Technology innovations that support technology enhanced teaching and learning and their evaluation in two Auckland secondary schools.

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A thesis submitted in partial fulfilment of the requirements for the degree of
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Declaration

Name of candidate: Rachel Williams

This Thesis/Dissertation/Research Project entitled: Technology innovations that support technology enhanced teaching and learning and their evaluation in two Auckland secondary schools, is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Educational Leadership and Management.

CANDIDATE'S DECLARATION

I confirm that:

• This Thesis/Dissertation/Research Project represents my own work;
• The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
• Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: 2015 – 1068

Candidate Signature: ................................Date: 20/11/16

Student number: 1092287
Abstract
Technology innovations have been introduced into Auckland secondary schools to meet the needs of 21st Century learners. All secondary schools in New Zealand are required to critically and strategically review their practice to best meet the needs of their school community. Auckland secondary schools are introducing numerous innovations that support technology enhanced teaching and learning with minimal thought being allocated to the evaluation of these innovations. This lack of evaluation means that schools are uncertain as to whether innovations are improving student outcomes. This research seeks to investigate the practices of evaluating innovations that support technology enhanced teaching and learning with the aim of identifying barriers to evaluation as well as successful evaluation practices.

This research adopted a qualitative approach to investigate the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools using two research methods. Semi-structured interviews were conducted with the Principal and the Senior Leader from each of the two schools purposively selected. Four focus group discussions were conducted, one Middle Leader group and one Classroom Teacher group from each of the two selected schools.

This research found that Google applications and Bring Your Own Device were the most common technology innovations introduced. As a result of the technology innovations being introduced into secondary schools this research found that teacher’s pedagogy had evolved. Findings from this research identified that evaluation of technology innovations is currently being done on an ad hoc basis and when it is being conducted it is mainly through the ‘Teaching as Inquiry’ cycle and online surveys.

This research finds that there has been an explosion of technology innovations into schools, however, the evaluation practices used to assess the effectiveness of these innovations has been poor. The development of a school wide evaluation framework and the allocation of time to conduct evaluation would help schools better quantify the use of technology innovations. It is recommended that secondary schools spend time developing suitable online surveys to help with evaluation processes. Improving evaluation practices would enable teachers to identify which technology innovations were worth implementing into their classrooms.
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## Abbreviations

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<th>Description</th>
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<tbody>
<tr>
<td>AUT</td>
<td>Auckland University of Technology</td>
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<tr>
<td>BYOD</td>
<td>Bring Your Own Device</td>
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<tr>
<td>ERO</td>
<td>Education Review Office</td>
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<td>ICT</td>
<td>Information and Communications Technology</td>
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<td>MOE</td>
<td>Ministry of Education</td>
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<td>NAGs</td>
<td>National Administration Guidelines</td>
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<td>NEGs</td>
<td>National Education Guidelines</td>
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<tr>
<td>NCEA</td>
<td>National Certificate of Educational Achievement</td>
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<tr>
<td>NZC</td>
<td>New Zealand Curriculum</td>
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<tr>
<td>NZQA</td>
<td>New Zealand Qualifications Authority</td>
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<tr>
<td>OECD</td>
<td>The Organisation for Economic Co-operation and Development</td>
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<td>PTC</td>
<td>Practising Teacher Criteria</td>
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CHAPTER ONE: INTRODUCTION

Introduction
As a Senior Leader in an Auckland secondary school I have witnessed an explosion of technology being used in my school. Personally I have been part of this explosion by introducing innovations that support technology enhanced teaching and learning. I have overseen the implementation of Bring Your Own Device, Google applications and specific Mathematical software into the school. The use of technology throughout my school has been varied and teachers within the school have reported mixed student outcomes as a result of using technology in their classrooms. I have also observed changes in teaching practice as a result of the introduction of innovations that support technology enhanced teaching and learning. The majority of change seen has focused on the student becoming the centre of the classroom.

As a Senior Leader, my role has meant that I have been involved in the strategic planning and review of the school. School reviews conducted have used quantitative data which has been used to inform the strategic planning of the school. However, specific data has not been collected to evaluate innovations that support technology enhanced teaching and learning at a school wide level. In my own school I have observed limited evaluation of innovations that support technology enhanced teaching and learning. This research will investigate the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools. This chapter will contain background information on the New Zealand context of this research, the rationale for carrying out this research, the research aims and questions and a synopsis of the thesis chapters.

Background
The function of the New Zealand Curriculum (NZC) is to “set direction for student learning and to provide guidance for schools as they design and review their curriculum” (Ministry of Education, 2007, p.6). The vision for learners espoused in the NZC is that learners will become “confident, connected, actively involved, lifelong
learners” (p.7). Values and Key competencies have been presented in the NZC as key elements to ensure that learners develop these skills (Ministry of Education, 2007). Teachers and leaders have focused on how they can use technology to promote the key competencies of: thinking; using language, symbols, and texts; managing self; relating to others; participating and contributing (Ministry of Education, 2007). Technology enhanced teaching and learning can promote all of the competencies listed in the NZC (Hipkins, 2006).

Technology is increasingly being seen as a useful tool in educational settings (Livingstone, 2012; Wastiau, Blamire, Kearney, Quittre, Van de Gaer & Monseur, 2013). In June 2012 the Minister of Education, Honourable Hekia Parata established the Ministerial Cross-Sector Forum on Raising Achievement. In March 2015 this Forum discussed 21st Century teaching and learning. The need to get the right amount of technology into teaching and learning environments was identified at this Forum alongside the fact that although technology is available in New Zealand schools it is not yet always built into learning programmes. The Digital Technologies in New Zealand schools 2014 report stated: that ninety four percent of New Zealand schools are using online learning or resources, that 87 percent of schools have wifi available across all their classrooms and that 73 percent of schools have an Information and Communications Technology strategic plan (Johnson, Wood & Sutton, 2014). This report also identified that 70 percent of Principals agreed that technology was positively affecting teaching and learning.

The Measuring Innovation in Education report 2014 released by the Organisation for Economic Co-operation and Development (OECD) recognises the importance of measuring innovation and how it contributes to improvements in education. According to the OECD report Measuring Innovation in Education, 76 percent of professionals in the education sector play a role in the implementation of at least one type of innovation (OECD, 2014). This percentage is above average compared with other sectors and second highest only to the Manufacturing sector. This same report recorded New Zealand as the fourth lowest within the education sector for overall education. In 2014
the New Zealand education sector showed approximately a 15 percent change in classroom innovation compared to the top countries of Indonesia and Denmark who had over 40 percent (OECD, 2014). However, the New Zealand education sector was much higher for school change at 24 percent compared to the top three countries: Denmark, China and England who were all listed at just over 30 percent (OECD, 2014). Within the education sector there are differences between innovation levels across primary, secondary and tertiary providers. In secondary schools 70 percent of teachers are actively involved in at least one innovation, this percentage is similar to primary schools but slightly lower than tertiary providers (OECD, 2014).

The Ministry of Education and the Education Review Office (ERO) in New Zealand both acknowledge the importance that self-review plays in raising student achievement (Ministry of Education, 2013; Education Review Office, 2014). ERO helps schools build their self-review capabilities through the external review processes they conduct at each school. ERO also provides self-review tools and examples of best practice to guide schools through internal self-review practices (Education Review Office, 2014). The expectation from ERO is that all schools are involved in strategic, regular and spontaneous self-review processes (Education Review Office, 2014). These different types of self-review provide schools with an opportunity to evaluate innovations that support technology enhanced teaching and learning.

**Rationale**
Schools have been placed under pressure to implement innovations that support technology enhanced teaching and learning for a variety of reasons. This has meant that there has been an explosion of technology introduced into classrooms. The pressure to introduce technology has largely come from society as they perceive great benefits to students learning (Livingstone, 2012). Society is also skeptical as to whether the public education system is delivering for the needs of all students (Smith and FUND, 2009). Teachers have been placed under pressure to introduce technology into their classrooms so that they can develop knowledge and skills that are valued in the 21st Century (Means, Shear & Roschelle, 2015). Teachers have also made the decision to introduce technology as it is seen to be: more efficient, more enjoyable,
more appealing and is more useful for students (Vaughan, 2014). Noeth and Volkov (2004) found from their research that technology can achieve the following: help students self-manage; provide resources to students anytime and anywhere; allows students, teachers and parents to interact and collaborate; stimulate interest in topic areas; help with extension or development programmes and helps students prioritise their information. However, as Livingstone (2012) states, it is difficult to determine the impact of technology when so many other factors are involved.

Evaluation practices need to be investigated as “there is a lack of research in the area of education” (Kaye, 2012, p.12). Few independent evaluations have been conducted to find out whether technology actually enhances learning (Livingstone, 2012). Researchers have found it difficult to isolate the impact of technology on learning from other factors (Livingstone, 2012). However, one research project conducted by Whip (2015) focused on the evaluation of an e-learning innovation. In particular he focused on the evaluation of leadership and how learners’ needs were met during the implementation of the e-learning innovation. One of the conclusions of this research project was that the school he studied lacked a project plan that included allocated roles for leaders and milestones. Whipp, (2015) therefore, made the recommendation that prior to the implementation of e-learning innovations, schools should develop a project plan which incorporates evaluation. Whipp’s (2015) research is one of the few that has been conducted on evaluating e-learning innovations. Due to limited research it is vital that schools and researchers spend time evaluating innovations that support technology enhanced teaching and learning. Evaluation practices should also be investigated due to the time and money that has been invested by stakeholders into the implementation of these innovations. The government has invested $1.5 billion for ultra-fast broadband, their target is to have 99.9 percent of students with access to ultra-fast broadband. A further $211 million was invested in the Network for Learning Ltd from August 2013. In August 2013, $157 million was targeted for School Network upgrades and another $136 million over four years was allocated to complete the School Network Upgrade Project.
Stakeholders within each school must be able to ascertain whether the investment of their time and money has made a positive difference for their school. Future decision making should be informed by evaluations (21st Century Learning Reference Group, 2014) conducted within each unique school environment. Participants in Baker’s (2014) research identified that they found it difficult to measure outcomes of technology innovations due to the fact that clear objectives and goals were not set before implementation of these innovations. Baker’s (2014) research identified the need for the evaluation of pedagogical practices in order to enhance teaching and learning rather than focusing on evaluating the technology being used.

Innovations should be evaluated so that school leaders and classroom teachers can ascertain whether in fact the innovation is making a difference to teaching and learning (Boyd, 2002). Ehrlich, Sporte and Sebring (2013) stated “As the technology supply expands, it will be critical to measure how teachers are exploiting technology to build knowledge and skills and to offer more complex learning opportunities” (p.27). Boyd (2002) suggested that evaluations should focus on recording the experiences of people involved in the innovation by asking “how” and “why”. As innovations are implemented and evaluated there should be identification of aspects that worked and those that did not so that teachers and leaders can decide what aspects need to be extended, altered or abandoned (Brinkerhoff, 2012). Senior Leaders have been acutely aware of the growing number of innovations that support technology enhanced teaching and learning and the cost of these innovations. They have seen first-hand how much time, money and energy has been invested into these innovations and the big overarching question is “Is it going to be worth it?”. The goals of the innovation must match the goals of the evaluation for evaluation to be effective (Culp, Hawkins, & Honey, 1999). Secondary schools across Auckland have goals similar to the following: “Are we developing students with the skills and knowledge to gain their National Certificate of Educational achievement qualifications?” and “Are we going to develop students ready for tertiary study or work in the 21st Century?”. Through robust evaluative practices hopefully schools can determine whether the time and money that they have spent implementing innovations that support technology enhanced teaching and learning has been worthwhile.
Research aims and questions
The aims of this research are:

1. To investigate practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools;
2. To investigate the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning; and
3. To identify successful evaluation practices of innovations that support technology enhanced teaching and learning.

The research questions are:
1. What are the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools?
2. What are the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning?
3. What are successful evaluation practices of innovations that support technology enhanced teaching and learning?

Thesis outline
This thesis is set out in five chapters.

Chapter One commences with background information on technology innovations and the evaluation practices of these innovations. The rationale for investigating practices of evaluating innovations that support technology enhanced teaching and learning is then presented. The research aims and questions are then proposed. Finally the structure of the thesis is outlined.

