology teacher at your school. I would be grateful if you could respond as soon as possible. If you wish to contact me my e-mail address is: sp99@waikato.ac.nz. I look forward to receiving your response.

Sincerely
Solomon Pita

APPENDIX 3

Consent Form for Participants (technology Teachers)

This consent form is administered in fulfilment of the requirements of the University of Waikato, School of Education Ethics Committee and the Solomon Islands Research Acts 1984 to ensure that the confidentiality and anonymity of research participants and institution are protected.

Please read the information in the table below before you sign this form.

- My participation in this research is voluntary and I fully understand my right to withdraw from the research at any time.
- I agree to participate in two audio recorded interview sessions of the research.
- All the information and data that I give from my interview or any written materials that I provide will not be used unless I give my prior permission.
- As far as possible my confidentiality and anonymity will be protected.
- The information that I provided during the research will only be used for the development and writing of the researcher's master thesis, presentation in conferences or similar forums, publications in research and educational journals and in reports to institutions like universities and government agencies like ministries.
- All the information I provided in the interview will be destroyed two (2) years after the completion of the research.
- No interviews or any other research activities in which I involve in will be conducted without my fully consent.

I have read and understood the above research information and guidelines and agree to participate in the research.

First name _____ Family name_____

Signature _____

Date: _____

APPENDIX 4A

INFORMATION SHEET FOR PARTICIPANTS

1. Research Title

Technology Teachers' Perceptions and the Realities of using ICT in Solomon Islands' classroom.

2. Justification for undertaking this research

The aims of this research are to find out how teachers perceive the use of ICT in teaching in the Solomon Islands and the realities of ICT practice in the classrooms. Since there is no such study conducted in Solomon Islands before, the need for a study that investigates the perceptions and beliefs of teachers on the use of ICT in schools to be carried out is important. This research would serve Solomon Islands in many ways; e.g. informing teachers, school leaders and the ministry of education on matters relating to the use of ICT in schools and provide a basis where further studies and development in the use of ICT in schools can be pursued.

3. Aims of the research

The study aims to find out how teachers perceive the use of ICT in teaching in the Solomon Islands and the realities of ICT practice in the classroom. The research is guided by the following objectives: (1) to investigate technology teachers' perception, beliefs and practices of ICT in their teaching and learning experiences; (2) to investigate the realities of the availability of ICT tools in the schools in Solomon Islands; (3) to investigate how technology teachers acquire the knowledge and skills in ICT; (4) to identify the challenges that technology teachers encountered when using ICT.

4. Research method

The method that will be used is semi-structured interview. Participants will be involved in two interview sessions.

5. Research Participants

The participants of this research are six (6) technology teachers selected form three (3) secondary schools in Honiara, two (2) teachers from each school. These teachers would have been teaching for more than one (1) years and have access to ICT facilities in their schools. The teachers teach technology classes from form one (1) to form six (6) in their school.

6. Ethical consideration

Access to participants will be guided by the Solomon Islands Ministry of education ethics regulations 1984, and the *Ethical Conduct in Human Research and Related Activities Regulation 2008*, University of Waikato. Permission will be sought from the three (3) school principals and the six (6) teachers that will be approached as participants in the research. In this regards, the researcher will ensure that all measures pertaining to ethical research such as confidentiality, inform consent, potential harm to participants, participant's right to decline, use of information and other requirements will be applied.

7. Procedures in which participants will be involved

All six (6) participants (technology teachers) will be engaged in a semi-structured interview that will take about an hour to conduct. The interview will be recorded and the participants will be consulted for their consent to be recorded. The interviews will be carried outside of formal class times to minimise participants work interruption. All transcribed materials will be hand delivered to them to check for correction, changes or addition while I am still there. If in any case that the I did not complete transcribing the interviews, then the transcribed materials will be sent to them through email attachments or through mail post. They will be advised to inform me of their feedbacks within two weeks of the time they receive the transcriptions. If they do not respond within the given time, I will assume that they have accepted that the transcribed materials are the true record of what they provided in the interviews.

8. Use of information

The data collected in this research will only be used for the development and writing of the researcher's master thesis, presentation in conferences or similar forums, publications in research and educational journals and in reports to institutions like universities and government agencies like ministries.

9. Programme of events

Programme of events will be given to the participants so that they are notified of dates of their interviews. This programme of events will be drawn up after negotiating with the respective schools and teachers of the times and dates of each interview.

10. Contact persons

Participants can contact the supervisors of this research if they have any questions or issues that concern them about the research.

Chief supervisor: **Kerry Earl,**

School of Education, University of Waikato, Private Bag 3105, Hamilton, New Zealand,

Phone: 64 7 838 4940, fax: 64 7 838 4898

Email:<kearl@waikato.ac.nz>

Assistance Supervisor: **Dr. Noeline Wright**

Wilf Malcolm Institute of Educational Research, School of Education, University of Waikato

Private Bag 3105, Hamilton, New Zealand

Telephone: 64-7-858 5171, Fax: 64-7-838 4712

Email: noelinew@waikato.ac.nz

APPENDIX 4B

INFORMATION SHEET FOR PRINCIPALS AND RESEARCH COMMITTEE

1. Research Title

Technology Teachers' Perceptions and the Realities of using ICT in Solomon Islands' classroom.

