

**TECHNOLOGY IN TEACHING:  
DOES THE IMPLEMENTATION OF LAPTOPS AS  
TEACHING TOOLS ENHANCE THE WORK OF TEACHERS  
AT TEREORA COLLEGE?**

by  
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## Declaration

### Statement by Author

I, Ngatutai-Annie Tearetoa, declare that this thesis is my own work and that, to the best of my knowledge, it contains no material previously published, or substantially overlapping with material submitted for the award of any other degree at any institution, except where due acknowledgement is made in the text.

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### Statement by Supervisor

The research in this thesis was performed under my supervision and to my knowledge is the sole work of Ms. Ngatutai-Annie Tearetoa.

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### **Abstract**

The basis of this research was to evaluate and analyse the implementation of laptops as a teaching tool to enhance the work of teachers at Tereora College. The study was approached from both a qualitative and a quantitative perspective, in which I examined the skills of 27 teachers in the school using laptops as teaching tools. Questionnaires and interviews were carried out to gather data. Data show that laptops as teaching tools enhance teachers work and simplify the teachers' experience at Tereora College. However, the results also demonstrate that these improvements are limited for both teachers and students. The report concludes that teachers need more computer training and literacy in order to maximise the benefits of using laptops as teaching tools.

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## **Chapter One**

### **Technology in Teaching:**

#### **Does the Implementation of Laptops as Teaching Tools Enhance the Work of Teachers at Tereora College?**

Ever since the missionaries introduced classroom learning, education has been important in the Cook Islands. Parents encourage their children to do well academically as it will affect their ability to be a bread winner in the future. I recall my parents saying that education or teaching used to be about writing up lesson and unit plans, manually saving their work in folders, and that teaching students was about teachers standing up in front of the classroom and talking. Today, teachers have laptops to create their lesson plans, save their work, and use PowerPoint or videos to help make teaching fun as well as interesting.

#### **The Importance of the Study**

This study is important for three reasons. Firstly, it is important to the Cook Islands Ministry of Education that there are close parallels between the teaching and learning conditions in the Cook Islands and New Zealand. This is because Cook Islanders are also New Zealand citizens and there is considerable two way migration between the countries. Secondly, research has shown that, in an increasingly technological society, the use of computer technology in the classroom can have a profound impact. Thirdly, this study is the first of its kind to be conducted in Rarotonga. Consequently, it adds to the body of research by providing data on the impact of the introduction of computers into the classroom environment of small Pacific islands.

#### **Cook Islands Ministry of Education Perspectives**

Cook Islanders enjoy the privilege of being New Zealand citizens. This makes Cook Islanders an unusually migratory people with frequent travel between, and residency in, the two countries. As a result it is not sufficient for Cook Islands students to meet some arbitrary “Cook Islands standard”. They must be educated and equipped to function effectively in both the Cook Islands and New Zealand environments. The provision of laptops to all Tereora College teachers was a deliberate move by the Ministry of Education to create a teaching and learning environment to foster this goal.

Sharon Paio, the Cook Islands Secretary of Education, stated:

The initiative was introduced to bring us into line with providing working conditions comparable to those enjoyed by teachers in New Zealand who are

delivering similar curricula at primary school and of course NCEA standards at senior secondary. Increasingly, as the wealth of education resources available on line increases and opportunity for Open Source Resources becomes available, to keep up with current pedagogical practice and meet administration requirements it was becoming obvious that a lack of technical knowledge and access to appropriate equipment was hindering teachers' ability to provide best possible learning experiences for our students. Increasingly, communication is done via email as are the administrative tasks required for teachers.

Handwritten is no longer acceptable in formal communication. Schools were moving to electronic reporting and the evidence was apparent that if we were to provide a quality 21<sup>st</sup> century learning experience for children, we had to come on board to support our teachers. This intervention responded to current needs of students and teachers. (S. Paio, personal communication, March 13, 2015)

### **Research on the Use of Laptops in Classroom**

#### **Laptops as an Administrative Tool**

Laptops as administrative tools have helped make things easier and less time consuming. Teachers are able to create lesson plans, unit plans and assessments with more flexibility of time and place of working (Cowie, et al., 2008). Laptops have enabled teachers to engage in more effective communication with colleague teachers and more easily collaborate with them (Cowie, et al., 2008). Improved access to resources is likely to eliminate unnecessary tasks.

#### **Laptops as a Teaching Tool**

Teachers use laptops to make teaching more effective and create fun ways of learning for students. Laptops have offered teachers new ways of engaging and motivating learners in the classroom (Mouza, 2008). Having resources and lessons prepared on laptops instilled confidence in the teachers and enabled them to develop new approaches to teaching (University of Wolverhampton, 2008).

#### **Laptops as a Learning Tool**

Laptops as learning tools help students better understand a subject by using visuals, audio and videos (Mouza, 2008). Providing every student with a laptop, which can also be taken home, can have a tremendous impact on students who are currently left out from the world of technology (Mouza, 2008)

### **Benefits of using Computers in the Classroom**

Teachers who used their laptops during lessons found the opportunity to introduce multi-modal materials that were well presented, which motivated students to engage creatively and critically in their learning (Cowie, et al., 2008).

### **Challenges**

Challenges of using laptops inside the class include surfing the web for personal reasons, social networking with peers and, to a lesser extent, entertainment in the form of watching videos or playing games (Kay & Lauricella, 2014).

### **Contribution to the Body of Research**

Much of the existing research relates to learning environments in large nations with extensive and complex school systems. These countries also have very different cultural norms to Pacific Island states in general, and to the Cook Islands in particular. This study is an important contribution as it adds the small Pacific Island and Cook Islands perspective to the existing body of knowledge.

As a teacher with a strong Information and Computing Technology [ICT] background teaching at Tereora College, I have watched teachers struggle with the implementation of technology in their classrooms, especially following the provision of laptops to all teaching staff. Discussions with my colleagues prompted a number of questions:

- Do teachers have adequate ICT training?
- What is the problem?
- Are there unresolved network issues?
- Is there student interest in technology supported instruction?
- Are the laptops adequate for the task?
- Do teachers have the knowledge and skills to integrate ICT into their instructional practice?
- Do we need an ICT administrator dedicated to teaching and learning?

The questions seemed to have no easy answers so I decided to focus on what I see as the central issue, namely, does the current use of computers at Tereora College enhance the learning experience for students?

### **Summary**

This study explores the question: “Does the implementation of laptops enhance the work of teachers at Tereora College in Rarotonga, Cook Islands?”

The study provides insights into:

- Whether or not the Ministry of Education's initiatives are having the desired positive effect.
- How Cook Islands implementation data compares with the research data on computer use in other parts of the world.
- Cook Islanders education in Rarotonga, the capital of a small Pacific island country.

Chapter two of this thesis will discuss the literature pertaining to the use and impact of computer technology in the classroom. Chapter three describes the methods used to carry out the research. Chapter four gives the results of the research. Chapter five discusses the results and the limitations, makes recommendations, and draws conclusions.

## **Chapter Two**

### **The Review of the Literature**

Technology has changed dramatically over the last few decades. We have gone from landline telephones in our homes to carrying cell phones and having them readily available whenever we want them. I have worked with typewriters, and dealt with the difficulties of typing, to now working with computers, which are easy and fast to use. Teachers of Tereora College are technologically “savvy”: I see them with smartphones, laptops, iPods, speakers and even iPads in their hands. Technology has become an integral part of personal and social life.

#### **Literature Review**

As there is limited relevant material from the Pacific Islands, some literature for this review has come from the US, New Zealand, Asia-Pacific, and Europe. For example, the literature from the New Zealand Ministry of Education and the Maine Learning Technology Initiative in the US were reviewed as they had very similar objectives to those of the Cook Islands. Studies into the barriers and challenges of introducing and implementing IT in education have been reviewed from across the world, including Hong Kong, UK, US, Canada, and Australia. It has been found that, in both developed and developing countries worldwide, there are common barriers to the implementation and integration of IT in education (Parker-Hay, 2012). Lastly, PI literature has been reviewed for the implementation of IT in the South Pacific as well as several One Laptop Per Child projects in the Pacific.

It has been a goal of educators for a long time to have digital technologies as every day tools in the classroom (Parr & Ward, 2011). In many classrooms, teaching and learning practices have changed very little (Cox, et al., 2003a; 2003b; Hayes, 2007). This lack of progress has taken place despite students having improved access to technology (Johnson, Kazakov, & Svehla, 2005).

It is not widely apparent that technology has been seamlessly integrated as part of the educational environment (Bransford, Brown, & Cocking, 2003; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). This means that students are not having learning experiences that are meaningful, relevant, and intellectually stimulating and, which would engage them (Bransford, Brown, & Cocking, 2003).

Students’ use of technology in their school activities and experiences has remained limited both in the length of time they use it for and how they use it (Bakia, Yang, & Mitchell,

2008; Becker, 2001). This is despite the fact that the use of technology in schools has increased (Bakia, Yang, & Mitchell, 2008; Becker, 2001).

### **IT in Education in the Pacific Islands**

In the Pacific, many countries did not have the technical or financial resources to enable them to upgrade or install the local infrastructure required for IT and, consequently, its implementation was still in its infancy (Parker-Hay, 2012). Therefore, there was very little literature available on the use of IT in education in the South Pacific Islands. Not only was research into this topic very rare but it was also usually conducted as part of wider, multi-sector analyses (Whelan, 2008). Moreover, developmental trends in the use of IT in education in the South Pacific were not being monitored in accordance with standard indicators (Whelan, 2008). Nevertheless, a study in 2002 of small nations that included Pacific island countries concluded that many states faced large technical and financial barriers and that pedagogical training was necessary for IT to be able to be best used in education (Brandjes, 2002).