Chapter Two reviews the literature themes around the evaluation practices of innovations that support technology enhanced teaching and learning. The three literature themes that have been identified are: pressures on schools to innovate for technology enhanced teaching and learning, implementing innovations, and the importance of evaluating innovations.
Chapter Three outlines the research methodology and methods for investigating practices of evaluating innovations that support technology enhanced teaching and learning. The selection of schools and participants is outlined as well as other sampling decisions. A full description of the two data collection methods: semi structured interviews and focus group discussions is given. Finally, the data analysis process is discussed as well as issues of validity and ethics.

Chapter Four presents the research findings from Principals, Senior Leaders, Middle Leaders and Classroom Teachers from the two schools that participated in the research. This chapter is divided into three sections: innovations, practices of evaluating innovations and barriers to evaluations. Within each section the findings from the Principals and Senior Leaders are presented first followed by the findings of the Middle Leaders, and lastly the findings from the Classroom Teachers are presented. Within each section key findings are presented for the Principals and Senior Leaders, Middle Leaders and Classroom Teachers. At the end of the chapter, consolidated key findings are presented.

Chapter Five discusses the major findings of this research project. The discussion of findings are presented under the following headings: innovations, practices of evaluating innovations and barriers to evaluations. The second purpose of this chapter is to present conclusions. The conclusions are presented under the following headings: explosion of technology and poor evaluation processes. This chapter concludes with recommendations, limitations of the research and areas for further study.
CHAPTER TWO: LITERATURE REVIEW

Introduction
The focus of this chapter will be to review the themes that emerge from the literature around the evaluation practices of innovations that support technology enhanced teaching and learning. The following three key themes will be reviewed and critiqued: pressures on schools to innovate for technology enhanced teaching and learning, implementing innovations, and the importance of evaluating innovations.

Innovation can be defined as “the implementation of a new or significantly improved product or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (OECD, 2005, p.46). However, this definition is not necessarily a good fit in the education sector due to the notion of improvement (OECD, 2005). In particular various stakeholders can perceive improvements differently over time and therefore innovations in the education sector must be linked to specific educational objectives (OECD, 2005). A better definition for innovation in education is proposed by Vaughan (2014), who states that innovation is about trying to achieve one of the following: making something better, more efficient, more enjoyable, more appealing, and more useful or perhaps creating more wow factor. A more concise definition for innovation in education was proposed in the report Measuring Innovation in Education, this report states that innovation is when either a significant change to an educational practice is made or when a new practice emerges (OECD, 2014). Innovations that are focused on pedagogic practice in schools have become more prevalent in the last ten years. These practices have focused on “relating lessons to real life, higher order skills, data and text interpretation and personalization of teaching” and “in their use of assessments and in the accessibility and use of support resources for instruction” (OECD, 2014, p.16). Sharples et al. (2015) define ‘innovative pedagogies’ as “theories and practices of teaching, learning and assessment for the modern, technology - enabled world” (p.6).
Technology can be defined as: computers, any device that can be attached to computers, computer networks and computer software (Gray, Thomas & Lewis, 2010; Livingstone, 2012). Vaughan (2014) has a similar definition of technology that it is not just computers and the internet but “whatever digital devices or applications help a student meet his or her needs” (p.11). Terms such as e-learning, computer based learning, technology based training, computer based training, virtual campuses and online courses have been used interchangeably in the literature and this has further confused the definition of technology enhanced teaching and learning (Sangrà, Vlachopoulos, & Cabrera, 2012).

Rushby (2001) suggests the use of a buzz phrase generator to come up with a suitable definition for learning that involves the use of technology. Rushby (2001) acknowledges that there are subtle differences between words such as ‘assisted’ and ‘aided’, however, he accepts that these words and others in the buzz phase generator can be used interchangeably. Therefore, using the definitions mentioned in the literature the phrase ‘technology enhanced teaching and learning’ will be used throughout this research project. ‘Technology enhanced teaching and learning’ is any teaching or learning that is being assisted by a computer or electronic device. ‘Innovations that support technology enhanced teaching and learning’ therefore are when either significant changes are made to educational practices or when a new practice emerges which involves the use of technology.

In particular innovations that support technology enhanced teaching and learning relate to how students are grouped, the timings of the school day, modern learning environments, the pedagogy used, the technology used and the type of assessment administered (OECD, 2013a; OECD, 2014). The Educational Technology report released in May 2015 by the Centre for Education Innovations identified four key emerging themes or characteristics across many of the innovations listed on their database. Firstly that the innovations provided an opportunity for students to have greater access to technology. Secondly, software and learning content was able to be offered to students and schools at reduced costs. Thirdly, teachers were being offered
training and instructions through technology. Lastly, students were given the opportunity to collaborate with other students around the world.

**Pressures on schools to innovate for technology enhanced teaching and learning**

The pressures placed upon schools to innovate to include technology in teaching and learning situations is highlighted in the following statement “Today, schools need to prepare students for more rapid economic and social change than ever before, for jobs that have not yet been created, to use technologies that have not yet been invented, and to solve problems that we do not yet know will arise” (OECD, 2015b, p.3). The pressures placed on schools to innovate to include technology in teaching and learning situations come from society and government agencies as well as being driven by international competitiveness (OECD, 2014; OECD, 2015b). These pressures can broadly be categorised into the following areas: the need to meet 21st century learning requirements, the development of pedagogy to make the best use of the technology available, and to make the best use of modern learning environments.

**21st century learning requirements**

Secondary schools in New Zealand must innovate if they are going to meet the *Future-focused learning in connected communities* vision that “Every young New Zealander is a confident, connected, lifelong learner equipped to live a full and active life, and contribute to a thriving and prosperous economy” (21st Century Learning Reference Group, 2014, p.4). This report also states that major change is needed to be able to prepare learners for life beyond school with both 21st century skills and digital competencies. The *Future State* document released by the New Zealand Qualifications Authority (NZQA) (2013) outlines the drivers behind this strategy. The main drivers for education to innovate are it is: learner centred, mobile, border-less and meeting industry needs (New Zealand Qualifications Authority, 2013). Another driver is NZQA’s desire to administer digital assessment. NZQA is already trialling digital assessment with the intention that it will be fully implemented by 2022. The intention is that by 2022 all learners can do their assessments digitally at a time and place which suits their needs (New Zealand Qualifications Authority, 2013).
Schools must also innovate if students are to be given the opportunity to develop “knowledge and skills that are valued in the 21st century” (Means et al, 2015, p.1). Aaniadou and Claro (2009) define 21st century skills and competencies as “those skills and competencies young people will be required to have in order to be effective workers and citizens in the knowledge society of the 21st century” (p.8). The New Zealand Curriculum (NZC) lists five key competencies that students should develop in order to prepare to live and learn in today’s world (Ministry of Education, 2007). These five competencies are: thinking; relating to others; using languages, symbols and texts; managing self; and participating and contributing (Ministry of Education, 2007). New Zealand unlike other countries does not have separate technology skills or competencies in their curriculum document (Aaniadou & Claro, 2009). As a result New Zealand schools are expected to teach both key competencies and technology competencies integrated across curriculum areas (Aaniadou & Claro, 2009).

The thinking competency in the NZC is about intellectual inquisitiveness, this can take the form of research and analysis which can be completed using technology (Aaniadou & Claro, 2009; Hipkins, 2006; Means et al, 2015; Sharples et al, 2015). The relating to others’ competency also has the ability to be enhanced by the use of technology. Through technology, students have the ability to leverage social interactions and to build knowledge together (Centre for Education Innovations, 2015; Hipkins, 2006; Noeth & Volkov, 2004; Sharples et al, 2015). Hipkins (2006) states that “participating and contributing is about participating actively in local, national and global communities” (p.51). Technology allows students to make connections with people, locally, nationally and globally so that collaboration can occur (OECD, 2015b; Means et al, 2015). An emerging theme of innovations worldwide is the focus on providing students with a platform where they can interact globally (Centre for Education Innovations, 2015). The key competency using language, symbols, and texts is about language and symbols being used to produce texts including technological texts (Hipkins, 2006). This competency is wider than numeracy and literacy skills as it also includes technology and communication skills (Hipkins, 2006).
While technology enhanced teaching and learning supports all of the competencies stated in the NZC, in particular it lends itself to students managing self (Hipkins, 2006; Means et al, 2015). Where students are given the opportunity to manage their own learning and behaviour through using their own device, students were more engaged and invested in their own learning (Alberta Education, 2012; Hipkins et al, 2014). The use of technology has allowed students to work at their own pace and to take responsibility for their own learning (Megeid, 2014). Tosheva and Martinovska (2012) found in their study of school students, that students engaged in technology innovations were more responsible for their work, had greater motivation levels and were more equipped to work in teams.

Siu Cheung et al. (2014) suggest that learners must develop 21st Century skills if they are going to benefit from technology enhanced teaching and learning practices. The 21st Century skills they refer to are inquiry, critical thinking, communication and collaboration skills (Siu Cheung et al, 2014). They describe inquiry and critical thinking skills as the ability to “select and process useful and reliable information from varying sources” (Siu Cheung et al, 2014 p.71), this skill is needed for students to display the key competencies of thinking, relating to others and participating and contributing (Hipkins, 2006; Ministry of Education, 2007). In order for students to complete tasks and shared outcomes with their peers they must show what Siu Cheung et al. (2014) refer to as communication and collaboration skills. These skills are encompassed in two key competencies in the NZC: participating and contributing, and using languages, symbols and texts (Hipkins, 2006; Ministry of Education, 2007).

It is assumed that students already have skills which enable them to learn in a technology rich environment, however, this is not always the case and students need to be taught to be responsible digital citizens (Alberta Education, 2012). Secondary and tertiary students are among the most active users of technology (Wentworth & Middleton, 2014). Schools therefore have a responsibility to teach technology and digital skills as well as to teach students to become responsible digital citizens (Alberta
Education, 2012; OECD, 2015a). Digital citizenship is about students using technology in appropriate and responsible ways (Ribble, 2010). Students who have highly developed thinking and reasoning skills will acquire digital skills more easily (OECD, 2015a). Therefore schools should focus on ensuring that key competencies in the NZC are integrated across the curriculum to develop students who have strong thinking and reasoning skills (Ananiadou & Claro, 2009). Schools must offer guidance to students about how information should be communicated as well as what type of information should be communicated (Alberta Education, 2012). Therefore a competent digital learner is someone who has the appropriate knowledge, values and attitudes to deal with an ever changing world (21st Century Learning Reference Group, 2014). Students must also display behaviours that allow them to be safe, legal and ethical if they are going to be classified as competent digital learners (21st Century Learning Reference Group, 2014).

The “Future Focused Learning Report” describes the need for pedagogy to change to meet the needs of 21st century learners through the use of digital competencies (21st Century Learning Reference Group, 2014). As stated in the Students, Computers and Learning: Making the Connection report "technology can amplify great teaching, but great technology cannot replace poor teaching" (OECD, 2015a, p.17). The focus must be on student centred learning through personalisation of content, assessment, learning processes, learning tasks and resources (Alberta Education, 2012).

**Technology and pedagogy**

There has been an increasingly greater demand placed upon teachers to innovate to keep up with the technology revolution (Culp et al, 1999; Hattie, 2015). In particular, pressure has been placed on teachers to use technology to create more productive and effective ways for students to learn (Leadbeater, 2011). Technology has aided the enhancement of teaching and learning by allowing students to receive, interact, and engage with materials, teachers and peers in a vastly different way than what they have done in the past (Megeid, 2014; Noeth & Volkov, 2004). Innovations worldwide have focused on increasing student access to learning materials through the use of technology (Centre for Education Innovations, 2015). Technology enhanced teaching
and learning can also cater for students who have different learning styles such as the seven learning intelligences proposed by Gardner (2011).

Smith and FUND (2009) suggest that one of the main pressures to innovate comes from the widespread opinion that the Public Education system isn't “delivering on its promise of educational excellence for all children – particularly for those in underserved communities” (p.1). Livingstone (2012) sums up the pressure placed on schools to innovate for technology enhanced teaching and learning as “There is little doubt that society’s main ambition for children’s use of digital technologies centres on their potential benefits for education” (p.9). The main objective of innovation needs to be the establishment of new, productive and effective ways of learning (Leadbeater, 2011). Innovation can improve learning outcomes and the quality of education for all students, it can also enhance equity, improve efficiency, minimise costs and maximise the ‘bang for buck’ (OECD, 2014).