2. Justification for undertaking this research

The aims of this research are to find out how teachers perceive the use of ICT in teaching in the Solomon Islands and the realities of ICT practice in the classrooms. Since there is no such study conducted in Solomon Islands before, the need for a study that investigates the perceptions and beliefs of teachers on the use of ICT in schools to be carried out is important. This research would serve Solomon Islands in many ways; e.g. informing teachers, school leaders and the ministry of education on matters relating to the use of ICT in schools and provide a basis where further studies and development in the use of ICT in schools can be pursued.

3. Aims of the research

The study aims to find out how teachers perceive the use of ICT in teaching in the Solomon Islands and the realities of ICT practice in the classroom. The research is guided by the following objectives: (1) to investigate technology teachers' perception, beliefs and practices of ICT in their teaching and learning experiences; (2) to investigate the realities of the availability of ICT tools in the schools in Solomon Islands; (3) to investigate how technology teachers acquire the knowledge and skills in ICT; (4) to identify the challenges that technology teachers encountered when using ICT.

4. Research method

The method that will be used is semi–structured interview. Participants will be involved in two interview sessions.

5. Research Participants

The participants of this research are six (6) technology teachers selected from three (3) secondary schools in Honiara, two (2) teachers from each school. These teachers would have been teaching for more than one (1) years and have access to ICT facilities in their

schools. The teachers teach technology classes from form one (1) to form six (6) in their school.

6. Ethical consideration

Access to participants will be guided by the Solomon Islands Ministry of education ethics regulations 1984, and the *Ethical Conduct in Human Research and Related Activities Regulation 2008*, University of Waikato. Permission will be sought from the three (3) school principals and the six (6) teachers that will be approached as participants in the research. In this regards, the researcher will ensure that all measures pertaining to ethical research such as confidentiality, inform consent, potential harm to participants, participant's right to decline, use of information and other requirements will be applied.

7. Procedures in which participants will be involved

All six (8) participants (technology teachers) will be engaged in a semi-structured interview that will take about an hour to conduct. The interview will be recorded and the participants will be consulted for their consent to be recorded. The interviews will be carried outside of formal class times to minimise participants work interruption. All transcribed materials will be hand delivered to them to check for correction, changes or addition while I am still there. If in any case that the I did not complete transcribing the interviews, then the transcribed materials will be sent to them through email attachments or through mail post. They will be advised to inform me of their feedbacks within two weeks of the time they receive the transcriptions. If they do not respond within the given time, I will assume that they have accepted that the transcribed materials are the true record of what they provided in the interviews.

8. Use of information

The data collected in this research will only be used for the development and writing of the researcher's master thesis, presentation in conferences or similar forums, publications in research and educational journals and in reports to institutions like universities and government agencies like ministries.

9. Programme of events

Programme of events will be given to the participants so that they are notified of the dates of their interviews. This programme of events will be drawn up after negotiating with the respective teachers of the times and dates of each interview.

APPENDIX 5

SOLOMON ISLANDS
FORM RA
RESEARCH APPLICATION

1. NAME: Solomon Pita (Underline Surname)

2. ADDRESS(es) (if more than one give all)
2 / 542 Grey Street, Hamilton East, Hamilton 3216, New Zealand. Mobile: 0210486476, Email: vajisolo@yahoo.com or sp99@waikato.ac.nz

3. Curriculum Vitae – (attach separately and include previous research work)

4. Subject(s) to be studied (brief synopsis, detail should be on the research proposal).
This research aims to explore the perception technology teachers on the use of information and communication technology (ICT) in Solomon Islands schools. Some schools in Solomon Islands have already used (ICT) in teaching and learning in their classrooms. By understanding how teachers perceive the use of ICT, it may be possible to further develop ICT in Solomon Islands schools.

5. Areas/locality where research work is to be conducted.
It is intended that this research will be conducted in three Honiara Schools since they have used and access to some of these ICT tools in their teaching and classroom activities.

6. Funding

(a) Who is funding this Research?
The research is funded by the ZNAID scholarship that funds my training.

(b) What is the level of funding?
The level funding is on:

- Travel costs
- Accommodation and
- basic allowance for researcher

7. Method of Research
The research method that is going to be used is:

- Semi-structured interviews

8. My Research will involve …….. Please tick

Filming		**Collecting Sample/Specimen**	√
Recording	√		
Photographing		**Others (Please specify)**	

Others : _____

_____

9. Arrangements for Accommodation in the place(s) of Research

I have accommodation in Honiara.

10. How will the research results be used? List

The data collected in this research will only be used for the development and writing of the researcher's master thesis, presentation in conferences or similar forums, publications in research and educational journals and in reports to institutions like universities and government agencies like ministries.

11. List benefits of Research to Solomon Islands.

The findings in this research may help to inform stakeholders in education in a number of ways. Some of these are potentially to:

- Inform teachers, school leaders and the Ministry of Education regarding the use of ICT in schools on matters of ICT development such as resourcing schools with ICT facilities.
- Help in ICT policy development in education
- Contribute to professional development programme in ICT for teachers.
- Contribute information for technology teacher training courses in ICT.

12. Name and Address of any person/organization/institution who is willing to assist you while you are doing your research. (A letter from local host will be useful).

The School of Education (SICHE)

13. How long will the research take? Specify dates if possible.

The research is expected to take 6 to 8 weeks. Possible dates: May 2009 – June

2009.

14. Any additional specific information you consider useful for our perusal of your application may be described below.
A quick response this application will be very helpful to my research.

15. Give us two referees certifying your research application and background. (Two separate statements expected)
Chief supervisor:
Name: Kerry Earl

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Assistance Supervisor:
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16. Applicants Signature _____ Date _____