Whelan's (2008) study of IT in education across the South Pacific reported similar results. This research "generated baseline data about educational ICT access as well as expert opinions in the [education] sector ... relating to ICT use in the South Pacific region" (Whelan, 2008, p. 64). When asked whether IT was integrated in their country's curriculum, 85% of the respondents answered "not at all" or "only partially" (Whelan, 2008, p. 58). The respondents were asked how effective their country's teacher training was in IT awareness and support and 55 out of the 56 who answered stated either "failing" or "adequate" (Whelan, 2008, p. 59). Whelan (2008) found that the respondents thought that the three greatest benefits for IT in education in the South Pacific would be:

1. Training and capacity building;
2. The development of localised content; and
3. New learning materials to be created.

Whelan's (2008) report made a number of recommendations, including that:

- Secondary school administrators and teachers should be given training in IT awareness and skills;
- The workloads of teaching staff should be reviewed due to the increased use of IT; and
- IT-literacy and awareness-raising initiatives, as well as formal curriculum development, should be conducted at the regional and national political levels in order to accelerate the development of IT in schools.

Lastly, the research found that there was strong support for increased local and national school networking (Whelan, 2008). Whelan (2008) asserted that this would provide a bottom-up approach that would enable the development of a more effective, IT-based education in the Pacific.

Although the literature already reviewed was limited to teachers' use of IT in teaching within the South Pacific, there have been studies conducted on the implementation of the One Laptop Per Child [OLPC] in several PICs across the wider Pacific. OLPC distributes inexpensive educational computers to children and teachers in developing countries in order to facilitate IT use in education (Parker-Hay, 2012; Iding & Singh, 2013). Within the Pacific, there has been a significant revision of thinking about education with reforms that include native languages being respected, culture and local knowledge being incorporated into the curriculum, and increasing the use of technology, which, it was thought, would also assist in achieving the other goals (Iding & Singh, 2013).

However, using IT in education in the Pacific Islands faced a number of challenges. Examples include the hot, humid, and often salty environments, which were damaging to the equipment; maintaining the computers was difficult, especially when replacement parts had to be sent from far away; and there was little or no maintenance training (Iding & Skouge, 2005). In the US-affiliated states in the Pacific, public schools that had computer laboratories were found to be mostly in disrepair and frequently without internet access (Iding & Singh, 2013). Iding and Singh (2013) also noted that if computers and other equipment were not going to fall into disuse, any that were donated for educational purposes had to be accompanied by committed partnerships that were ongoing, upkeep of the equipment, and proper training.

Another key issue in the Pacific's use of IT in education was the support of teachers. Iding and Singh (2013) made the point that if a teacher had limited IT experience then s/he might be frightened or intimidated by a computer which was supposed to be making her/his life easier. Iding and Singh (2013) asserted that, as teachers were the key to the success of IT programmes in education, it was essential that they were given support in the form of professional development. One example of support for teachers was the partnership that was created by the Pacific Resources for Education and Learning [PREL] and OLPC in the Federated States of Micronesia [FSM]. In FSM, servers were put into the schools, which gave teachers templates of lesson plans as well as teaching the teachers how to use computers to create effective lessons (Iding & Singh, 2013). Another example took place in the Marshall

Islands and Kosrae, where PREL helped teachers to develop interdisciplinary lessons, “such as incorporating mathematics concepts into science” (Iding & Singh, 2013, p. 233).

In 2008, trial OLPC projects began in three schools in the Solomon Islands [SI], which were subsequently evaluated in 2010 (Australian Council for Educational Research [ACER], 2010). Prior to the implementation of the projects, the teachers and students were given training and, subsequently, a part-time project officer was employed in order to continue the teachers’ training and to give them technical support (ACER, 2010). ACER (2010) found that the impact on teaching of the OLPC projects had been largely positive: teachers had better access to information through research on the computers, which had improved the teachers’ ability to plan and deliver their lessons. It was also noted that the use of the computers in teaching had given teachers more time to attend to the slower or more needy students (ACER, 2010). One reason given for this extra time was that the teachers did not have to spend as much time in the classroom writing on the blackboard (ACER, 2010). Concomitantly, the additional time, together with the technological assistance from the computer, meant that teachers could create extra activities for their faster-learning students (ACER, 2010).

The SI teachers reported that it was not only in the classroom that the computers had assisted them. The computers enabled the SI teachers to record and store information, allowed them to better communicate with parents, send homework to students, and, generally, make communication and writing faster and easier (ACER, 2010). Overall, the SI teachers stated that the laptops had decreased their overall workload as a result of the changes mentioned above (ACER, 2010).

However, the SI teachers were consistent on one aspect that needed improvement: they wanted additional training, particularly in how to alter the curriculum so that it worked with the computers, in technical expertise so that they knew how to create or install new programs and maintain/repair computers, and in using the internet, networking, and emailing (ACER, 2010).

The (ACER, 2010) evaluation concluded that the SI projects had been successful and had had positive impacts in the pilot schools as well as having increased the teachers’ professional capacity. Moreover, the projects had received the endorsement of the communities as a whole, including community members, students, parents, and teachers, who had reported seeing major benefits (ACER, 2010). ACER (2010) recommended that further training for teachers should be an ongoing part of the projects and that this should include training the teachers to be able to address minor technical problems as well as teaching them

how to incorporate curriculum material into their computer-based lessons. A further recommendation was that all schools should have local technical support from trained, local community members (ACER, 2010).

Also in 2008, an OLPC project began in Niue, a small, Polynesian PIC, which has close ties to New Zealand. The Niue OLPC project gave laptops to all students and teachers in the country and, initially, there was a great deal of excitement over the project (Parker-Hay, 2010). Not only did teachers report that their confidence and knowledge with the computers had increased, but also they noticed an increase in their pupils' interest levels when they were given a computer (Parker-Hay, 2010).

However, the initial enthusiasm rapidly altered as teachers found that they were not given any professional development in how to use the computers for teaching (Parker-Hay, 2010). Additionally, the teachers found that they were unable to rely on the technology as they had issues with printing and problems with the network capacity and, therefore, did not have sufficient confidence in the computers to enable their use in the classroom (Parker-Hay, 2010). Parker-Hay (2010) reported that, before the OLPC programme was implemented in Niue, there was very limited training in the computers' use but no guidance on how to use the laptops in teaching. Moreover, prior to the arrival of the computers, the teachers were not informed about the OLPC project or its intended outcomes, which meant that the teachers were left out of the decision-making process and felt that the whole initialisation of the project was very rushed (Parker-Hay, 2010). Lastly, as the project continued, the lack of technical support meant that a large, and an ever-increasing, number of laptops were unable to be used as they were broken through not being maintained or repaired (Parker-Hay, 2010).

By 2010, the OLPC project in Niue had been abandoned as the challenges had proved overwhelmingly to have outweighed the benefits (Parker-Hay, 2010). Parker-Hay (2010) concluded that both the general and the teaching communities in Niue had not been sufficiently prepared in advance to be able to cope with the OLPC project, particularly one which covered the whole country at once. Parker-Hay (2010) recommended that, in future, the community should be included in the consultation process and that teachers should be given regular training to improve their professional development, particularly in the area of technology-supported teaching.

### **Teaching Technology in New Zealand**

A number of educational authorities around the world have tried to deal with the issues that are preventing effective integration of ICT into schools (Parr & Ward, 2011). One

such educational authority is the Ministry of Education in New Zealand. The ministry introduced a compulsory strategy called “Digital Horizons: Learning through ICT” to effectively integrate ICT into schools (Ministry of Education, 2002). The first step of the scheme, which began in late 2002, was to provide teachers in secondary schools with laptops (Ministry of Education, 2002). This policy was later called TELA [the Teachers Laptop Scheme] and, in the scheme, the New Zealand government would pay two-thirds of the laptop cost for every teacher and the balance would be paid by either the school or the teachers (Cowie, et al., 2008). The main goal of the scheme was to increase teacher confidence and competence in the use of technology for learning and teaching, classroom management, administration, and their professional lives (Cowie, et al., 2008).

However, the ministry imposed conditions on the schools before they received the laptops (Cowie, et al., 2008). Each school’s application would only be approved if they fully integrated the laptops into the school environment (Cowie, et al., 2008). This integration included bearing the costs of any additional infrastructure and providing technical support as well as professional development (Cowie, et al., 2008). This meant that teachers were only able to receive the laptops if they incorporated the computers into the learning environment and did not have them for exclusive personal use.

### **The Integration Approach of the State of Maine, USA**

Research carried out into the introduction of computers into Maine’s middle schools, a state in America, indicated that a large majority of teachers who applied for the one-to-one laptop programme were successful and extensive evidence shows that student learning increased (Silvernail & Lane, 2004). This programme began in 2002, when Maine started a bold new plan designed to “...transform Maine into the premier state for utilising technology in kindergarten to grade 12 education in order to prepare students for a future economy that will rely heavily on technology and innovation” (Task Force on Maine’s Learning Technology Endowment, 2001, p. vi).

Year 7 and 8 students and their teachers were given laptops and the school and teachers were provided with technical support and professional development to ensure that the technology integration into their curriculum and instruction was successful (Silvernail & Lane, 2004). This was the initial phase of the Maine Learning Technology Initiative [MLTI] (Silvernail & Lane, 2004).

The MLTI had a plan to train and prepare the students of Maine for a world that was changing fast (Silvernail & Lane, 2004). In 2000, Governor King created a joint task force for Maine Learning Technology Endowment to follow. The task force concluded:

We live in a world that is increasingly complex and where change is increasingly rampant. Driving much of this complexity and change are new concepts and a new economy base on powerful, ubiquitous computer technology linked to the internet. Our schools are challenged to prepare young people to navigate and prosper in this world, with technology as an ally rather than an obstacle. The challenge is familiar, but the imperative is new: we must prepare young people to thrive in a world that doesn't exist yet, to grapple with problems and construct new knowledge which is barely visible to us today. It is no longer adequate to prepare some of our young people to high levels of learning and technological literacy; we must prepare all for the demands of a world in which workers and citizens will be required to use and create knowledge, and embrace technology as a powerful tool to do so.