Hattie (2008) states that technology is effective in classrooms when: a range of teaching strategies are used, teachers are given appropriate professional development on how to best use the technology, when learning time is increased, when classes are student driven, where peer learning is maximised and when feedback is extremely frequent. However, this viewpoint is not shared by all. Wentworth and Middleton’s 2014 study of 483 students from a private University in the Unites States of America collected data on cell phone usage, social network usage, computer usage, academic information and demographic information. They found that the more time participants spent on their computers the lower their Grade Point Average and the less time they spent studying. This supports Spitzer’s (2014) viewpoint that disruptions that are available to students on their devices can have a negative impact on their learning. Spitzer (2014) also states “the less you experience and think for yourself (by having IT do it for you), the less you learn” (p.83). In contrast, Hattie and Yates (2014) suggest that stronger effects on student outcomes are seen when technology supplements learning rather than being used as an alternative to traditional methods. Furthermore the effect of technology on student outcomes is
dependent on whether students spend longer on the learning objectives or whether the computer task is just a straight replacement for the traditional task (Hattie & Yates, 2014; OECD, 2015a). Hattie (2015) summarises this viewpoint concisely “It is only when we move from using technology as a newer form of knowledge consumption to seeing technology as an aid to teaching for enhanced knowledge production that there will be an effect” (p.31). Positive effects on student outcomes using technology are limited to specific outcomes and uses of computers (OECD, 2015a).

Technology and modern learning environments
When learning environments are reshaped, technology has limitless potential (OECD, 2013a). A learning environment can be defined as “the complete physical, social and pedagogical context in which learning is intended to occur” (para.1) and an innovative environment as one that “is capable of evolving and adapting as educational practices evolve and change” (Ministry of Education, 2016b, para.3). The aim is for schools to upgrade their spaces to ensure they have “vibrant, well connected, Innovative Learning Environment’s that encourage and support many types of learning” (Ministry of Education, 2016b, para.2). These learning spaces must be upgraded so that they become flexible learning spaces to facilitate 21st century skills and competencies (Ministry of Education, 2016b; Campbell, Saltmarch, Chapman & Drew, 2013). Campbell et al. (2013) argue that learning environments must reflect the technology enriched environments that students are going to face in the workforce, these environments must cater for different learning styles and needs. Technology along with modern learning environments has managed to transform classrooms from teacher centred environments to student or learner-centred environments (Megeid, 2014; Campbell et al, 2013). Technology is a crucial part to growing and sustaining innovative learning environments (OECD, 2015b).

Implementing innovations
Schools need to consider many factors before implementing innovations that support technology enhanced teaching and learning. There are many types of innovations available to schools and they must consider which ones will improve learning
outcomes for their students. The right conditions also need to be present in order for schools to innovate successfully.

**Considerations for implementing innovations**

In order to innovate it is necessary to consider four key fundamental elements; learners, educators, content and resources (OECD, 2013a). Means et al. (2015) suggest that as data and research becomes available educators should also consider these findings before implementing innovations. Educators should think about each innovation they are looking to implement by two factors: their confidence that the technology is going to improve student outcomes and the level of risk involved (Means et al, 2015). Ely (1990) states that technological change will occur when eight conditions are met and suggests that these conditions can be used as a checklist to begin the process of implementing technological innovations. The eight conditions are: dissatisfaction with current practice, the existence of knowledge and skills, availability of resources, availability of time, incentives for participants, participation is expected, a commitment is made by those involved and leadership is evident (Ely, 1990). Ely (1990) also states that local conditions and experiences should be taken into account when making technological change.

Three key themes: ubiquity, agency, and connectedness must be considered when implementing innovations that support technology enhanced teaching and learning (21st Century Learning Group, 2014). Specifically what this means is that we need to consider the following: the prevalence of technology, the ability to make changes, and finally that students and teachers have a sense of being part of something bigger than oneself (21st Century Learning Reference Group, 2014). Ehrlich et al. (2013) found that students were more likely to use technology at school and at home if they attended a high achieving school and if they had teachers who were frequent technology uses. They also noted that teachers were more likely to use technology if their students were using technology.
Hipkins et al. (2014) suggests that educators, researchers, policy makers, students’ parents, whanau and other community members all have a part to play when making changes to the education system. However, often research and evidence on the benefits of technology in education are often “too hard to find, too thin, too weak, or too confusing to interpret” (Means et al, 2015, p.1). Therefore, a rethink needs to occur in the way we approach evidence in technology rich environments (Means et al, 2015). Means et al. (2015) suggest that researchers, developers, policy makers, teachers and school leaders all have a role to play in the collection of data and research.

**Types of innovations**

Smith and FUND (2009) describe successful innovations as innovations that bring about improved student results. They define innovations that break with current practice as disruptive innovations whereas innovations that improve the current system are known as sustaining innovations (Smith and FUND, 2009). Smith and FUND (2009) state that if we are going to meet the needs of all students in the public education system then both disruptive and sustaining innovations are required.

The *Measuring Innovation in Education* report released by the Organisation for Economic Co-operation and Development (OECD) in 2014 states that across all countries the tendency to innovate pedagogic practices has increased over the years from 2000 to 2011, these innovations are a mixture of disruptive and sustaining innovations. During this time, innovations in education have focused more on classroom practices than on school practices (OECD, 2014). However, this has not been the case for maths and science innovations introduced into New Zealand during this period, these innovations have focused on changing practice at the school level (OECD, 2014).

The *Educational Technology* report released in May 2015 by the Centre for Education Innovations had 130 educational technology programs listed on their database. Approximately forty five percent were aimed at providing support for students, thirty
percent were for school support and twenty percent were focused on the delivery of curriculum content (Centre for Education Innovations, 2015). Innovations in classrooms and schools have focused on: teaching style, instructional practices, class organisation, use of textbooks, assessment, computer and internet availability, use of computers, provisions for special needs students, teacher collaboration, feedback mechanisms, evaluation and hiring of staff, and schools’ external relations (OECD, 2014).

The *Measuring Innovation in Education* report released by the OECD in 2014 notes that the education sector is above average compared with other sectors with approximately 70 percent of graduates employed in workplaces that have at least one type of innovation currently being implemented. However, the education sector is below average compared with other sectors with only 20 percent of graduates employed in workplaces that have three or more innovations currently being implemented (OECD, 2014). This report also states that 68 percent of secondary teachers participate in knowledge and methods innovation compared with 39 percent for product and service innovation and only 31 percent for technology, tools or instrument innovation (OECD, 2014). Primary and secondary teachers are less likely to participate in innovations than staff in the higher education sector (OECD, 2014). New Zealand has been identified as one of the bottom four nations when it comes to innovation within in the education sector along with the Czech Republic, Austria and the United States (OECD, 2014).

**Suitable conditions to innovate**

Research conducted by Ehrlich et al. (2013) entitled *The Use of Technology in Chicago Public schools 2011* surveyed over 11,000 teachers in the Chicago area. They found that more than seventy percent of teachers felt that their school culture encouraged technology innovations. Technology is more likely to be integrated into classrooms where teachers already adopt teaching practices which are student oriented (OECD, 2015a). Faced with students who are frequent users of technology, teachers are also more likely to integrate technology in their teaching practice (Ehrlich et al, 2013). More than seventy percent of European teachers had a positive opinion
about the “relevance and positive impact of ICT to support different students’ learning processes and objectives” (Wastiau et al., 2013, p.23). According to Wastiau et al. (2013) it is not necessary to spend time convincing teachers of the importance of technology rather time should be spent equipping teachers with the expertise needed to transform their practice.

Hayes (2007) found that a comprehensive professional development programme was needed for teachers to increase their use of technology in the classroom. Successful implementation by teachers was dependent on teachers having time to think about their pedagogy as well as having the capability to collaborate with their colleagues (Hayes, 2007). Wastiau et al. (2013) made the recommendation to policy makers in European countries to invest in professional development in order to increase the effective use of technology in schools. This supports the view held by Noeth and Volkov (2004) who state that the greatest factor to increasing student achievement using technology is the skill level of the teacher. A high level of professional development is therefore needed to ensure that teachers have the necessary skills (Noeth & Volkov, 2004). Teachers need to be in a supportive environment for technology to be implemented into their classroom practice (Hayes, 2007).

Schools that combine technology policies with concrete support measures such as fewer teaching hours and financial incentives show the highest frequency of technology use (Wastiau et al., 2013). Wastiau et al. (2013) made a further recommendation to national, regional and local policy makers in Europe to adopt policies that focused on the integration of technology into existing teaching and learning programmes.

The 21st Century Learning Reference group (2014) states that “Effective leadership is essential to successfully implement digital technologies for learning” (p.14). Leaders that have the highest effect on student achievement outcomes are those leaders that can form a vision, set clear goals and provide an environment where teachers can
collaborate effectively (Hattie, 2008). A Principal can influence the use of ICT for administrative tasks but Cowie, Jones and Harlow (2011) found that it was other teachers and department heads that had the greatest influence on the use of laptops in teaching and learning. This supports the findings in the report *Students, Computers and Learning* released by OECD in 2015. This report identifies that having a vision and being able to connect students, computers and learning are key to successful student outcomes.

Leaders must also view “technology not as a solution, but as a key component in enabling schools to address core educational challenges” (Culp et al, 1999, p.7). Learning must remain at the centre of any innovation, however, in order for change to occur and be sustained quality leadership is essential (OECD, 2013a; OECD, 2013b). The *Future Focused Learning in connected communities* report released by the 21st Century Learning Reference Group in May 2014 suggests that leaders need support to manage change as both teachers and leaders throughout this process challenge their long held beliefs about teaching and learning. This report also states that investments must be made in people and innovation. Schools must build and maintain knowledge, resources and motivation to create effective and lasting change (Cowie et al, 2011). An integrated digital technology training programme and access to evidence based professional development are keys to supporting effective leadership and teaching (21st Century Learning Reference Group, 2014). This is consistent with the viewpoint of Piggot-Irvine (2006) who states that professional development programmes should be informed by research and that this “should lead to significant improvements in teaching and learning” (p.478). Fullan (2011a) states that it is vitally important to have the leader of the organisation participating as a learner for the successful implementation of any innovation. Baker (2014) agrees that school leaders should commit to an ongoing professional development programme throughout the implementation of new innovations such as Bring Your Own Device (BYOD).

In the research conducted by Cowie et al. (2011) they found that there were two key drivers that enhanced the use of teachers using laptops: peer mentoring and collegial
support. Learning leadership goes hand in hand with developing an environment where 21st century teaching and learning is at the centre of all leadership decision making (OECD, 2013b). The Leadership for 21st Century Learning report describes learning leadership as "setting direction and taking responsibility for making learning happen" (OECD, 2013b, p.9). This report states that leadership has a huge influence on organisational direction and the outcomes that are produced by any innovation that is introduced. The role that these leaders play in the development of other leaders within the school is also vital to implementing innovations (Cowie et al, 2011). Leadership should be distributed to a number of people throughout the institution so that knowledge is not lost if people move on or are no longer involved with the innovation (Fullan, 2009). Cowie et al. (2011) identify that the key to being able to distribute leadership is having a clear shared vision. However, ultimately teachers should be responsible for leading learning change in their own classroom (Cowie et al, 2011). Fullan (2011b) highlights that the drive for action should come from within your own context and practice, however, he also recognises the need to look at others’ practice.