If technology is a challenge for our educational system, it is also part of the solution. To move all students to high levels of learning and technological literacy, all students will need access to technology when and where it can be most effectively incorporated into learning (Task Force on Maine's Learning Technology Endowment, 2001, p. i).

The first step into developing a trained network of teachers was to identify Regional Integration Mentors (RIM) (Silvernail & Lane, 2004). Each school had one teacher chosen to become the RIM for that region (Silvernail & Lane, 2004). RIMs were given the overarching goal of making technology integration successful in both the middle schools and the region (Silvernail & Lane, 2004). They were to do this by developing practices and laptop procedures and assisting MLTI in creating professional development programmes (Silvernail & Lane, 2004).

In 2002-2003, 17,000 year seven students and their teachers in over 240 schools were given laptop computers (Silvernail & Lane, 2004). At the same time, Maine Department of Education created a professional development network which comprised of new roles and regional positions (Silvernail & Lane, 2004). All 243 middle schools chose a teacher leader and technology co-ordinator, both of whom received training to assist leaders within their schools for the MLTI (Silvernail & Lane, 2004). Additionally, new roles were created in the MLTI professional development network called Content Mentors and Content Leaders (Silvernail & Lane, 2004). Content Mentors were specialists in specific content areas e.g.

Mathematics and Science (Silvernail & Lane, 2004). Content Leaders were content specialists in the nine regions within Maine (Silvernail & Lane, 2004).

The individuals who were trained along with RIMs and teacher leaders from each region were there to organise, establish, and maintain the MLTI professional development network (Silvernail & Lane, 2004). These positions were created to simplify curriculum and technology integration and support the transformation of teaching and learning in Maine's classrooms (Silvernail & Lane, 2004). Before laptops were given to teachers in Maine's middle schools, teacher training and professional development began, and continued to be ongoing, such as MLTI Teacher Trainings, Teacher Leaders, Regional Meetings for Principals and Technology Co-ordinators (Silvernail & Lane, 2004).

### **Effective Integration**

It is important that ICT integration is handled correctly because the four aspects that are affected - teacher practices, the way ICT is used in schools, student practices, and curriculum content and goals - impact both social and economic development (Kozma, 2005).

The integration of laptops into teacher and school practices has not, by itself, changed schools (Kerr, 1991). Other issues such as cultural, organisational and pedagogical have to be introduced alongside the technological changes (Kerr, 1991). Some technology introduced into schools is only being used by teachers to do more work quickly and efficiently (Cuban, 2001). Current practices can just as easily be maintained or they can be transformed by the introduction of ICT (Cuban, 2001). Coughlin and Lemke (1999) asserted that there were three stages of instructional evolution: entry, adaptation, and transformation. This meant that teachers' knowledge would evolve from:

1. Improved learning but not changing their teaching practices; to
2. Incorporating ICT into their current teaching; and finally,
3. Using the technology for major changes in their methods of teaching (Coughlin & Lemke, 1999).

It has been said that evolution happens over a period of time and not overnight (Hennessy, Ruthven, & Brindley, 2004). Zhao, et al. (2002), at the end of studying teachers for a year, concluded that teachers' technological innovations in the classroom were likely to happen if they took "small, but advanced steps towards change" (p. 512). However, it has been recommended that close attention is paid by policymakers to the relationship between the realities in schools and attempts to introduce innovative technology (Olson, 2000; Selwyn,

2002). Technical support quality and availability are also considered important points for laptop integration efforts (Inan & Lowther, 2010). Teachers claimed that they were not comfortable with computers because they were not provided with sufficient support and encouragement (Khambari, Moses, & Luan, 2009).

In classrooms, the teachers' control and authority over knowledge could be challenged by the use of ICT such as the internet (Wallace, 2004). To enhance schools' use of ICT, professional development was needed (Christensen, 2002; Jones, 2004; Cox, Preston, & Cox, 1999). Teachers' levels of knowledge and expertise needed to be catered for and teachers' skill and pedagogical needs needed to be balanced (Christensen, 2002; Jones, 2004; Cox, Preston, & Cox, 1999). An integrated classroom required reliable technological infrastructure that included network systems, hardware, and software (Cox, Preston, & Cox, 1999). Dependable and good quality on-site technical support was also important (Cuban, 1999; Scrimshaw, 2004) because teachers need to know that equipment will be reliable and will function when they need it (Bradley & Russell, 1997; Jones, 2004; Zhao, Pugh, Sheldon, & Byers, 2002).

School leadership support was important because any change that included technology could also have financial consequences (Langer, 2005). It was essential that there was good planning and a coordinated implementation because the introduction of technology could have impacts that were both wide ranging and unpredictable (Langer, 2005). These impacts could also affect a school's systems and structures as well as its culture, in addition to altering the learning and teaching processes (Cuban, Kilpatrick, & Peck, 2001; Jewell, 1998). Cunningham et al., (2003) assert that the use of laptop in schools could increase communication between teachers, students and parents, whilst enabling better sharing of information among teachers.

Increased confidence and competence in ICT amongst teachers has led to greater positivity in classrooms for both students and teachers (Sockwell & Zhang, 2003). Teachers who used to share desktop computers with their peers and students now had laptops, which they could claim as their own (Sockwell & Zhang, 2003). They liked having the laptops readily available to them every day and having all their work in one place (Cowie, et al., 2008). When the computers were not stand-alone but were linked to peripherals teachers were able to produce better materials for their classes (Cowie, et al., 2008).

The literature identifies a number of factors that impact ICT use among teachers (Kerr, 1991). Changes in teachers or schools cannot be done by ICT alone (Kerr, 1991). For

changes to occur school-wide, due to ICT use, other aspects have to change such as departmental and classroom factors (Cowie, et al., 2008). Professional development is required for teachers because teacher confidence and expertise take time to develop when they are learning new knowledge and ICT practices (Cowie, et al., 2008).

It has been found that teachers' beliefs are major factors influencing computer integration and they also affect how much teachers use the technology in the classroom (Ertmer, 2005; Lei & Zhao, 2008; Sclater, Sicol, Abrami, & Wade, 2006; Wozney, Ventakesh, & Abrami, 2006). The likelihood of technology integration is dependent on the teachers' knowledge, skills and confidence (Inan & Lowther, 2010; Ward & Parr, 2010). Teachers who are knowledgeable about the technology and have greater skills use laptops more often and for a greater range of applications than those who do not have that level of skills and knowledge (Ronkvist, Dexter, & Anderson, 2000). To plan and produce effective lessons with technology, requires knowledge and skill in order to support curriculum learning (Dawson, Cavanaugh, & Ritzhaupt, 2008; Donovan, Hartley, & Strudler, 2007).

### **Professional Development**

Professional development for teachers is critical, as it helps boost teacher skills, knowledge, and confidence (Zhao, Pugh, Sheldon, & Byers, 2002). Zhao et al., (2002) found that professional development usually only focusses on teachers' technical skills and attitudes and they recommended that there should be more attention paid to pedagogical content, which is necessary for integration. In order to increase the likelihood that teachers will use computers in their professional lives as productivity tools, they need to have both ready access to the technology as well as developmental programmes so that they gain sufficient skills to encourage this (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010).

Giving teachers laptops so that they have "anytime, anywhere professional learning" facilitates teachers' engagement with the technology and enhances their skills and knowledge (Power & Thomas, 2007, p. 376).

### **The Importance of Teachers**

Around the world, it is generally agreed that teachers are important to students learning and an increase to improve teacher quality has increased (Ball & Forzani, 2009). Teachers' main tasks are to help students learn and this is known as the "work of teaching" (Ball & Forzani, 2009, p. 497). Learning takes place both inside and outside the classroom (Ball & Forzani, 2009). Activities such as investigating student answers, reviewing material for a test, conversing with parents, evaluating students' papers, planning, and creating a

supportive environment for learning (Ball & Forzani, 2009). A teacher's set of skills include communication skills, cultural abilities, and imagination, as these are fundamental to effective practice (Ball & Forzani, 2009).

It has been stated that teaching is not a natural skill despite the fact that it is generally believed that most of it can be learned through experience (Jackson, 1986; Murray, 1989). Helping others to learn to do certain things in our normal everyday lives is frequently considered to be teaching (Ball & Forzani, 2009). However, specialised, professional classroom teaching is different from telling and helping (Ball & Forzani, 2009). A teacher's work is professional and specialised in form and nature (Ball & Forzani, 2009).

The art of teaching is not only strange but it is also complex (Ball & Forzani, 2009). Each instruction contains a lot of tasks and moves that are not seen by onlookers (Lewis, 2007). Teachers in each lesson decide how much time they will spend on it and decide the point or aim of the lesson (Sleep, 2009) and choose materials, examples, and tasks (Ball & Forzani, 2009). Classes are normally filled with 25 or more students and, as teachers deliver their lesson, they have to remember their goal, manage individual student behaviour, interpret student work, pose planned questions, and assess and direct students' growth (Ball & Forzani, 2009). All of the above are things that teachers do in the classroom and at school in conjunction with parents, administrators, as well as policies and community priorities, and this requires these efforts to be highly co-ordinated (Ball & Forzani, 2009).

Ball and Forzani (2009) argue that up-skilling teachers improves their knowledge and skills and increases the professionalism and of teacher education. Equally, those who say that teachers should develop individually through experience are recommending no system at all and this is not professional (Ball & Forzani, 2009). With the high demands to educate our youth of today, there is an urgent need to supply teachers to meet that request (Ball & Forzani, 2009). It is time that we acknowledge teachers, as teaching is not an easy task and many people need to study in order to do well and build a system of reliable professional preparation (Ball & Forzani, 2009).

### **The Ways Teachers Use Computers at Work**

Teachers have found that the introduction of laptops has made administration work easier and less time consuming (Cowie, et al., 2008). Cowie, et al. (2008) asserted that laptops have made things easier for teachers by providing them with the flexibility of time and place in creating lesson plans, unit plans, and assessments. Technology also gave teachers the

opportunity to communicate better and faster with colleagues and co-operate better with them (Cowie, et al., 2008).