Smith and FUND (2009) claim that the research and design cycle in “education is broken, creating disconnects across practice, research, development, and investment, which in turn inhibits the ability to create and scale innovations” (p.5). This lack of cohesion creates an environment where it can be difficult to implement innovations (Smith & FUND, 2009). The report Students, Computers and Learning released by the OECD in 2015 identifies the following as barriers to implementing technology into the classroom: students and teachers access to devices, connectivity, poor investment in infrastructure, a lack of development of new resources to maximise the benefit of technology, a lack of professional development for teachers, a lack of collaboration within schools and an environment which is not conducive to taking risks. Introducing technology into schools is dependent on increasing the technology skills of both teachers and administrators (Noeth & Volkov, 2004). Market dynamics and incentives can also be barriers to promoting innovation in education (Smith & FUND, 2009).
Teachers are more frequent users in schools where barriers to the use of technology are minimised (Ehrlich et al, 2013). However, even when barriers are removed some teachers felt that the use of technology was more complimentary to certain subject areas (Selwyn, 1999). Selwyn (1999) also notes that teachers who avoided using technology stated they did so as they felt it was at odds with the pedagogy that was appropriate to their subject areas. Hayes (2007) suggests that the slowness of teachers to integrate technology into their classroom practice is due to teachers trying to figure out how best to use technology in their current teaching practice.

**Importance of evaluating innovations**
The importance of evaluating innovations and appropriate models to evaluate innovations that support technology enhanced teaching and learning will be discussed in this section.

Throughout this section the terms evaluation and review have been used interchangeably which is consistent with their use in literature (Coleman & Earley, 2005). Evaluation is key to ensuring that schools run effectively and that improvements are seen (Coleman & Earley, 2005). In New Zealand, schools are bound by the National Administration Guidelines (NAGs) and National Education Guidelines (NEGs) which state, that schools must “maintain an on-going programme of self-review” (Ministry of Education, 2013; Piggot-Irvine & Cardno, 2005, p. 15). Evaluation according to Piggot-Irvine and Cardno (2005) is about “making judgements about work performance” (p. 13). Specifically through the evaluation process schools should focus on their aims, collect data, form conclusions and make recommendations for future practice (Piggot-Irvine & Cardno, 2005). This is consistent with Coleman and Earley’s (2005) viewpoint that evaluation is about systematically looking back at what has been achieved in relation to the original objectives.

Internal and external evaluations are discussed in this section of the literature review. Coleman and Earley (2005) state that the purpose for internal reviews are for school improvement whereas the purpose of external evaluations is to validate the findings
of the internal evaluations. Internal evaluations will typically be focused on the improvement of practice and involve the majority of school staff (Coleman & Earley, 2005). External evaluation is an inspection conducted by an outside agency (Coleman & Earley, 2005).

**Evaluation and innovations**

Current documentation released by the Ministry of Education (MOE) and Education Review Office (ERO) state the importance of schools engaging in a continuous cycle of self-review to enable them to effectively meet the needs of their unique communities. Highly effective self-review needs to have a “strong focus on teaching and learning and outcomes for students” (Education Review Office, 2014, p.22). Razik and Swanson (2001) describe the importance of evaluation, “As long as education remains a human process, it will remain imperfect and open to improvement” (p.250). It is vital for organisations to understand the pitfalls and challenges of innovations they have implemented so that they can continue to learn (Baker, 2014). The Innovative Learning Environments report states that for organisations to become contemporary learning environments, then one of the characteristics they must display is to become a formative organisation (OECD, 2013a). Specifically, organisations must have “strong design strategies with corresponding learning leadership, evaluation and feedback” (OECD, 2013a, p.190).

As technology is a relatively new innovation in teaching and learning practices it is vital that the effects of technology on learners are evaluated within schools (Baker, 2014). As Boyd (2002) states, “Too much emphasis has been placed on increasing access to technology rather than focusing on the objectives for using technology” (p.53). The 21st Century Learning Reference Group in the 2014 report on Future-Focused learning in connected communities identifies the need to build a robust evidence base which includes examples of best practice. Evaluation must be the basis of what informs decision making at all levels of schools (21st Century Learning Reference Group, 2014).
Evaluation should consider contextual factors as all schools are set in their own context and therefore have their own unique set of learning needs for their students (Noeth & Volkov, 2004). Traits that work in one organisation do not necessarily work for other organisations, and therefore care must be taken when making generalisations (Fullan, 2011a). New Zealand teachers are bound by a set of Practising Teacher Criteria (PTC) developed by the Education Council of Aotearoa New Zealand. The PTC describe what quality teaching looks like. Many of the PTC are linked intrinsically to technology enhanced teaching and learning practices. PTC 12 (Education Council of Aotearoa New Zealand, 2015): “Use critical inquiry and problem solving effectively in their professional practice” states that teachers should engage in systematic and critical reflection of their practice and consider the impact their practice has on the achievement outcomes of all students. Schools must continuously review their practices, as is stated in the NAG Two set by the MOE in October 2013. Specifically, this guideline states that schools must engage in an ongoing review process of their learning programmes. Schools must include as part of their review process the evaluation of student outcomes, including their academic achievement. The documentation from the MOE clearly states that self-review is essential to improve student outcomes. Fullan (2009) supports this viewpoint by stating "When leaders and other participants have opportunities to learn more deeply in context, they have a chance of transforming the contexts that constrain them" (p.16).

Technological innovations have been around New Zealand schools since the early 1980s (Ferguson, 2009). Recently an increasing number of innovations that support technology enhanced teaching and learning have been introduced into schools, an overview of these innovations can be seen in Figure 2.1. A plan for the evaluation of innovations such as BYOD at the time of implementation is recommend by Baker (2014) who also suggests that this evaluation could be part of the appraisal system which already exists within the school. Few independent evaluations have been conducted to find out whether technology is actually enhancing teaching and learning (Livingstone, 2012). The evaluation that has been done does not suggest that merely increasing the availability of technological innovations such as those listed in Figure 2.1 is going to improve student learning outcomes (Livingstone, 2012).
NAG One states that students’ level of achievement should be evaluated through the collection and analysis of assessment data (Ministry of Education, 2013). NAG Two then mentions that schools must engage in ongoing self-review in the following areas: policies, plans, programmes and student achievement (Ministry of Education, 2013). Lastly NAG Eight requires schools to annually produce a variance report comparing their actual performance to their aims and objectives (Ministry of Education, 2013). New Zealand schools must evaluate and review all of their practices throughout the various levels of their organisations (Education Review Office, 2015; Ministry of Education, 2007). The variance report provides key performance indicators for schools to assess whether their current practice is successful (Ministry of Education, 2013).
The 2015 OECD report on *Students, Computers and Learning: Making the Connection*, highlights the fact that the introduction of technology in educational settings appears to be mixed at best (OECD, 2015a). The report further states that technology is only linked to increased student outcomes in certain contexts. The report suggests student outcomes are enhanced when technology is used for collaboration, to connect to the outside world and when it increases study and practice time (OECD, 2015a). It is, therefore, imperative that schools evaluate their technological innovations so that they can learn from their own pitfalls and mistakes (OECD, 2015a).

It is essential for new ideas to be introduced into an organisation for it to be an effective learning environment (Garvin, 1993). This viewpoint reinforces the need to introduce innovations that support technology enhanced teaching and learning to ensure continual improvement in school performance. This notion is further supported by Plowright (2007) who suggests that to raise the quality of teaching and learning a school must develop a culture of learning. This learning should be done onsite so that it is context specific, this can be achieved through a systematic evaluation process (Fullan, 2011a).

Guskey (1990) states that if teachers do not have direct evidence that new innovations and strategies will bring about positive effects they will quickly revert back to their old teaching and learning strategies. The “Future Focused Learning Report” released by the MOE in May 2014 lists one of its ten priorities as to “Build a robust evidence base” (p.5). This priority has strong links to Guskey’s comments about teachers needing to see the positive effects of new innovations. The report elaborates on what it means by “Build a robust evidence base” (21st Century Learning Reference Group, 2014, p.24), that is the commitment to ongoing research and evaluation to ensure innovation and improvement can be seen throughout the education sector. This involves exploring best practice, trialling these practices for oneself, drawing conclusions as to what this means for you in your classroom and lastly generalising these conclusions (Fullan, 2011b).
The expectation is not only that schools continually evaluate and review, but teachers also must engage in the practice of self-review (Education Review Office, 2015; Ministry of Education, 2007). Schools and teachers must continue to learn through their own and others’ practice (Fullan, 2011b). Holly and Southworth (1989) suggest that for a school to have a development culture it must have a cyclical approach to evaluation, provide an environment where students, teachers and leaders are continually learning and are encouraged to work collaboratively to enhance school performance. Four of the PTC explicitly mention the need for ongoing review and evaluation of teaching practices to ensure that teaching practices meet the needs of all students. PTC Four states that teachers must engage in professional learning to develop their own teaching practice. The need for teachers to modify and adapt their teaching practices to meet the needs of diverse learners is covered in PTC Nine. The need to use data to inform practice is stated in PTC 11 and 12. PTC 11 and 12 state that teachers need to reflect, evaluate and refine their practice. Meaningful learning can only take place when schools are given the opportunity to reflect critically and constructively on their performance through self-evaluation (Plowright, 2007). Devos and Verhoeven (2003) therefore suggest that feedback from external agencies is also vital to ensure that schools do not miss blind spots. However, feedback from external agencies does not always lead to improvements in school performance as factors unknown to the external agency can prevent this improvement happening. Schools must rely on both internal and external review processes if they wish reviews to lead to improvement in school performance (Devos & Verhoeven, 2003).

The literature shows that if schools are to improve student performance they must engage in a continuous self-review process, coupled with engaging outside agencies when needed (Noeth & Volkov, 2004; OECD, 2013; OECD, 2014). In the report The Inquiry into 21st Century learning environments and digital literacy the recommendation is to invest in research in technology use in education to ensure that future policy thinking is informed by current research (Kaye, 2012). There has been difficulty determining the impact of technology on student outcomes when so many other factors such as attendance, teacher training, student attitudes and social expectation are involved (Livingstone, 2012).
**Evaluation models**
Different evaluation models available to schools will be presented in this section. When implementing new programmes Razik and Swanson (2001) suggest that formative evaluation is extremely useful as it gives organisations a way to monitor the progress of change. Formative evaluation is done during the implementation of a new programme whereas summative evaluation is done at the end (Piggot-Irvine & Cardno, 2005). Piggot–Irvine and Cardno (2005) suggest that the “formative and summative roles of evaluation can be seen to overlap” (p. 13). ERO provides two models for schools to use, to effectively self-review these involve both summative and formative evaluation. One model provides schools with a cyclic model to develop and evaluate school curriculum design. The other model shows the different types of self-review that schools need to carry out to sustain and develop student outcomes. The ‘Teaching as Inquiry’ cycle presented by the MOE in 2007 will also be presented in this section as this cycle enables teachers to inquire into the impact of new strategies or innovations on student outcomes.

To achieve greater student improvements schools must gather and analyse student data and use these results to formulate action plans which they can articulate to other stakeholders (Fullan, 2009). Riley (2014) states that all school decisions related to pedagogy should be supported by what science tells us. A lack of change in schools has often been as a result on a reliance on professional judgements rather than on evidence (Hattie, 2008). Hattie (2008) also mentions that we can do damage to teachers, students and schools if decisions are not based on evidence. Fullan (2009) proposes that for change to occur schools should adopt a tri-level lens model to a problem. We must not only focus on changing individuals but also changing systems. The tri-level lens questions that schools should ask themselves about a problem:

- What has to happen at the school and community level?
- What has to happen at the district level?
- What has to happen at the state level?
The evaluative models and methods that will be discussed are focused at the school and teacher level, however, it is imperative that these evaluations are carried out not only for the school who is carrying out the evaluation but also for the wider educational community (Cowie et al, 2011; Noeth & Volkov, 2004). This is particularly important as most good ideas or innovations introduced into schools come from examining what is working well in other contexts, trying them out and then inquiring into the impact that they have had on student outcomes (Fullan, 2011b).

The link between evaluation, data and improvement in school performance is clearly evident in Bernhardt’s (2013) statement “Comprehensive data analyses focused on the continuous improvement of the entire school will result in school improvement plans that will improve learning for all students” (p.77). The challenge, however, is to ensure that more than one perspective is gained when drawing conclusions (Bernhardt, 2013). Bernhardt (2013) suggests that schools engage in a systematic and focused approach to evaluation as this is what she believes will result in improvements for all students. It is obvious in the two models proposed by ERO that self-review needs to be an ongoing and cyclic process. The focus of the ERO models is to improve student outcomes by examining schools in considerable detail.

The ERO model in Figure 2.2 is the cyclic process for self-review. This model has been designed to provide schools with a framework for strategic self-review but can also be used for regular and emergent self-review (Education Review Office, 2014). A feature of this model is that there are five stages and each stage has a set of evaluative questions, prompts and indicators to enable schools to effectively self-review. The starting point for the cyclic process for self-review is the considering stage, this is an opportunity for schools to consider what they already know about their specific context (Education Review Office, 2011). The planning stage gives schools the opportunity to set targets about where they want to be and to develop a plan about how they are going to get there. This is followed by the implementing stage which provides an opportunity for schools to collect evidence. In the monitoring stage schools then
ascertain whether they have met their targets. The fifth stage is the informing stage where the school must decide what they now need to do with the information collected.

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**Figure 2.2: Cyclic Process for Self-Review**

Source: ERO, Evaluation Indicators for Schools Reviews, 2011, p.8

ERO identifies three types of reviews that schools should complete, on an ongoing basis, if they are going to continually improve their practice. These reviews are strategic, regular and emergent (Education Review Office, 2015). Strategic self-review, as can be seen in Figure 2.3, is overarching the whole review cycle. The strategic self-review gives schools the opportunity to evaluate how well they are attaining their mission, vision and strategic goals (Education Review Office, 2014). This type of review is long-term and can assist schools in making decisions about their future practice (Education Review Office, 2014). Regular self-reviews are focused on schools everyday business, they are “smaller, focused and ongoing” and often the conclusions feed into the strategic self-review (Education Review Office, 2014, p.23). Finally the emergent self-review are evaluations that are in response to spontaneous events that happen within the school (Education Review Office, 2014). Emergent
reviews should feed into both strategic and regular reviews (Education Review Office, 2014).

**Figure 2. 3: The three types of self-review**
Source: ERO, Evaluation Indicators for Schools Reviews, 2011, p.9

In the NZC there is a model for the ‘Teaching as Inquiry’ cycle. The ‘Teaching as Inquiry’ cycle allows teachers to “inquire into the impact of their teaching on their students” (Ministry of Education, 2007, p.35). The ‘Teaching as Inquiry’ cycle allows teachers to focus on self-review in their classroom as opposed to the ERO models which enable school wide self-review. The ‘Teaching as Inquiry’ cyclic model shown in Figure 2.4 is relevant for all teachers as different strategies will have varying impacts on their students due to each school being set in their own unique context with students who have unique learning needs (Ministry of Education, 2007). This model gives teachers a guide as to how they can inquire into their practice. Like the other models discussed, this inquiry cycle is based on the notion that “evidence from research and from their own past practice and that of colleagues” should inform their teaching practice (Ministry of Education, 2007, p.35). This model can be used for a
A wide range of strategies or innovations that teachers decide to implement into their classroom. It is an appropriate model for teachers to inquire into the impact of innovations that support technology enhanced teaching and learning. Like the ERO models discussed earlier the ‘Teaching as Inquiry’ cycle is based on evidence informing practice. As mentioned earlier PTC 12 explicitly mentions the need for teachers to “systematically and critically engage with evidence and professional literature to reflect on and refine practice” (Education Council of Aotearoa New Zealand, 2015, p.14). The ‘Teaching as Inquiry’ cycle also gives teachers a framework for systematic and critical self-review to occur. The ‘Teaching as Inquiry’ cycle allows teachers to think critically about their current practice and what strategies or innovations they could use to improve student outcomes. Like the cyclic process for self-review it is about collecting evidence to see the impact of the strategy or innovation being used.

![Teaching as Inquiry Model]

**Figure 2.4: Teaching as Inquiry Model**

Source: Ministry of Education, 2007, p.35

This section of the literature review has focused on a few of the many models and methods that are available to schools and teachers for self-review. They all have similar underlying themes of the need to use data to inform practice and that the process of self-review must be continuous and focused on improving practice. The self-review models presented by ERO for all schools to use are comprehensive and
provide a suitable set of guidelines for schools to conduct effective self-review. The ‘Teaching as Inquiry’ model suggested by the MOE gives teachers an opportunity to inquire into their teaching practices so that they can improve educational outcomes for their students.

The focus of this chapter was to review and critique the literature associated with the evaluation practices of innovations that support technology enhanced teaching and learning. The following key themes were identified in the literature: pressures on schools to innovate, implementing innovations, and importance of evaluating innovations. It has become evident that whilst the impact of technology on teaching and learning is variable, the importance of evaluative practices cannot be underestimated. The following chapter outlines the research methodology. It describes the research methods and tools used to gather data to answer the research questions.
CHAPTER THREE: METHODOLOGY

Introduction
This chapter will outline the research methodology and methods for investigating practices of evaluating innovations that support technology enhanced teaching and learning. The selection of schools and participants will be outlined as well as other sampling decisions. A full description of the two data collection methods: semi structured interviews and focus group discussions will be given. Finally, the data analysis process will be discussed as well as issues of validity and ethics.

Research methodology
Davidson and Tolich (2003) state that epistemology deals with “deciding what counts as legitimate knowledge” (p.24). This research set out to investigate the different experiences and perceptions that educators have around the practices of evaluating innovations that support technology enhanced teaching and learning. Different types of technology innovations have been implemented in schools in numerous ways with a diverse range of outcomes. This resulted in different perceptions and understandings being formed regarding the benefits of innovations that support technology enhanced teaching and learning. This research was approached from the social constructionism viewpoint as educators do not work in isolation and that their knowledge base is influenced by the environment in which they work (Bryman, 2012).

Approaching this research from a paradigm of interpretivism allowed the unique experiences and perceptions of individuals participating in this research project to be accounted for. Bryman (2012) writes that social scientists should aspire to interpret the actions of people and their world from their perspective. This research was small scale, subjective, based on understanding meanings rather than causes and focuses on human actions (Cohen, Manion & Morrison, 2007). Therefore it lent itself to an interpretive approach, the participants described and interpreted their experiences. The methodology that was used to investigate practices of evaluating innovations that support technology enhanced teaching and learning was qualitative research. Denzin
and Lincoln (2005) state that using qualitative research methods allows the researcher to gain a rich account of current practices in the participants’ own unique environment. In this project, qualitative research allowed the researcher to gain descriptive accounts of current practice (Bryman, 2012) of the evaluation of innovations that support technology enhanced teaching and learning in each of the selected Auckland secondary schools. Two different secondary schools in the Auckland region were used in this research, each one set in a unique environment. Within each school, technology innovations were relatively new concepts and the terms used to describe them were varied and had a range of meanings across individuals and schools. This supports the need to use qualitative methodology to ensure that all participants get an opportunity to give rich accounts of their experiences. The rich data collected using the qualitative methods of semi structured interviews and focus group discussions (Merriam & Tisdell, 2015) allowed the researcher to investigate the different experiences and perceptions that educators had around the practices of evaluating innovations that support technology enhanced teaching and learning. This research was limited to two secondary schools in the Auckland region, it is therefore not viable for this research to be generalised to the whole population due to each secondary school in Auckland being a unique entity. However, the findings about the evaluation practices of innovations that support technology enhanced teaching or learning can be transferred to other secondary school contexts (Jensen, 2008).

**Sampling selection**
The two secondary schools participating in this research were selected due to their geographical location, being a secondary school, their willingness to participate and the fact that they had recently introduced innovations that support technology enhanced teaching and learning. The two schools selected were therefore chosen due to their convenience and the fact that the researcher felt that they were going to meet the purpose of this research project (Bryman, 2012). The initial question asked of potential schools by the researcher was, “Has your school been involved in the implementation of innovations that support technology enhanced teaching and learning in the past five years?”. 
The schools selected in this study were approached based on the recommendation of the researcher’s Principal taking into consideration their recent introduction of at least one technology innovation. Each school was then contacted through email to gauge whether they were interested in being part of this research. Follow up emails and phone calls were then exchanged where research and ethics information was provided to the Principal of each school so that they were in a position to make an informed decision as to whether they were willing to participate in the research project. Of the two Auckland secondary schools that were initially approached, one school showed interest straight away while the other school declined to participate. A third school was then contacted and was willing for their school to participate in this research. In the end two co-educational state schools, one medium sized and one large sized, participated in this research project.

Research methods
Semi structured interviews and focus group discussions were chosen as the two qualitative research methods as both of these methods are consistent with the researcher’s epistemological and methodological positions. These two data collection methods allowed data to be obtained from a variety of perspectives. The use of these data collection methods allowed the researcher to record experiences of individuals in each school from their own perspectives, which was important for this interpretative researcher (Morrison, 2007). The researcher then liaised with a member of the Senior Leadership Team at each school so that purposive sampling of participants for the focus group discussions could take place.

Semi structured interviews
Semi structured interviews were chosen as one of the qualitative data collection methods in order to gain rich and relevant data to answer the research questions (Coleman & Briggs, 2007). In order to find out the current practices of evaluating innovations that support technology enhanced teaching and learning, information needed to be ascertained from the participants as to what their experiences had been around the evaluation of these innovations and in fact whether evaluating these
innovations was actually important to them. The semi structured interview schedule consisted of eighteen pre-determined questions (see Appendix A).

The interview question schedule was carefully constructed to ensure that the following research questions could be answered:

1. What are the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

2. What are the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

3. What are successful evaluation practices of innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

When in-depth information is required, when the subject matter is potentially sensitive and when further development or clarification of ideas is sought, it is appropriate to carry out one to one interviews (Hinds, 2000). In-depth data needed to be collected to answer the research questions. In order for this to happen it was necessary to provide an environment where statements or ideas could be further developed or clarified by the participant if necessary. On the surface it would appear that this research topic was not overly sensitive, however, participants were asked to share current practices in their respective schools. The information that was shared did not turn out to be sensitive but it may have if it had not reflected the school in a positive way.

The sample size for the semi structured interviews was four, these interviews took place over a period of two months across the two selected schools. Two interviews were conducted in each of the two schools selected in this research project. The two people selected from each school were the Principal and another member of the Senior Leadership Team. The person in the Senior Leadership Team interviewed was
the person in the Leadership Team who had responsibility for implementing and maintaining technology innovations within the school. By conducting interviews with these people comprehensive data about the pressures placed on schools to innovate was able to be collected. These interviews also gave insight as to how innovations had been implemented into their school and the challenges they faced implementing innovations that support technology enhanced teaching and learning. Lastly, Principals and Senior Leaders were able to describe the importance to their school on ensuring that innovations that support technology enhanced teaching and learning were evaluated.

The interviews conducted were recorded electronically and brief key notes were taken, this allowed the researcher to actively participate in the interview process. Appropriate verbal and non-verbal communication was used during the interview to ensure that participants felt comfortable during the interview process (Hinds, 2000). The interviews were transcribed so that what was actually said was accurately recorded and not the researchers interpretation of what was said (Bryman, 2012). This was done to avoid bias and to increase internal validity of this research project. Participants were thanked at the beginning and end of each interview to ensure that they felt appreciated. Prior to conducting the interviews, background information was provided to all participants as to the purpose of this research project (Krueger, 1994). This information along with an interview question schedule was sent to participants a week prior to the interview in the hope that it would enhance their responses.

The semi structured interview was conducted in a flexible way to ensure that the researcher was able to answer the research questions using the views of the participants (Bryman, 2012). There were eighteen set pre-determined questions but depending on how the participants responded the researcher adapted the interview schedule appropriately to elicit in-depth responses to the interview questions. Galletta (2013) suggests three segments to the semi structured interview: opening, middle and concluding segments. This structure was followed for the semi structured interviews conducted in this research project. The opening segment was dedicated to stating the
purpose of the research, expressing gratitude to the participants for partaking, checking that consent had been completed and asking some broad questions that gave participants an opportunity to speak about their experiences (Galletta, 2013). The opening segment was vital to set the scene so that in the middle segment of the interview the research questions were answered in greater depth. The questions within the middle segment of the semi-structured interview schedule were divided up into the following three subheadings: the pressures placed upon individuals and schools to implement innovations involving technology, the implementation of innovations involving technology and the evaluation of innovations involving technology. The questions in the middle segment gave the researcher rich data to answer the research questions. The concluding segment saw the participants given an opportunity to return to any prior statements and to add any further clarification or understanding. The participants were also given an opportunity to add any final thoughts that they had about the research or add some thoughts as to what further action could be taken. Finally participants were thanked for their time and the contribution that they had made to the research.