Laptops made teaching more fun and innovative, which motivated students to learn in classrooms (University of Wolverhampton, 2008). The ease of creating lesson plans on laptops and having peripherals enabled teachers to create new teaching methods in classrooms, which built self-confidence in them (University of Wolverhampton, 2008). Having all necessary teaching resources on a laptop was important because it made evaluating and updating of resources possible on a daily basis (University of Wolverhampton, 2008).

### **How Students Use Computers at School**

Mouza (2008) asserted that providing students with laptops that they are able to take home can impact students, who are sometimes left out from the world of technology. There are four fundamental characteristics of learning that are believed to enhance students learning through the use of computers (Mouza, 2008). They are:

1. Active engagement,
2. Participation in groups,
3. Frequent interaction and feedback, and
4. Connections to real-world contexts.

The use of computers changes what students learn by giving them exposure to ideas and practices that would otherwise be unreachable (Mouza, 2008). The disadvantages of letting students use laptops inside the class can include:

- Surfing the web for personal reasons,
- Social networking with peers, and
- Entertainment e.g. watching videos and playing games (Kay & Lauricella, 2014).

Laptops can both enhance students learning and as well as distract them (Inan & Lowther, 2010).

### **Researching Technology in Teaching**

The research into Maine's integration of technology into their middle schools used both quantitative and qualitative methodologies (Silvernail & Lane, 2004). According to Frechtling and Sharp (1997):

By using different sources and methods at various points in the evaluation process, the evaluation team can build on the strength of each time of data collection and minimize the weaknesses of any single approach. A multi-method approach to evaluation can increase both the validity and reliability of evaluation data. (pp. 1-8).

Cuban (2001) and Cuba, Kirkpatrick, and Peck (2001) have asked questions such as what is the profit on large technology investments, from both a financial as well as a teaching and a learning perspective. In order to assess the true results of technology in education one should ask questions of:

- access (e.g., how many computers are there in the school, and are they connected to the internet or not [*sic*]); to the more difficult questions of
- availability (e.g., do the computers work? Do they have good software? Is there good technical support at the school?); and
- integration (e.g., have teachers been prepared to use technology effectively in their classrooms? Are they using technology for both personal productivity and to support and enhance student learning?). (National Center for Education Statistics, 2002, as cited in Hernandez-Ramos, 2005, p. 40)

### **Barriers**

In both developed and developing countries worldwide, there are common barriers to the implementation and integration of IT in education (Parker-Hay, 2012).

In 2004, the British Educational Communications and Technology Agency [BECTA] reported that the barriers to teachers integrating IT into classrooms could be grouped into internal and external barriers. The internal barriers were lack of confidence, resistance to change, negative attitudes, and no perception of benefits (BECTA, 2004). The external barriers were lack of access to resources, lack of time, lack of effective training, and technical problems (BECTA, 2004).

According to Hew & Brush (2006) there are six main barriers of technology integration:

1. Resources;
2. Knowledge and skills;
3. Institution;
4. Attitudes and beliefs;
5. Assessment;
6. Subject culture.

These are now discussed in more detail.

#### **Resources.**

The lack of resources which may include one or more of the following:

- Technology;

- Access to available technology;
- Time; and
- Technical support.

Lack of technology includes inadequate computers, peripherals, and software (O'Mahony, 2003; Pelgrum, 2001). Without satisfactory access to hardware and software, teachers have very little opportunity to integrate technology in the curriculum (Hew & Brush, 2006). Access to technology is more than availability of technology; it also involves providing the correct amount and correct types of technology in places where students and teachers can access them (Fabry & Higgs, 1997). Selwyn (1999) asserted that resources were mostly consumed by the technology classes (e.g. computer classes) resulting in a hierarchy of subjects where non-technological classes were at a disadvantage. Zhao et al., (2002) have also found that teachers who do not have easy access to computer laboratories compete with other teachers for lab time. Lack of time is also another resource type barrier (Butzin, 2001; Karagiorgi, 2005; O'Mahony, 2003). Teachers found themselves running out of time to visit websites, locate photos required for classes, and scan photos into the computer (Hew & Brush, 2006). Teachers who worked long hours paid a personal price in "burn out" and would leave teaching (Hew & Brush, 2006).

#### **Knowledge and skills.**

Snoeyink and Ertmer (2001) found that lack of computer knowledge or skills contributed to the lack of technology integration by teachers. Teachers did not try any technology-related activities in the classrooms until they had developed basic computer skills such as logging on the network, opening and closing files, and basic word processing (Hew & Brush, 2006). Hughes (2005) asserted that teachers who were trying to integrate technology into their teaching needed to have a pedagogical knowledge and skills base that was supported by the technology. Typically, in a technology-integrated classroom teachers needed to be prepared with technology-related classroom management skills such as organising the classroom efficiently so that students have equal opportunities to use the computers or to be able to solve a problem when students are working on computers (Newhouse, 2001).

#### **Institution.**

Institutional barriers may include:

- a. Leadership,
- b. School time-tabling structure, and
- c. School planning

Fox and Henri (2005) found that school leadership can hinder technology integration by the teachers. In Hong Kong, for example, Fox and Henri (2005) stated that teachers felt that their principals did not understand the technology and its relevance. Lack of school planning is another institution type barrier (Hew & Brush, 2006). Lawson and Comber (1999) reported that there had been no plans for how to use the technology once installed, administrators had left the information technology department with the devices during the project, and, consequently, the use of the technology equipment did not go beyond that department.

### **Attitudes and beliefs.**

Hermans et al., (2006) claimed that another major barrier to technology integration is the teachers' attitudes and beliefs towards technology. Attitudes can be defined as feelings that specifically show whether a person likes or dislikes something (Simpson, Koballa, Oliver & Crawley, 1994). Beliefs can be defined as principles about something that are felt to be true (Calderhead, 1996; Richardson, 1996). Scholars have found that beliefs' determine a persons' attitude (Bodur, Brinberg & Coupey, 2000). Ertmer (2005) contended that teachers' beliefs influenced how they used technology as well as whether or not they used it. For example, Ertmer et al., (1999) found that teachers who saw technology as a way of keeping students busy did not see the importance to the curriculum. Researchers found that teachers' beliefs were a major barrier to technology integration (Hew & Brush, 2006). For example, in Australia, Newhouse (2001) found that the majority of teachers thought that the use of portable computers at secondary level would not lead to faster learning or better understanding by the students.

### **Assessment.**

Reeves (2000) defined assessment as the activity of measuring student learning. The nature of assessment can be either formative or summative, however, in education it is normally summative (Hugh & Brush, 2006). Summative testing is highly regarded as a form of promotion or graduation for students (CEO Forum on Education and Technology, 2001). The stress of such testing can be a major barrier to the integration of technology (Hew & Brush, 2006). For example, Fox and Henri (2005) discovered that the use of technology in secondary schools in Hong Kong gave teachers little time to create new instructional methods for high-stake technology testing.

### **Subject culture.**

A set of practices and expectations that surround a particular school subject and defines that subject as a distinct area of study (Goodson & Mangan, 1995). Teachers refuse to accept technology that opposes the standards of a subject culture (Hennessy, Ruthven & Brindley, 2005). For example, Selwyn (1999) discovered an art teacher who did not use computers because she believed that the students' hands and minds would be disjointed by using a mouse instead of their own hands.

### **Strategies to Overcome Barriers**

Sharing visions of learning and teaching can overcome leadership barriers to technology use (Sandholtz et al., 1997; Tearle, 2004). For example, Lim and Khine (2006) found four schools who shared the same vision in the technology integration plan, which would allow teachers and school leaders to correspond on how they might use technology, where to start achieving their goals, and to set future guidelines. Without such a vision, administrators and teachers are likely to think of technology as only limited computer skills or "boxes and wires" (Fishman & Pinkard, 2001, p. 70). The most important vision to be addressed with regards to technology integration is the relationship between technology and certain curriculum content areas (Staples, Pugach & Himes, 2005). It has also been noted that visions should not only be made by school leaders; teachers in particular should be involved in the decision making as teacher participation is believed to be a successful ingredient to technology integration in schools (Bowman, Newman & Masterton, 2001; Eshet et al., 2000). Fishman and Pinkard (2001) advised that, in order to expedite the development of an integration plan, a technology planning committee should be created consisting of teachers, administrators and facilitators from outside (e.g. education technology experts) who are more than willing to enable change. Any questions that teachers and administrators had, could be answered by outside experts (Hew & Brush, 2006).

Lim and Khine (2006) assert that an issue which needs to be addressed is the instructional purposes of technology expectations, such as specified number of technology-facilitated lessons conducted per week. Specifying the number of technology-integrated lessons serves as an instrument to exercise pressure on teachers to use technology and to increase usage (O'Dwyer, Russell & Bebell, 2004). Expectations for teachers to take part in team meetings regarding the use of technology is another form of pressure that has been found valuable for technology integration as it develops skill levels (Schiller, 2002). Another matter to consider in technology planning is the monitoring of activities to guarantee that integration of technology is proceeding (Schiller, 2004). Some monitoring activity examples that can be

used by principals to ensure that teachers are using technology effectively could include: one-on-one discussions with teachers, observation visits to classrooms, and analysis of lesson plans (Schiller, 2002).

### **Overcoming the scarcity of resources.**

Hew and Brush (2006) discuss three strategies that may overcome the lack of technology. First of all, set up the classroom in a hybrid setup using cheaper computer systems “thin client computers” (Hew & Brush, 2006, p. 235). Thin client computers are comprised of only a monitor and a device that provides access to a network with no hard or floppy drive (Hew & Brush, 2006). Sandholtz and Reilly (2004) established that the use of thin clients provides three distinct advantages:

1. Lower costs permitted schools to extend their purchasing capacity,
2. It presents fewer maintenance or technical problems, and
3. It reduces space management issues due to their small size.

Secondly, introduce technology into one or two subject areas to guarantee that students and teachers in those specified areas grasp the technology (Tearle, 2004).

Thirdly, instead of building expensive computer laboratories, introduce the use of laptops with wireless connections (Lowther, Ross & Morrison, 2003). Lowther et al., (2003) state that evidence shows that laptops are the best method for integrating technology use into teaching practices. To overcome the barrier of lack of access to technology involves two strategies (Hew & Brush, 2006). Firstly, have a few computers installed in the classroom instead of in a centralised location (Hew & Brush, 2006). Secondly, make sure that each student gets an opportunity to use a laptop by rotating groups of students through the computers that are in the classroom (Hew & Brush, 2006).

Overcoming the lack of time barrier, there are three strategies (Hew & Brush, 2006). First, schools have to change their time-table to increase class time to double period sessions (Bowman et al., 2001). Second, reduce teachers’ class loads so that they are able to familiarise themselves with the technology (Snoeyink & Ertmer, 2001). Third, encourage teachers to team up and create integrated lesson plans and materials (Dexter & Anderson, 2002; Lim & Khine, 2006). Working together will shorten time needed to produce technology-integrated lessons compared to working alone (Hew & Brush, 2006).

Lim et al., (2003) found that an effective way to reduce technical problems was by training students, which would leave teachers time to concentrate on running and handling subject activities. Training students to be able to solve simple hardware and software

problems is one way to overcome lack of technical support (Hew & Brush, 2006). Then, it would only be necessary to pay a technician if students were not able to fix a hardware or software problem (Hew & Brush, 2006).

### **Changing attitudes and beliefs.**

Hew and Brush (2006) suggest that there are four factors needed to enable change in attitudes and beliefs:

1. Teachers' knowledge and skills,
2. Subject culture,
3. Assessment, and
4. Institution support.

Institution support comes in four ways:

1. Having a vision and plan of what the teachers wish to do with technology (Lawson & Comber, 1999);
2. Providing the teachers with the necessary resources (Sandholtz & Reilly, 2004);
3. Giving teachers on-going professional development (Schiller, 2002; Teo & Wei, 2001); and
4. Providing teachers with encouragement (Mouza, 2002).

Hugh and Brush (2006) assert that school leaders should not blame teachers for making mistakes, especially when it comes to new technology. Dawson and Rakes (2003) suggest that principals should be trained so that they are made aware of the methods and procedures of integrating technology into the curriculum.

### **Providing professional development.**

Professional development can not only influence teachers' attitudes and beliefs concerning technology but also it can provide teachers with the knowledge and skill to utilise the technology in the classroom (Fishmann & Pinkard, 2001; Shaunessy, 2005; Teo & Wei, 2001). Studies show that successful professional development for technology integration needs to:

- Focus on content (technology knowledge and skills),
- Enable teachers to do 'hands-on' work, and
- Ensure that professional development is consistent with teacher's needs (Hew & Brush, 2006).

Snoeyink and Ertmer (2001) found that technology integration amongst teachers was not beneficial until they had established basic skills, such as logging on to the network.

Hughes (2005) claimed that the most effective method was helping teachers to see the connection between the technology used and the subject content being taught. As Hughes (2005) put it, “It accords that the more content-specific the example, the more likely the teacher will see the value [of technology] and learn it” (p. 296).

### **Reconsidering assessment.**

Curriculum assessment is carefully linked and there is a need to completely reconsider the assessment approaches (Hew & Brush, 2006). Hew and Brush (2006) stated that other methods of assessment plans could be formulated. For example, Bowman et al., (2001) found that one teacher made contracts for students detailing what was expected of them to submit for their final grade. The contract specified how many PowerPoint slides should be produced as well as evidence on information gathering (Bowman et al., 2001).

### **Summary**

Our struggles to understand computers and related technologies in classrooms have more to do with school practices, educational cultures and power battles among investors in the process (Hernandez-Ramos, 2005). We look into the perspective of one of the main stakeholders – teachers who are known as “gatekeepers” in educational processes (Hernandez-Ramos, 2005, p. 40). Pedagogical knowledge is more important than technical skills and, therefore, the more teachers know about how students learn, the more they are likely to try new teaching strategies to cater for different learning needs (Bransford, Brown & Cocking, 2000; Hernandez-Ramos, 2005; Sandholtz & Reilly, 2004).

What is technology integration? There is no one set or clear definition of technology integration (Bebell, Russell & O’Dwyer, 2004). Some scholars understood technology integration as teachers’ use of computers in classrooms whether it was low-level (e.g. students carrying out research on internet) or high-level (e.g. students doing multimedia presentations) (Cuban, Kirkpatrick & Peck, 2001). Other scholars understood technology integration as teachers using technology to deliver activities or lessons more consistently and effectively (Hennessy, Ruthven & Brindley, 2005). However, others believed that it meant teachers using technology to improve students’ thinking skills (Lim et al., 2003).

## Chapter Three

### Methodology

This chapter describes the participants, the materials utilised, the procedures followed, and the analysis of the data. The overall methodology for this study is shown in the flow chart below (see Figure 1). The methodology flow chart was designed to explain how information was gathered in conducting the research. The first step was to contact Sharyn Paio, the Secretary of Education, in order to get background information on why the Ministry of Education introduced laptops to teachers at Tereora College. The second step was deciding the methods that would be used to collect the research data. The third step was to collate the collected data and to analyse the results. The fourth step was whether the analysis of the data collected supported or rejected the research question and to show the evidence in either case.

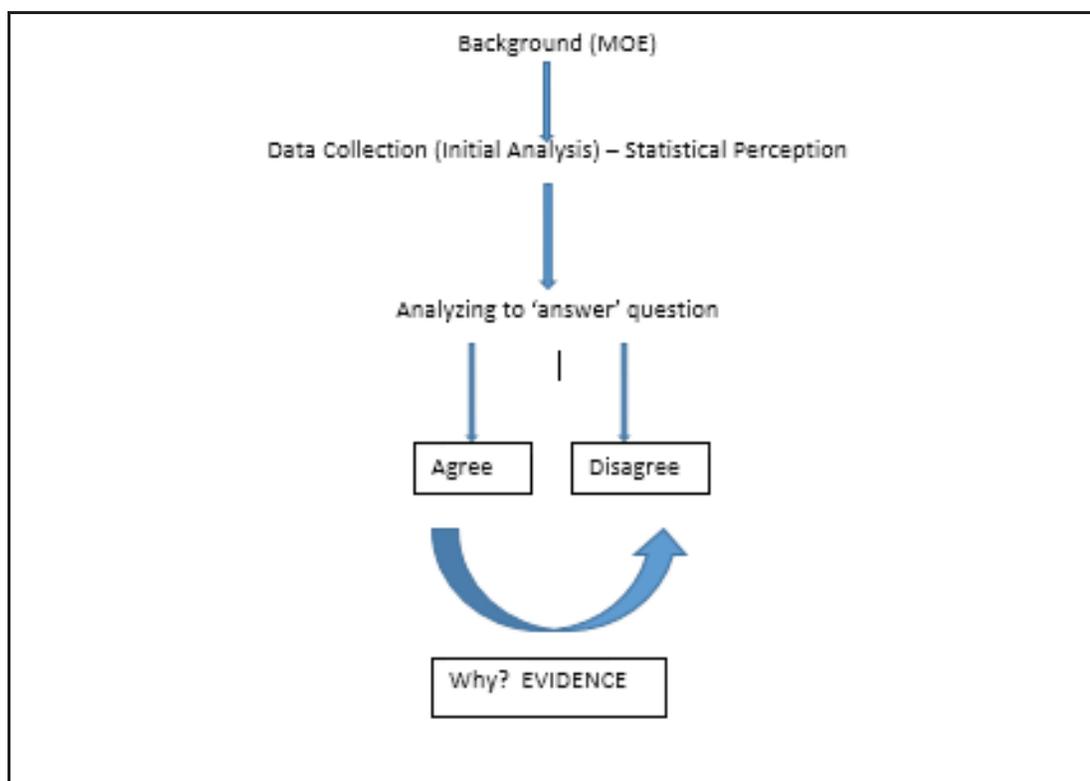


Figure 1: Methodology Flow Chart

### Method

#### Participants

The research participants were 27 teachers at Tereora College in Rarotonga, Cook Islands. The college has 45 teachers, aged from 24-55, 24 of whom are female and 21 are

male. However, as only 27 of these teachers participated and did so anonymously, the ages or genders of the participants could not be determined. Nevertheless, those that took part did so voluntarily and were not paid for their cooperation with this research.

### **Materials**

- Questionnaires
- Interview Questionnaires
- iPhone 4 (recording)

### **Procedure**

As a mean of collecting information I used questionnaires as well as interviews. This section firstly covers the procedures for questionnaires followed by the procedures for interviews.

#### **Questionnaires.**

A draft questionnaire was emailed to two staff members and a retired professor to read and comment. Once their comments had been received, changes were made to the questionnaire (see Appendix A) and it was emailed to the 45 teachers who taught with laptops in the classrooms. In the email was an explanation of the research that was being carried out and what it was for. The email also asked staff members to put the completed questionnaires in my pigeon hole for collection and, in this way, their identity would remain unknown. Questionnaires were also printed and distributed in each staff member's pigeon hole in case they did not wish to use email for the research. The questionnaire also advised the teachers how to return the completed forms anonymously by placing them in the researcher's pigeon hole. This method of research was chosen because of time restrictions and because it gave teachers the opportunity to choose between electronic or paper communication. Once collected, the quantitative data were entered into a spreadsheet and a table was created. This data was also graphed so as to enable detailed comparisons of the results.

#### **Interviews.**

This interviewing method was chosen as it allowed personal insights or opinions from staff members to be collected. A further email was sent to the 45 teachers who used laptops to teach in classrooms to ask who were willing to be interviewed by me and six of them responded positively. I emailed the six teachers asking for their availability for the interview and I attached the interview questions (see Appendix B) for them to look over and to give them time to prepare. Once the appointments were made I sent a reminder email to the participant the day before the scheduled interview. Each interview took place with only

myself and the participant present and was conducted in a quiet room within our school computer lab. The participant and I sat around the table with an iPhone 4 in the middle to record the interview taking place. Each interview lasted for approximately 30 minutes. After all the interviews were completed, I transcribed four of the interviews. The remaining two interviews were not transcribed in full but notes were compiled from the recording.