It was essential that the researcher placed great importance on getting the relationship right between her and the participants. As Coleman and Briggs (2007) state it is vital for the interviewer to manage themselves and the interviewee effectively. It was also crucial that appropriate interview questions were formed prior to conducting the interview. Interview questions were pilot tested prior to use at a secondary school not involved in the research project. This enabled some fine tuning of the interview questions to ensure the collection of rich and relevant data to answer the research questions. Throughout the interviews, open-ended questions were used to ensure a variety of responses were elicited from the participants. When appropriate follow up questions were used when further clarification on a particular topic was desired. The semi-structured interviews were used as each of the schools researched were set in their own unique context with their own unique history and political climate. The collaborative nature of the interview process allowed a contextually created story to emerge (Fontana & Frey, 2005).
In order to be able to triangulate the data, focus group discussions were also used in this research as the other method of data collection. Similar questions were used in the focus group discussions to the semi structured interviews in order to gain a range of viewpoints about the evaluation of innovations that support technology enhanced teaching and learning from different perspectives. The researcher felt that it was important to investigate whether there was shared knowledge about the evaluation processes of innovations that support technology enhanced teaching and learning across the school.

**Focus group discussions**
Focus group discussions enabled the collection of in-depth rich information which helped answer the research questions proposed (Vogt, Gardner, & Haefele, 2012; Bell 2010). It was appropriate to use focus group discussions in this research for the following reasons. Firstly, it was imperative to know what people thought about current evaluation practices of innovations that support technology enhanced teaching and learning. In order for this to happen, participants needed to have an opportunity to recount their experiences (Hinds, 2000). Secondly, the focus group discussions also allowed the flexibility to seek further clarification of unique experiences the participants have had (Vogt et al, 2012). Focus group discussions were also used to seek two different perspectives (Hinds, 2000): Middle Leaders and Classroom Teachers. The viewpoint of each group was invaluable in order to answer the research questions proposed. The focus group discussion schedule consisted of eighteen pre-determined questions (see Appendix B).

The focus group discussion schedule was carefully constructed to ensure that the following research questions could be answered:

1. What are the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools?
2. What are the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

3. What are successful evaluation practices of innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

Four focus group discussions were held across the two selected Auckland secondary schools, two in each school. Prior to the formation of the focus group discussions, a point of contact was established at each school. This point of contact liaised with the researcher throughout the process of recruiting participants. The point of contact addressed the whole staff and asked for expressions of interest to participate in this research. The researcher followed this up with emails that contained information about the research to all potential participants. A range of participants volunteered at each school, they were then placed either into the Middle Leader’s focus group or the Classroom Teacher’s focus group depending on their role within the school. Participants were selected purposefully based on their willingness to partake in the research and the fact that they were involved in implementing innovations that support technology enhanced teaching and learning (Merriam & Tisdell, 2015).

The focus group discussions had sample sizes between four and 11 participants as this allowed group dynamics to be maximised (Merriam & Tisdell, 2015). The focus groups were not too big and therefore did not run the risk of fragmenting, and as a result the quality of responses was enhanced (Bryman, 2012; Hinds, 2000). In total there were 26 participants involved in focus group discussions. The focus group discussions were all conducted either before or after school during that particular schools meeting time. At School A, the Classroom Teacher focus group had a Senior Leader present, the impact that this had on the responses is unknown. However, this did not seem to prevent participants from engaging in the focus group discussion. The Middle Leader focus group at School A had no Senior Leader present. There were similar responses elicited from these two focus groups so it would appear that having
the Senior Leader present did not have a major influence on responses. During both focus groups at School A all participants contributed fairly equally. At School B neither of the focus groups had a Senior Leader present. The focus groups at School A were larger at eight and eleven participants than at School B. School B was a smaller school and both groups had four participants in each focus group. During both focus groups at School B all participants contributed fairly equally.

The development of the focus group discussion schedule was thought out carefully to ensure that all of the research questions could be answered. Quality questions needed to be developed to ensure quality responses (Krueger, 1994). The technique used to conduct the focus group discussions was the questioning route as opposed to the guiding route (Krueger, 1994). The researcher wanted the same questions delivered to all four focus groups, this was done through questioning as opposed to guiding. As a result subtle differences in language were eliminated and therefore this enabled a more efficient analysis of data (Krueger, 1994). The focus group discussions were semi structured so that the interviewer had the ability to systematically question participants so that further opinions could be elicited (Fontana & Frey, 2005).

The focus group discussion schedule was split into the same three segments as the semi structured interview question schedule. This involved opening, middle and concluding segments (Galletta, 2013). The opening segment which reminded the participants of the purpose of the interview and allowed the researcher to express gratitude for participating (Galletta, 2013). The middle segment which was the main body of the focus group discussion was divided up into the same sub headings as the semi structured interviews: the pressures placed upon individuals and schools to implement innovations involving technology, the implementation of innovations involving technology and the evaluation of innovations involving technology. The concluding segment saw the participants given an opportunity to return to any prior statements and add any further clarification or understanding. This last segment also gave the participants an opportunity to add any final thoughts that they had about the research or where they thought further action could be taken. Finally, all focus group
participants were thanked for their time and the contribution that they had made to the research.

The role of the researcher was crucial during the focus group discussion sessions. The researcher needed to be flexible, objective, empathetic, persuasive and a good listener (Fontana & Frey, 2005). The researcher developed and practiced these skills prior to conducting the focus groups. In particular the ability to ensure that one person did not dominate the conversation and that all participants responded equally (Fontana & Frey, 2005). Therefore, strategies for dealing with such behaviours were developed by the researcher prior to administering the focus group (Bryman, 2012). Throughout the four focus group discussions, participants displayed a high level of professionalism, which allowed all participants to freely express their viewpoints. The researcher used both verbal and non-verbal cues to ensure that all participants felt valued and were able to contribute to the focus group discussions. All participants contributed to the focus group discussions in varying amounts.

The focus group discussions were recorded electronically, key notes were also taken by the researcher. This enabled the researcher to act as the facilitator as opposed to the director of the focus group (Hinds, 2000). Transcription was used so that the sessions were accurately recorded without bias (Bryman, 2012). As with the semi structured interviews it was imperative that participants were thanked at the beginning and end of the focus groups to ensure that the participants felt appreciated (Bryman, 2012). Prior to the focus group discussions, consistent, quality background information was provided to all participants as to the purpose of the study (Krueger, 1994). An information sheet and the focus group questions were sent to participants a week prior to the focus group in the hope that it would enhance their responses. The questions used in the focus group discussions were pilot tested by running a focus group in the researchers own school prior to them being used in the two selected secondary schools.
Data analysis
The transformative process of taking raw data and turning it into findings was then completed (Lofland et al, 2006). The two data collection methods chosen presented unique challenges when analysing and presenting the findings. It was therefore essential that when the analysis and presentation of findings was completed it was done in a valid and rigorous way so as to reduce bias. At the completion of each focus group discussion and semi-structured interview, the transcription and additional notes were completed in a timely manner so that the essence of what was discussed in these sessions was not lost (Hinds, 2000). However, full data analysis was not completed until all raw data had been collected from both participating schools so that the first impressions of the raw data did not influence any of the data collection still to be completed (Cohen, Manion & Morrison, 2013).

Once all transcriptions were available, the researcher went through and dealt firstly with the interview data and then with the focus group data. The researcher used two types of coding: line-by-line coding and thematic coding (Lofland et al, 2006) both of these coding methods were important for the analysis of the data. Line-by-line initial coding was used first, these codes were numerous and varied. Thematic coding was then used which allowed the data to be sorted into important emerging themes. Numerous categories emerged from initial coding, later on in the coding process several categories were subsumed into broader categories reducing the number of categories (Wilkinson, 2000). For instance, the initial categories used under the barriers theme were: inconsistent use of technology, survey overload, access to technology, survey design, evaluation design, evaluation framework and checkpoints. Several of these initial categories were then combined to give the final categories of technology, surveys and evaluation framework.

The interview schedule questions were then ordered so that all interview schedule questions that related to each specific sub theme were placed together in the excel document. For example, the sub theme ‘factors that influenced their decision to implement innovations’ responses from interview schedule Questions 2, 3 and 4 were
placed together under this sub theme. Three excel documents were then set up, one for each of the major themes: innovations, practices of evaluating innovations and barriers to evaluations. Each sub theme was allocated an individual sheet in the excel document. For example the theme ‘barriers to evaluations’ had two sub themes ‘barriers to evaluating innovations’ and ‘next steps for schools to evaluate innovations’. Each excel document had codes, participants’ identification and verbatim data recorded on it. The method above was used to process the data from the semi structured interviews as well as the data from the focus group discussions. Once coding was completed the first draft of the analysis was started (Lofland et al, 2006).

Throughout the analysis, the researcher adapted her thinking to avoid getting locked into a particular theory too early. Periodic distancing was also used to great effect to ensure that the researcher did not lose sight of the overall research questions. The data collected from the two different Auckland secondary schools was kept separate throughout the data analysis process. The researcher searched for patterns within and across each participating school throughout the data analysis process (Tolich & Davidson, 1999).

The data in this research project were firstly organised by instrument, then by issue and finally by participants. Specifically, the data from the semi structured interviews and focus groups were kept separate throughout while the data was organised into sub themes and themes. This allowed for all the specific data to be drawn together keeping the data whole and cohesive. Patterns, relationships and comparisons across and within the two schools were then able to be presented (Cohen et al, 2013).

Validity
Throughout this research project the research design, methodology and conclusions needed to have regard to validity to ensure that the research accurately described the phenomenon that it intended to (Bush, 2007). Cohen et al. (2007) suggest that it is impossible for any research to be one hundred percent valid and therefore the best
we can do is to maximise the validity of the research design. The researcher who conducted this research was inexperienced and as a result the researcher was open to change and was therefore reflexive.

Several factors at the design phase of this research project needed to be considered to maximise validity (Cohen et al, 2007). The data collection methods in this research project were carefully chosen so that appropriate data could be collected to answer the research questions. Data were collected from two different secondary schools to ensure that a variety of responses were obtained. Data collection was done in the two chosen schools over a period of two months to avoid timing biases such as the differences in attitudes at the end of the school year to the start of the school year. Only one researcher was used to collect the data for this research project and thus ensured that researcher bias was minimised. This decision helped to ensure validity of this research project. The semi structured interview and focus group discussion questions were also pilot tested to ensure that they elicited the responses from the participants that would answer the research questions. The semi structured nature that was used for both the interviews and focus groups also increased the validity as participants were faced with the same questions regardless of which school or focus group they were in (Cohen et al, 2007). One obvious method that was used in this research project to increase validity was to triangulate the data. Methodological triangulation was used, this meant using both semi structured interviews and focus group discussions to collect data to answer the research questions. Validity was maximised in this research project as a range of participants’ perspectives and research methods were used. The researcher focused on triangulation and validity to ensure that this research was meaningful and worthwhile (Bush, 2007).

In order to further increase validity in the data analysis phase, a consistent and systematic way of coding the data was used. The analysis of the interviews and focus groups took place at the completion of data collection at both schools. This minimised making subjective interpretations of the data or using selective parts of the data. The integrity of the data was paramount when trying to maximise validity, therefore
whenever possible, participant voice was used rather than paraphrasing. This decision was intended to reduce the risk of the researcher's voice coming through too strongly in the analysis.

It was important to the researcher that this qualitative research project was trustworthy and authentic. In order for this research project to be trustworthy the researcher focused on the following four criteria: credibility, transferability, dependability and confirmability (Lincoln and Guba, 1985). This research project has focused on small groups however the fact that rich accounts of participant’s experiences have been collected, gave the researcher great confidence that the accounts given were truthful and credible. Whilst the findings are going to be unique to the participating schools some of the experiences shared can be transferred to other contexts. Dependability of this research project was gained by adopting an auditing approach, complete field notes, data collection decisions, research design decisions and transcripts were completed throughout. Finally, confirmability was taken into account by acknowledging that the researcher’s world views will taint the research and therefore it was vital to allow the data to speak for itself as much as possible. All semi structured interviews and focus group discussions were transcribed so that the researcher could increase authenticity in this research project. These transcriptions allowed the researcher to have accurate participant voice to use in the analysis for this research project.