### **Analysis**

The questionnaire asked teachers how many times they carried out a certain task per week as the first question. The data collected from the questionnaire survey were exported to Microsoft Excel format. Any written responses in text were kept separate from any multiple-choice and numerical data. Multiple-choice and numerical data were analysed with basic addition and descriptors such as total and times per week. Tables were generated and calculated in Microsoft Excel from the numerical data to produce column graphs that showed how many times teachers carried out certain tasks within a week.

The text responses from the more personalised questions in the questionnaire were analysed by being coded and categorised into similar topics. These data were tabled in a quantitative format in Microsoft Excel and graphed in order to show how staff felt about laptops as teaching tools.

In each interview, the questions that were asked were all similar. The answers given by these participants were analysed by being coded and categorised into similar topics to those answers given by the participants who completed the questionnaire. The data were tabled in Microsoft Excel and graphed in order to show what teachers thought were the most beneficial aspects of using laptops as teaching tools.

## Chapter Four

### Results

Table 1: *Teachers Laptop Usage*

<u>Times used per week per teacher</u>	<u>0-1</u>	<u>2-4</u>	<u>5-7</u>	<u>8-10</u>	<u>11-13</u>
<u>Activity</u>					
Create student worksheet	6	6	8	1	6
Print student worksheet	4	6	7	4	6
Create assessments	7	4	5	4	7
Print assessments	6	5	4	4	8
Liaise with parents via email	15	5	3	2	2
Mark class roll on kamar <sup>1</sup>	2	1	1	3	20
Show visual for students learning	5	5	4	3	10
Play video for learning purposes	6	8	4	4	5
Work related emails	4	5	6	3	9
Lesson plans, unit plans	0	0	0	2	25

The data displayed in the table above are shown in graphs below:

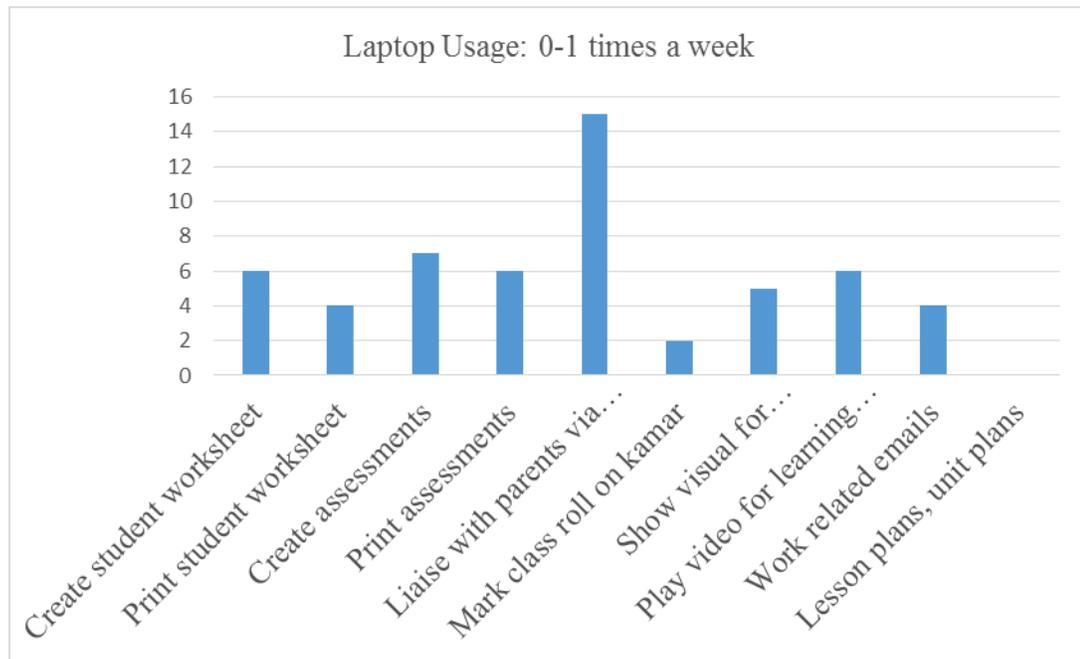


Figure 2: Staff laptop usage 0-1 times a week

Based on the data gathered, more than half the participants in this study used their laptops for email communication to parents once a week.

<sup>1</sup> The student database, which contains information about students such as their grades, attendance, and personal details.

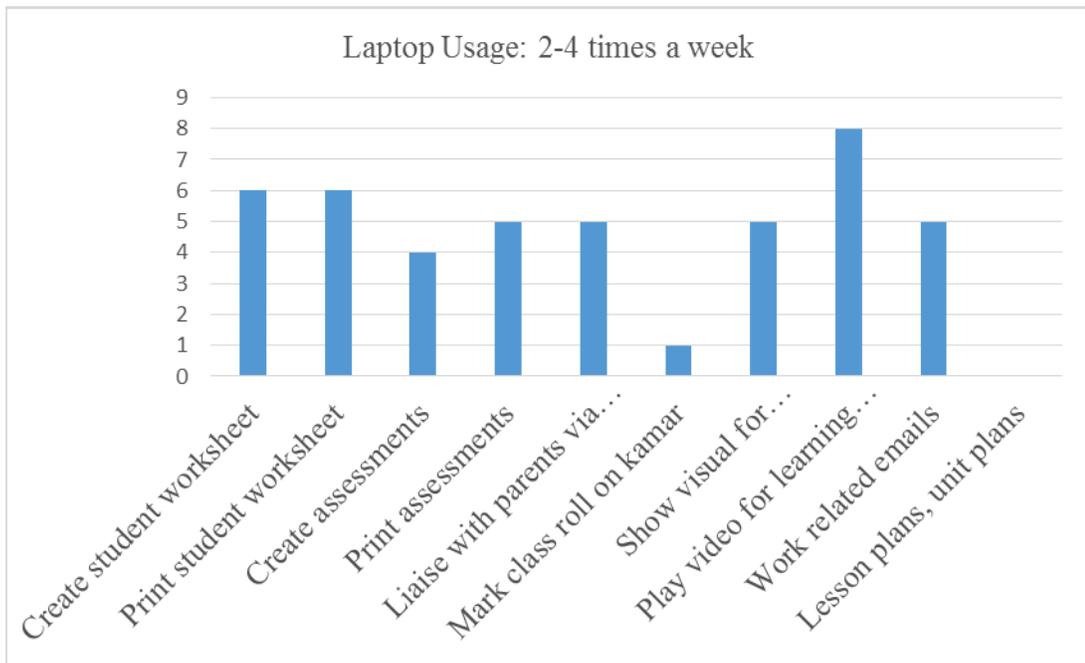


Figure 3: Staff laptop usage 2-4 times a week

Data collected in this study shows that more than half of the participants used their laptops two to four times a week to play videos for learning.

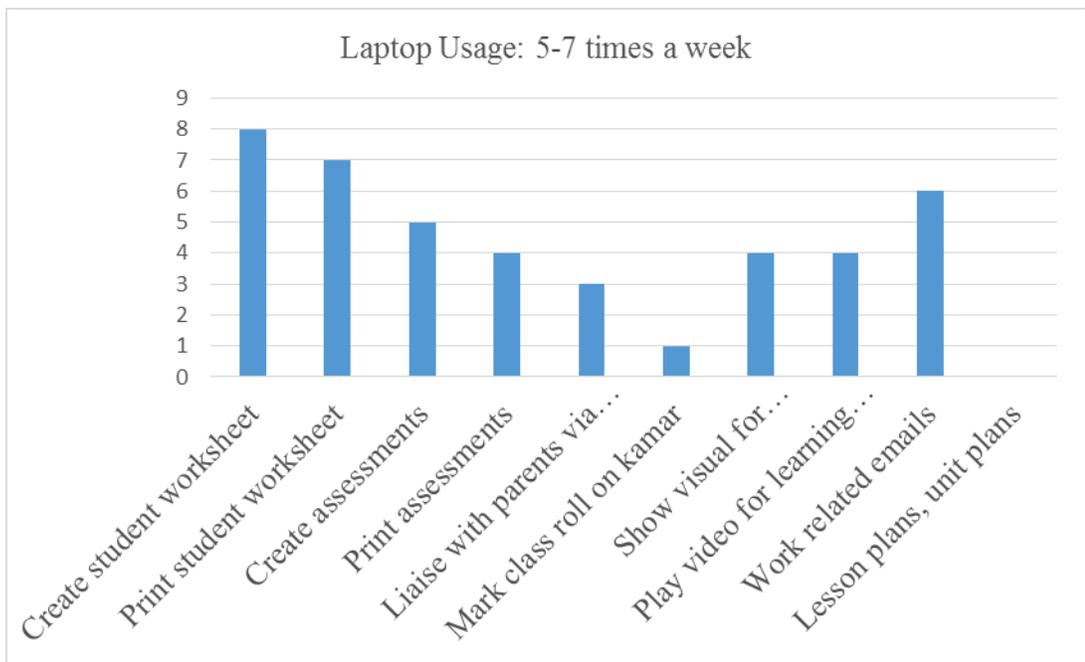


Figure 4: Staff laptop usage 5-7 times a week

Data gathered in this study shows that most of the participants used their laptops to create and print student worksheets five to seven times a week.