The selection of the participants in this research was done on a voluntary basis. My sample of participants may have been biased towards participants who were motivated into wanting technology to be effective in the classroom. A number of the participants at one of the schools used in this research were known to the researcher. There may have been some bias with participants being eager to please the researcher and articulate what they think that the researcher wanted to hear.
Ethical issues
The two chosen participating secondary schools were asked to consent to this research prior to the research taking place. Information about the research aims was sent to the participating schools prior to any data collection occurring. Schools were sent a permission letter by the researcher which they completed prior to any data collection occurring. The two schools used in this research will remain anonymous. No background data such as decile ranking, ethnicity breakdown, or geographical data, were collected as this information was not needed to answer the research questions. Participants within each school will also remain anonymous, participants were also not pressured to participate in this research project. Participants were given the opportunity to opt out of the research project two weeks after the return of either the transcript (Interviews) or summary (Focus groups) was sent to them for verification.

Schools and individuals were given a research Information Sheet (see Appendix C) before data collection. This information was provided so that they could make an informed decision as to whether or not they wanted to participate (Bryman, 2012). Participants in focus groups and interviews were asked to give informed consent by signing a consent form before they participated in the research, this was done in written form (see Appendix D). Information about the research aims was also given in writing to all participants approximately one week prior to data collection. It was important to the researcher that all participants knew exactly what they were agreeing to and what the benefits and burdens were of this research project (Wilkinson, 2001). Each school and individual was informed that this research was on investigating practices of evaluating innovations that support technology enhanced teaching and learning and that this research is part of the requirements for the degree of Master of Educational Leadership and Management and that the completed Thesis can be found online at the Unitec library Research Bank. Transcriptions for the interviews and focus groups were completed by transcription company Purple Giraffe. A confidentiality agreement was signed by a representative from Purple Giraffe prior to being given access to the data.
When planning the research design some ethical concerns were in the forefront of the researcher’s thinking. Areas of concern were, harm, lack of informed consent, invasion of privacy and deception (Bryman, 2012; Fontana & Frey, 2005). Decisions for this research project were also influenced by Wilkinson (2001) viewpoint that the benefits of any research should significantly outweigh any burdens of carrying out research. This research project was carried out as the researcher believed that finding out about the practices of evaluating innovations that support technology enhanced teaching and learning were going to benefit secondary schools in Auckland.

The following chapter presents the findings of this research project that have been collected from the two participating Auckland secondary schools. The findings from the semi structured interviews and focus group discussions will be presented under three sections: innovations, practices of evaluating innovations and barriers to evaluations.
CHAPTER FOUR: FINDINGS

Introduction
This chapter displays the findings from the semi structured interviews and focus group discussions in each of the two Auckland secondary schools that participated in this research project. This chapter is divided into three sections: innovations, practices of evaluating innovations and barriers to evaluations. In each of these sections the findings from Principals and Senior Leaders will be presented first. The Principal and Senior Leader findings will reflect the school wide viewpoints on innovations and evaluations. The Middle Leader findings are then presented, these give the viewpoints across the departments of innovations used and how they have been evaluated. The Classroom Teacher findings will give us the individual viewpoint from teachers of innovations and how they are evaluated. At the end of each section key findings from each section will be presented.

Data coding
Four semi structured interviews were conducted across two secondary schools in Auckland. Two interviews were conducted in each school: with the Principal and another member of the Senior Leadership team. The person selected from the Senior Leadership team had overseen the implementation of innovations that supported technology enhanced teaching and learning during the past five years. The Principal from School A is coded IA1, and the Senior Leader is coded IA2. The Principal from School B is coded IB1 and the Senior Leader is coded IB2.

Four focus group discussions were conducted, two in each school with a total of 26 participants. The Middle Leaders who participated in both School A and B were all curriculum leaders. The Classroom Teachers who participated from School A consisted of members of their e-learning team. The Classroom Teachers who participated from School B were members of one particular department, this department had recently introduced a number of technology innovations. The codes assigned to each of the participants of the semi structured interviews, are represented by the letter M (and a number) for Middle Leaders and the letter C (and a number) for
Classroom Teachers in School A and B. For example a participant from School A in the Middle Leader’s focus group could be described as AM1.

**Section 1: Innovations**
Within each heading in this section the findings are presented under the following themes: innovations schools have implemented, the next steps for schools, factors that influenced their decision to implement innovations and student outcomes from innovations.

**Principal and Senior Leader findings**
The Principals and Senior Leaders were able to describe and comment on the innovations that had been implemented in their school during the past five years. To varying degrees they were able to articulate what the next steps were in terms of implementing innovations into their schools. They acknowledged that there were several factors that influenced their decision making about implementing innovations. They were also able to describe a range of student outcomes as a result of implementing innovations.

*Innovations schools have implemented*
The Principals and Senior Leaders all reported that the focus on infrastructure was key to ensuring that innovations involving technology could be implemented. As one Senior Leader stated:

> If you want to have students using devices within the school you’ve got to have the school capable of furnishing that. (IA2)

School B had an Education Review Office (ERO) visit in 2011, ERO identified that the school had poor technological infrastructure. The feedback given by ERO was that School B needed to develop a five year plan to improve technological infrastructure in the school. The Principals and Senior Leaders from both schools acknowledged that the introduction of Google applications had been a significant recent innovation in their schools.
School A and School B both described the importance of using technology in such a way so that it enhances teaching and learning. The Principals of both schools described the need to only use technology where it was appropriate to do so. The Principal of School B also described the importance of developing appropriate pedagogy so that students and teachers could make the most of the technology available to them.

The Principal from School A noticed that they had seen a change in the focus of their e-learning team that moved away from purchasing technology to a focus on how technology could best be used in the classroom. The importance of allocating time for professional development to ensure that innovations could successfully be implemented was commented on by both schools. School B not only gave time but set up a peer tutoring model for staff development.

BYOD was identified by both schools as one of the most influential recent innovations introduced. School A had made BYOD compulsory for students whereas School B had not. School B had a relatively low number of students bringing devices but did acknowledge that this number was increasing.

Next steps for schools
The Principals and Senior Leaders acknowledged that an important next step for their individual schools was to ensure that they could provide quality professional development for staff in order to introduce innovations that supported technology enhanced teaching and learning. Both Principals and the Senior Leader from School A acknowledged the need to do research before implementing further innovations into their schools.
The need to invest in staff development to make the most of technology available in schools was identified by the Principals of both schools as a priority in the future. The Senior Leaders from both schools felt that an important next step was to increase collaboration between students and teachers using Google applications.

Factors that influenced their decision to implement innovations
Both Principals and the Senior Leader from School A identified the need to prepare students for further study and work in the 21st Century as being a driving factor as to why their schools had implemented innovations that supported technology enhanced teaching and learning. In the words of one of the Principals:

*It is no longer acceptable that you teach the way you taught twenty years ago. So the push came from the desire to meet the demands of 21st Century learning skills. (IB1)*

The Principals and Senior Leaders acknowledged the important role that research had played in the implementation of innovations that support technology enhanced teaching and learning. The need to do research upfront before committing to implementation was discussed at length by both schools. They felt that doing the research upfront enabled them to make informed decisions. They also felt that teachers, students and parents had more confidence in the decisions being made about technology enhanced teaching and learning when adequate research was conducted.

Technology such as phones in the past had not been welcomed into the school arena. This viewpoint is changing and the Principal from School A discussed at length the need to ensure that students did not have to leave their digital identities at the gate. The Principals and Senior Leaders at both schools acknowledged that the wider school community only played a limited role in the introduction of innovations that support technology enhanced teaching and learning. One Senior Leader stated:
They’re not particularly a driving force but if you think of their families and other communities that are having access to these devices, they were very supportive of the idea that the school could facilitate digital tools, maybe not so much themselves being able to afford the tools initially but definitely from the point of view that they can see other schools in the wider community going forward and wanting the same for their kids. (IB2)

Another factor identified by the Principals and Senior Leaders was the need for pedagogy to change for a variety of reasons. The Principal at School A spoke about the need to make learning more interesting and interactive. This view was shared by the Principal at School B who also spoke of the change in philosophy that the teacher no longer needs to be at the centre of the classroom.

**Student Outcomes from innovations**
The two Senior Leaders and the Principal from School B acknowledged the change that had occurred in pedagogy as a result of technology being used in the classroom. The Principal and Senior Leader at School A referred to the Substitution, Augmentation, Modification, Redefinition (SAMR) model and the requirement for students to be working at the modification and redefinition stages to ensure they get the most out of the technology available to them.

Both Principals noticed and commented on increased engagement and enjoyment levels displayed by students from using technology. One Principals’ observation:

*I think there’s more enjoyment in learning. I’ve noticed that the number of classrooms where they’ve shown me what they’ve done. I think there’s more pride in what they achieve.* (IB1)

However, the Senior Leader from School A stated that student outcomes are not necessarily positive and referred to their schools asTTle data. The asTTle data at School A showed no significant improvement in student outcomes as a result of using
technology in the classroom. This Senior Leader acknowledged the limitations of the current assessment tools available.

School A spent numerous hours over the past few years setting up Google sites and classrooms. Their Principal described the process of how they have had to refine their practice over the last few years:

_When we first started heading this way, we were all setting up class sites, so I had one for my twelve maths so that would be where the kids would go to. What we have moved much more towards is using Google classrooms to direct the students to the resources that are part of the maths department site so that stuff isn’t owned by me so that when I leave, things aren’t going to walk out the door with me. Also, it’s about sharing that workload._ (IA1)

School A spent time refining how best to use Google applications in their school. They are now focused on using Google classrooms as opposed to Google sites. School B had not used Google applications for as long as School A, due to the fact that their students do not all have their own devices. This meant that School B focused on providing students with access to school owned devices.

Key findings
The need for schools to maintain good infrastructure is seen as being key to ensuring that innovations that support technology enhanced teaching and learning can be implemented. Innovations such as Google applications and BYOD have been the most significant innovations involving technology that schools have introduced in the past five years.

Professional development opportunities for staff was vital in ensuring that the technology available to students and teachers was used in a way that teaching and learning was enhanced. The most important factors that influenced schools decisions to implement innovations was to prepare students for work and study in the 21st
Century and to be able to captivate learners. Increased student engagement and enjoyment in their learning was the most notable student outcome from implementing innovations involving technology. Time and energy had been invested by teachers to ensure that innovations have been implemented successfully. Teachers have been extremely active in reflecting on their pedagogy so that they can best meet the needs of their students.

**Middle Leader findings**
The Middle Leaders were able to describe and comment on the innovations that had been implemented in their school during the past five years. They were able to articulate what the next steps were in terms of implementing innovations into their schools, departments or classrooms. They were also able to identify several factors that influenced their decision-making around the implementation of innovations. A range of student outcomes as a result of implementing innovations were discussed by the Middle Leaders.

**Innovations schools have implemented**
The discussion with the Middle Leaders in School A focused on rearranging the physical environment and students having access to devices. These innovations were designed to encourage technology to be used in a collaborative way. Middle Leaders at School B focused their discussion on describing the technology available to them.

The Middle Leaders from both schools described at length the google applications they had implemented into their departments during the last five years. These discussions focused on the use of Google classroom and sites. The Middle Leaders also described how Google applications allowed students to self-manage at their own pace. Middle Leaders explained how the use of Google applications had helped with the tracking of students. One Middle Leader described how Google classroom can be used to track student progress:
In Google Classroom I created an assignment at the start of the year which is only due at the very, very end and I attached a template and I give a copy to each student which is a class notes template with all the headings for the relevant units and that’s what they going into to write their notes for my class. I can go in and check who’s got what and that’s also how they do their homework task instructions. (AM1)

Middle Leaders from both schools also shared their experiences of how the use of Google documents had allowed for increased student collaboration. The discussion focused on how the sharing function could be used to share with peers, teachers and the wider school community.

The Middle Leaders described the need for pedagogy to change to make the best use of the technology that had been implemented into their departments. One of the Middle Leaders described the change in focus from technology to pedagogy.