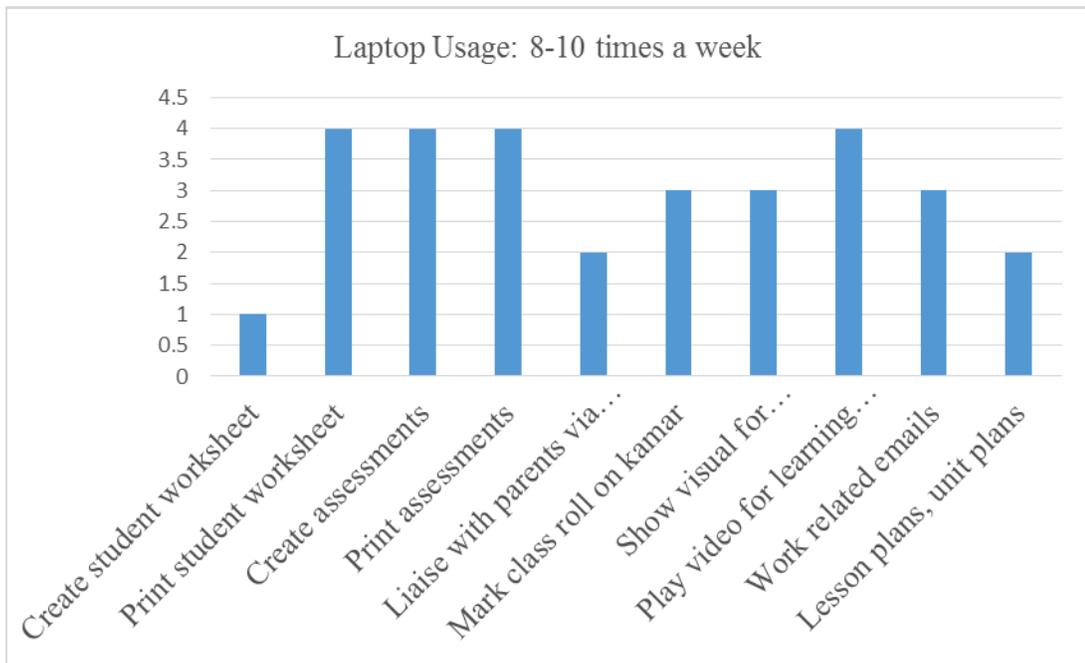


Figure 5: Staff laptop usage 8-10 times a week

Based on the data gathered, more than half of the participants used their laptops eight to ten times a week to print student worksheets, create and print assessments, and play video for students learning.

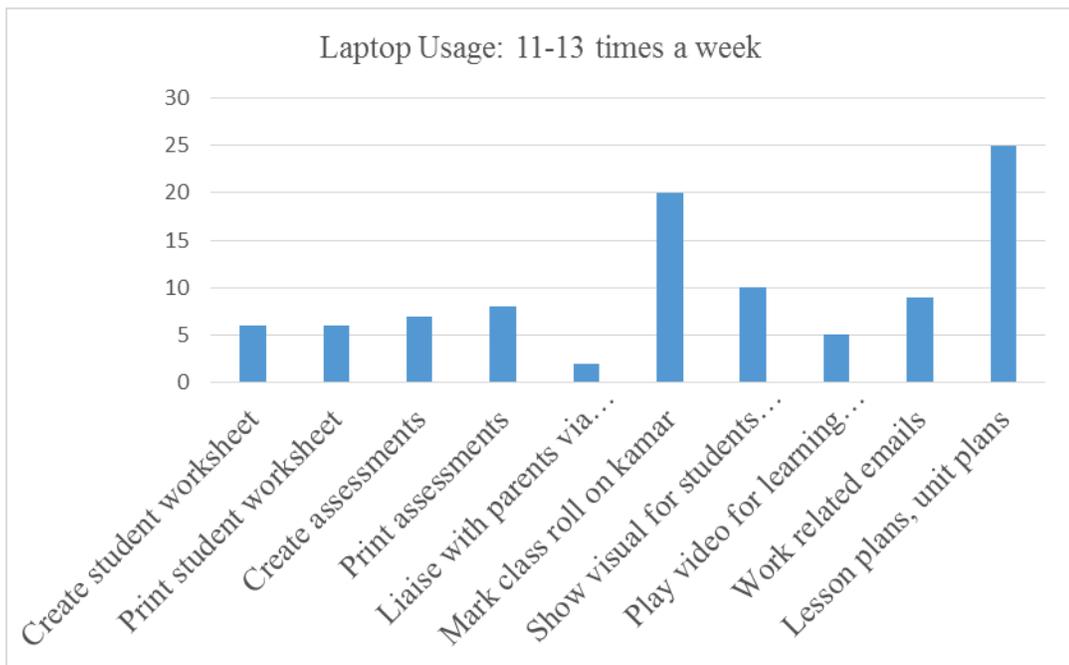


Figure 6: Staff laptop usage 11-13 times a week

This graph shows that more than half of the participants used their laptops eleven to thirteen times a week to create lesson and unit plans.

Table 2: *Common Benefits/Uses Taken from Interviews and Questionnaires*

<u>Benefits/Uses</u>	<u>Total</u>
Visuals e.g. Powerpoint	10
Efficient	9
Video	8
Higher student engagement	8
Less time consuming	7
Audio	5
Effective learning	5
Up-to-date Materials	4

Below is a graph displaying what teachers think laptop benefits are and how laptops enhance students learning.

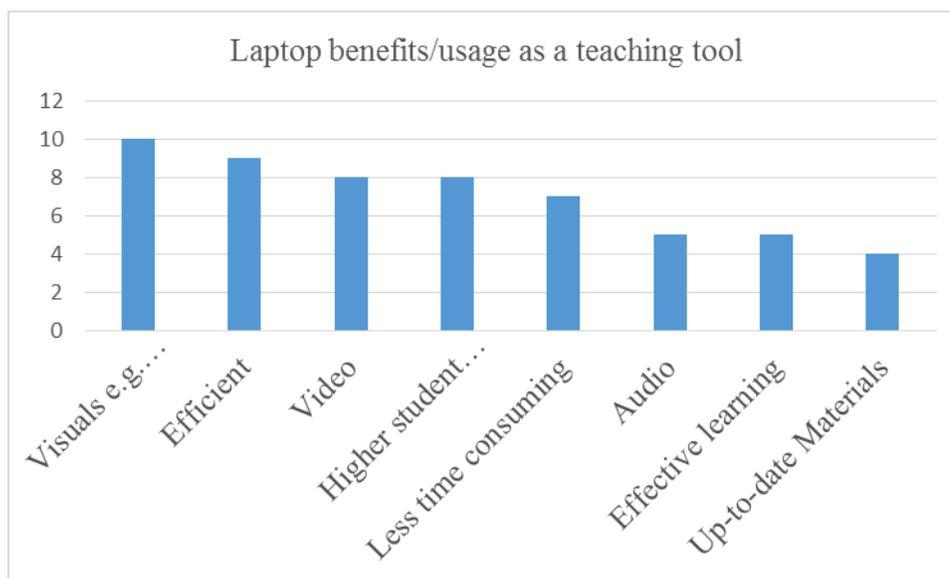


Figure 7: Laptop benefits and usage as a teachers teaching tool

Based on the data gathered, more than half the participants in this study stated that the main benefit of their laptop was using it for visual teaching methods e.g. PowerPoint.

## Chapter Five

### Discussion

Did the implementation of laptops as a teaching tool enhance the work of teachers at Tereora College? In 2015, the Cook Islands Ministry of Education had introduced laptops to the Tereora College staff. Paio (personal communication, March 13, 2015) stated that the aims of the Ministry of Education were a) to get teachers of the Cook Islands to use laptops as a teaching tool to deliver lessons in classrooms for both primary and secondary schools and b) to facilitate Cook Islands teachers to be on the same level as teachers in New Zealand. The literature review confirmed that the New Zealand Ministry of Education and the Maine Learning Technology Initiative in the United States had very similar objectives to those of the Cook Islands. They both wanted teachers to integrate technology into their daily practices and in the classrooms (Cowie, et al., 2008; Silvernail & Lane, 2004).

The Cook Islands Ministry of Education introduced laptops to teachers at Tereora College so they were able to:

- Keep up with the current pedagogical practice, and
- Meet administration requirements such as lesson plans, unit plans and assessments (Paio, 2015).

The New Zealand Ministry of Education also introduced a laptops-for-teachers scheme [TELA] so that the teachers were able to:

- Use the laptop as a teaching and administration tool, and
- Deliver curriculum at both primary and secondary schools (Cowie, et al., 2008).

In America, Maine introduced the Maine Learning Technology Initiative so that teachers could:

- Integrate technology into their curriculum and instruction, and
- Prepare students for a rapidly changing world (Silvernail & Lane, 2004).

The results of the Tereora study, the data for which were collected over two months, indicated that laptops were being used by teachers at Tereora College. The study showed that the highest number of times that teachers used their laptops was for preparing lesson plans and unit plans. Slightly over 92% of the participants spent between 11-13 times per week in this activity.

The results showed that the second highest activity for which teachers used their laptops was marking the roll. The participants indicated that 74% of them spent between 11-13 times per week recording the students' attendance.

The Tereora results demonstrated that the third highest activity was liaison with parents via email. Approximately 56% of the participants sent at least one email a week to parents. These results support Cowie, et al., (2008), who stated that teachers' use of laptops made administration work easier and less time consuming as well as providing teachers with the flexibility of time and place in creating lesson plans, unit plans, and assessments.

The Tereora results are also in agreement with Cowie, et al., (2008), who found that computers gave teachers opportunities to communicate better and faster with colleagues and parents. Cowie, et al., (2008) also reported that teachers found that the use of laptops improved the students' quality of work, the students were learning more, and were motivated to learn as well as becoming engaged in the learning process.

The University of Wolverhampton (2008) also stated that laptops made teaching fun and innovative, and motivated students to learn in classrooms. However, these findings of Cowie, et al., (2008) and the University of Wolverhampton (2008) were not concordant with the Tereora results, where the teachers did not report similar improvements to students' work and/or attitude. It may be that this is because teachers having laptops is still new to both the Tereora teachers and the students. Nevertheless, there are indications that students may become more engaged. The participants reported that the computers have enabled them to carry out research for students in order to help them understand more about a subject.

The Tereora teachers found that the laptops made teaching resources easy to update on a daily basis. This result supports the University of Wolverhampton (2008), who asserted that laptops with teaching resources were important because they made it possible to evaluate and update those resources.

Some obstacles, however, have been encountered by the teachers of Tereora College with the implementation of laptops. The Tereora research found that, consequently, the teachers struggled to accept the new technology into their daily practices. These obstacles ranged from the practical to the technical. For example, one of the participants, who was interviewed, mentioned a challenge she had faced when implementing a laptop as a teaching tool. She found that not only did she have to learn basic computer and file management skills, but also that she had had to rearrange her classroom furniture to allow for laptop access to electrical outlets (S. Chand, personal communication, April 24, 2015).

Some teachers reported technical problems, and many teachers had difficulties with the implementation because there was no technical support on a need-basis. Additionally, there was no professional development provided in order to help them improve their

knowledge of, and skills related to, the technology. These results support Inan and Lowther (2010), who reported that teachers need quality technical support as well as availability in order for the technology integration to be successful. These results also supported the findings of Khambari, Moses and Luan (2009), who reported that there were teachers who were not comfortable with computers because they had not been provided with support and encouragement. The issues of technical problems as found in the Tereora results also support Silvernail and Lane (2004), who asserted that teachers faced technical problems implementing laptops into their daily practices because they felt that they needed more support.

The Tereora research showed that laptops were playing a large, and ever growing, part in the lives of the teachers, and that without the computers, some of the teachers would feel lost. There were participants who relied on laptops for administration tasks, preparing for classes, and for communication with work colleagues. Additionally, there were some participants who were slowly making the transformation from manually writing their work to digitised plans.

The study also uncovered that some teachers at Tereora College had very little knowledge about how to effectively operate a laptop. They had limited laptop skills, which could have prevented them from creating effective learning for students. Without proper laptop support or training, those participants were not able to navigate a laptop successfully. The teachers with only limited knowledge were not able to further develop plans or class activities, thereby preventing them from enhancing student learning. However, participants who had sound knowledge of laptops could cater to students' needs by knowing how to carry out effective research on the subject, creating operative PowerPoint visuals as well as knowing how to use different Microsoft office programs. Without sufficient laptop knowledge, the teachers were limited to delivering less effective learning.

The Tereora results showed that many of the teachers were uncomfortable with using the new technology because they had very little knowledge and skill, also support was not provided or readily available for them when they needed it. This result supports the finding that teachers stated that the lack of sufficient professional development activities, as well as the lack of time to explore and learn more about the technology, hindered them from integrating the technology into their teaching (Silvernail & Lane, 2004).

This is concordant with the results from Tereora College: Many of the staff reported that they needed professional development in order to make them feel confident when teaching in front of a class. Further, the Tereora teachers said that without that confidence

they were not able to deliver effective teaching with technology. This was because they were afraid of what the students would say and think with regards to how much they knew about the technology and what they were and were not capable of doing. This finding supports Cowie, et al., (2008), who stated that teachers needed professional development because confidence and expertise took time to develop when learning a new knowledge and ICT practices. The research of Inan and Lowther (2010) confirmed this when they stated, in the positive, that the likelihood of technology integration depended on the teachers' knowledge, skills and confidence. Lastly, this result echoed Whelan (2008), who asserted that 99% of respondents stated that their country's IT teacher training, awareness, and support was either "failing" or "adequate" (p. 59).

The Tereora research found that although some teachers at Tereora College had very little knowledge and skill about the technology, and had no technical support, they were using the laptops in the classrooms and in their daily practices. These Tereora teachers were using it to mark student attendance, on-the-spot editing of lessons, and using email to liaise with colleagues as well as parents. Even though these teachers had no training, no technical support, and no professional development they took the plunge and accepted the technology with no questions asked. These results support those of Ringstaff and Kelly (2002) and Hadley and Sheingold (1990), who found that teachers were using laptops in their classrooms five days a week and were doing so without technical support. Moreover, this was approximately the same amount of time as teachers who worked in schools that had a system of full technical support (Hadley & Sheingold, 1990; Ringstaff & Kelly, 2002).

The study at Tereora found that, due to the lack of finance, Tereora College was not able to employ a full-time technical support person onsite. The technical support role was added to the duties of an existing, full-time, computing teacher. This supports the findings of Hernandez-Ramos (2005) who found similarities in California, which was suffering budget crisis and many technical support positions were being cut. This also supports Brandjes (2002), who concluded that technical and financial barriers, along with the lack of pedagogical training, meant that IT was not being effectively used in education. Nevertheless, there are examples of schools that have successfully integrated technology into the work of teachers, and administrators, and where student performance had improved. One example was the implementation of computers into Maine's Middle Schools (Silvernail & Lane, 2002). Silvernail and Lane (2002) stated that, in Maine, the technology was successfully implemented by teachers and the students' work and learning improved because

they had support already laid out and set up well before the introduction of computers to the schools. Both the literature review and the Tereora results highlighted that the problems and barriers to the successful implementation of IT in education were similar in all the studies. Therefore, the success of the implementation in Maine may mean that this could be duplicated in the Pacific.

The Tereora College staff are all on email and are encouraged to utilise the program efficiently as it was the main point of contact with the principal. The researcher noticed that the older teachers, who were Cook Islanders, seemed to have difficulties in accepting the idea of using laptops in teaching. However, they have been gradually increasing their use of the equipment in response to the Ministry of Education's vision of moving with the times and new technology. Any staff member who wished to participate in this research, but who did not want to use email, was given the opportunity to express their perspective by answering the paper questionnaire placed individually in their pigeon holes.

The significance of the dataset and statistical conclusions show that the introduction of the laptops as teaching tools at Tereora College enhanced the work of teachers and helped to improve student learning. Additionally, the laptops provided a better and more efficient way of communicating with students' parents, while also facilitating teachers' administration work.

### **Limitations**

There were limitations experienced during this research. They were:

- **Time** – This was due to the limited time available for this research, which had to be conducted, concluded, and written up within two months. Consequently, it was not possible to compare data received from Tereora College with other colleges in the country e.g. Titikaveka College or Araura College in Aitutaki.
- **Resources** – There were no additional resources available to fund the purchase of proper research equipment, e.g. tape recorder, which could have improved the effectiveness of the research.

### **Recommendations**

- Any future research into the same topic should compare data between Cook Islands colleges, either between those in Rarotonga and/or the only other college outside Rarotonga which is in Aitutaki.
- The researcher is in favour of laptops being implemented as a teaching tool to enhance teachers' work at Tereora College because she has seen more benefits to the

implementation of these tools and only a few disadvantages. As the years go by, it is recommended that the Ministry of Education provides support and training for teachers who need or want to improve their understanding of, and skills on, these modern tools.

### **Conclusion**

The results of the research have been presented and discussed. This research was carried out on Rarotonga, the capital of the Cook Islands, at the country's national secondary school, Tereora College. Results could differ in other regions, countries, and other schools due to many factors, including gender, cultural factors, and differences in teacher attitudes.

The research results provided some support that the use of laptops as teaching tools enhanced the work of teachers at Tereora College. The research showed that laptops have made administration tasks more effective and efficient for teachers. Laptops have also helped teachers create effective learning tools to enhance students learning via visuals e.g. PowerPoint, audio, and videos, as well as up-to-date materials, which may, in time, create higher student engagement. However, the research made it very clear that teachers needed support and training to boost their knowledge and skills in using laptops effectively. Additionally, if students' learning was to be enhanced, teachers needed to improve their skills on, and their knowledge of, computers.

The study at Tereora College highlighted a number of issues. Firstly, the Cook Islands Ministry of Education needed to have considered the issue of support, in order for the laptop integration into Tereora College to have been a success. Both prior, as well as ongoing, support should have been planned and structured before the implementation of the technology. For example, the ministry could have run some professional development programmes for the teachers prior to the introduction of the laptops into the college. Additionally, the ministry could train one or two staff within the school to cater for the teachers' technical problems as well as having a technician from the Ministry of Education available to tend to problems that the staff are unable to fix.

This study showed that, when it comes to technology integration, the teachers at Tereora College were not that different to those in schools in New Zealand and Maine, judging from the similar results reported. Ringstaff and Kelly (2002) and Hadley and Sheingold (1990) asserted that, one day, some teachers will manage to change their teaching and create unforgettable learning experiences with students, *despite* the institutional economic, social, political and cultural factors that may come up as distractions in their path

(original emphasis). This was echoed in the results of this research, which showed that Tereora College staff will keep using the laptops as a teaching tool whether or not they have onsite support, training, and professional development.

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## Appendix A

### Teacher Questionnaire

Kia Orana teachers! This questionnaire is to assist me with my research in completing my Masters in Information Systems. My project title is 'Does the implementation of laptops as a teaching tool enhance the learning experience of teachers at Tereora College'.

I would really appreciate it if you can take the time to complete the questionnaire and place it in your pigeon hole for me to pick up or if you see me walking by please call out and I will pick it up. Meitaki Atupaka ☺

1. Please tick the appropriate box below:

The numbers represent how often you use your laptop/notebook for the listed tasks per week.

<b>Laptop Usage:</b>	<b>0-1</b>	<b>2-4</b>	<b>5-7</b>	<b>8-10</b>	<b>11-13</b>
Create student worksheet/workbook					
Print student worksheet/workbook					
Create assessments					
Print assessments					
Liaise with students' parents via email					
Mark attendance/roll on kamar					
Show powerpoint for students learning					
Play video for learning purposes					

2. Do you think that using a laptop as a teaching tool enhances students learning experience, why?
3. How are the laptops enhancing students learning experience?
4. What are your thoughts of using a laptop as a teaching tool?

## **Appendix B**

### **Teacher Interview Questions**

1. How does the implementation of laptops as a teaching tool enhance students learning experience?
2. Do you think that laptops are effective teaching tools? Why
3. How can we improve the students learning in another way apart from laptops?
4. What do you know about laptops as a teaching tool?
5. How well is using the laptop as a teaching tool working for you? Why
6. What are you main use for your laptop as a teaching tool?