It’s become more pedagogical focused rather than just innovation focused. That’s my feeling towards it now because it’s now implementing it in a way where the kids will benefit from it far more rather than just plonking a computer in front of a student then going, “Get some skills.” (BM1)

The Middle Leaders at School A discussed how the classroom environment had changed as a result of technology enhanced teaching and learning. They discussed how students could self-manage and differentiate their learning using technology. They also described how the role of the teacher in the classroom had changed, so the classroom was a more student centred environment.

Next steps for schools
The Middle Leaders at School A discussed the importance of changing teaching and assessment practice to make the most of innovations involving technology. Middle Leaders at both schools also identified the importance of helping teachers to implement technology to ensure success by using a collaborative approach. The Middle Leaders at School B focused their discussion on the need for teachers to start
small and build up their expertise and confidence. They also discussed the need to find and use support people who have experienced success with implementing innovations. One Middle Leader from School A spoke strongly about the importance of having a mentor.

Evaluation was discussed by Middle Leaders at both schools. Middle Leaders from School A spoke about the evaluation that was already happening and the importance of continuing this so that they could refine their practices. The Middle Leaders from School B acknowledged that evaluation was an area that required further development. In the words of a Middle Leader from School B:

*The evaluation from this interview has struck a chord, to be honest, and we’re going, oh, yeah, so we have everything so how are we gonna check that out if it’s working.* (BM2)

**Factors that influenced their decision to implement innovations**

Middle Leaders at School B spoke about the importance of members of their school attending Mind Lab courses. The Middle Leaders who had attended the Mind Lab course described how the course had improved their teaching practice by encouraging them to reflect about why and how they are using certain technology in the classroom.

The Middle Leaders at both schools discussed the role the community had played in the implementation of technology in their schools and classrooms. The role the community played at School B was limited. The Middle Leaders at School A discussed the commitment that parents had shown by buying the devices to support BYOD.

The Middle Leaders from both schools discussed that captivating learners was a crucial factor to success when implementing technology in their schools and classrooms. As this Middle Leader described:
The only reason we’ve made changes or innovations is either to make it more accessible for the students or to give them better outcomes of their results of their learning. So if it doesn’t fit those requirements or we try something and we don’t seem to find any improvement or the students don’t react to it well, then it goes and we continue the search for something else that will work. (AM6)

The ability to give students timely feedback and feedforward was also discussed by the Middle Leaders as a huge benefit for technology enhanced teaching and learning.

**Student Outcomes from innovations**
The Middle Leaders at both schools spoke about pedagogy change as a result of the implementation of technological innovations. The Middle Leaders of School A discussed the increased collaboration that can occur between students as a result of using Google documents. These Middle Leaders were also able to describe how technology allowed students to present their work in a variety of ways and how this meant that students could pick a method that suited them best. The Middle Leaders at School B focused their discussion on how technology was able to give students timely feedback.

Student engagement was discussed as a positive outcome from the implementation of technology innovations by Middle Leaders from both schools. Middle Leaders at School A described levels of student engagement increasing as a result of being able to track student progress using Google applications. One Middle Leader contributed the following:

> You’ve got transparency now, you can see who’s done what. Or in the classroom, “You haven’t been on to this document for the last five minutes – what are you doing?” (AM7)

The Middle Leaders at both schools discussed the evolution of technology, in particular how technology was discarded as new technology became available. Specifically the Middle Leaders from School A discussed how teacher dashboard and Google sites had been replaced by Google classroom. Whereas the discussion at
School B focused on the exclusion of Microsoft and the introduction of Google applications.

**Key findings**

Google applications was seen as the most significant innovation introduced by schools in the last five years involving technology. In particular the Middle Leaders had observed the introduction of Google classroom and Google sites into classroom practice. The introduction of these applications had allowed teachers to monitor student progress and for students to collaborate with one another.

Pedagogy change had occurred as a result of introducing innovations involving technology. This pedagogy change had come about as a result of professional development opportunities which have allowed teachers to build expertise and confidence using technology. Teachers have been able to modify their teaching practice through evaluation processes. Teachers being able to captivate their students was the most important factor that influenced schools decisions to implement innovations.

**Classroom Teacher findings**

Classroom Teachers were able to describe and comment on the innovations that had been implemented in their school during the past five years. To varying degrees they were able to articulate what the next steps were in terms of implementing innovations into their schools, departments or classrooms. Classroom Teachers were able to identify several factors that influenced their decision making around the implementation of innovations. Classroom Teachers discussed a range of student outcomes as a result of implementing innovations.

**Innovations schools have implemented**

Infrastructure was discussed by the Classroom Teachers at School B. The discussion focused on what technology is currently available in classes and how this technology could be used. Classroom Teachers from School A and B were able to describe at
length the Google applications that they had implemented into their classrooms in the last five years. The discussions held focused on the use of Google classroom and sites and how these applications allow learners to self-manage at their own pace. They also discussed how the availability of technology allows students to extend their learning experience. The Classroom Teachers at School B were at the start of their Google applications journey so were not able to comment in as much depth about their use.

Classroom Teachers at both schools described the need for pedagogy to change in order to make the best use of the technology that had been implemented into their classrooms. There was a discussion around the use of flipped classroom strategies by the Classroom Teachers at School A. This highlighted the importance that teachers placed on being reflective practitioners and developing their pedagogy. The Classroom Teachers at School A had tried a new strategy, discovered that it did not work and amended their pedagogy accordingly. One of the Classroom Teachers described their experience:

*Tried an experiment with flipped classroom two years ago, doing that completely. Didn’t work with our students cos they had no idea and even when I allowed learning time, I had to drop a whole standard because it took so much time so now I do the blended – it’s a little bit of the technology and more of what the students are used to. I’ve got all of the learning online now, much more engagement with the parents.* (AC7)

It was evident from these discussions that the Classroom Teachers at School A felt safe to adapt, reflect and change their pedagogy according to what they thought was best for their students.

*Next steps for schools*

The importance of helping teachers to implement technology was identified by Classroom Teachers at both schools. The Classroom Teachers at School A identified that the school needed to create an environment where teachers felt supported to
implement innovations and that the school leadership accepts the potential risks involved. The Classroom Teachers at School B spoke about the need to have time allocated in order to try some of the new technological innovations. They felt that they were often exposed to new innovations but were not given enough professional development time to implement these innovations in their classrooms.

The Classroom Teachers at School A discussed the importance of changing teaching and assessment practice to make the most of innovations involving technology. Evaluation was not identified by the Classroom Teachers at either School A or B as a next step for their school or department.

Factors that influenced their decision to implement innovations
The Classroom Teachers at both schools discussed the role that educational research had played on the implementation of technology in their schools and classrooms. The Classroom Teachers at School A acknowledged that the research done in their school had ensured that technology was not being introduced on an ad hoc basis. These teachers explained that technology was introduced only if it was going to enhance teaching and learning.

Classroom Teachers from School A also discussed the role the community had played on the implementation of technology in their schools and classrooms whereas School B made no mention of the role the community had played. The Classroom Teachers at School A saw parents as being supportive by buying devices. These teachers thought that parents might be more supportive if they understood how technology was going to enhance their child’s education.

The Classroom Teachers from School B discussed how the need to captivate learners is a factor in the implementation of technology in their classrooms. Their discussion
focused on using different mediums to capture student interest. They also discussed how using technological innovations helps cater for a range of learning styles.

**Student Outcomes from innovations**
Classroom Teachers discussed how the implementation of technology innovations had impacted on student engagement. In particular Classroom Teachers at School A spoke of levels of student engagement increasing as a result of being able to track student progress using Google applications. The Classroom Teachers at School B described how the quality of student writing had increased since technology had been introduced into their courses.

Improvement in the types of technology available was discussed by Classroom Teachers at School A. The discussions centred on the evolution of technology. The Classroom Teachers at School A discussed how teacher dashboard and Google sites had been replaced by Google classroom.

**Key findings**
Google applications was seen as the most significant innovation introduced by schools in the last five years involving technology. In particular the Classroom Teachers had observed the introduction of Google classroom and Google sites into classroom practice. The introduction of these applications had allowed teachers to monitor student progress and for students to collaborate with one another.

Pedagogy change had occurred as a result of introducing innovations involving technology. This pedagogy change had come about due to teachers being reflective practitioners. Allocating time for professional development was seen as being critical to implementing innovations involving technology.
Teachers being able to captivate their students was the most important factor that influenced a teacher’s decisions to implement innovations. Increased student engagement and enjoyment in their learning was the most notable student outcome from implementing innovations involving technology.

Section 2: Practices of evaluating innovations
Within each heading the findings are then presented under the following themes: use of tertiary institutions for evaluation, surveys for evaluation purposes, teacher appraisal and evaluation and benefits of evaluating innovations.

Principal and Senior Leader findings
The Principals and Senior Leaders were able to describe and comment on the current practices of evaluating innovations being used in their schools. They were also able to articulate how they used tertiary providers to assist in the evaluation of innovations. The use of surveys and the teacher appraisal system to evaluate innovations was also discussed by the Principals and Senior Leaders. They were also able to describe the benefits of evaluating innovations that supported technology enhanced teaching and learning they had seen in their schools.

Use of tertiary institutions for evaluation
The Senior Leaders from both schools and the Principal from School A spoke about how tertiary institutions had impacted on their evaluation practices. School A had used a lecturer from Auckland University of Technology (AUT) to observe learning environments at their school. This lecturer produced a report which evaluated learning environments, this evaluation was based on the SAMR model. The Senior Leader at School A described the importance of this process:

*We see that getting feedback is not only great for ourselves, it's great for our parents who need that reassurance and it helps us refine our practice. We've been surprised at some of the things that have come up, things we hadn't thought of as far as actually changing the way we do things. (IB1)*
The Senior Leader at School B described how they had modified their appraisal practice as a result of some of their staff attending the Mind Lab course at Unitec. School B is now using Google forms to help collect and collate information for appraisals. School B had not had an external person come into the school to evaluate any of their innovations.

**Surveys for evaluation purposes**
The Senior Leaders from both schools and the Principal from School A discussed the use of surveys within their school to evaluate innovations. The Principal and Senior Leader from School A could both describe how they had used surveys in the evaluation process. In the words of the Senior Leader:

> Within the first few weeks as part of the Google Apps platform we were able to survey students absolutely easily, sending it from Google forms straight to their Chrome box, get an answer back within half a day. We were asking students about how accessible they were finding the learning, what they were learning – all sorts of things. We've kept data since we started, we did that in some forms, we did it a couple of times a year. (IA2)

School B had not used surveys but instead had used the 21st Century skills rubric for evaluation purposes. The Senior Leader from School B described their evaluation process using the 21st Century skills rubric:

> I think as part of the 21st Century learning design, we evaluate our teaching practices. I don’t think we’ve evaluated the effectiveness of the infrastructure itself but through the 21st Century skills rubric that I share regularly and marry that in with the appraisal system, individuals will do it for themselves. (IB2)

The Principals and Senior Leaders from both schools spoke of the importance of collecting data using surveys so that this could inform their school wide practices.

**Teacher appraisal and evaluation**
The Principal and Senior Leader from School B both discussed how the evaluation of innovations had been integrated into the school appraisal system. The Principal at
School B outlined how the information collected as part of the appraisal process was then used to improve teaching practice:

> It’s part of every teacher’s appraisal and once the appraisal has been done I look at the – we call it the ICT plan. I look at their individual goals, their individual needs. What has been done? What has been met? What has not? If so, why so? If not so, why so? (IB1)

The information from the appraisal process was also used to tailor the professional development programme to meet a teacher’s needs.

The Senior Leader at School B also described how the Microsoft evaluation tool was used in an alternate way at their school. The Microsoft evaluation tool is designed to give an individual an overall score as to how they had incorporated technology into their teaching practice. However, School B had used this evaluation tool to help them identify areas where they needed to develop their individual teachers. This information was then used to tailor their professional development programme.

**Benefits of evaluating innovations**

The Senior Leader from School A and the Principal from School B described how carrying out evaluations allowed them to ascertain student use of technology. The Senior Leader at School A described the results from their evaluation:

> Also they compared their subject usage at Year 9, year subject which was, I guess you could say, both interesting and concerning at some levels, about what some departments were doing more than others. (IA2)

This evaluation allowed School A to target subject areas that needed more support in order to help them implement technology into their learning programmes. School B had focused their evaluation on the analysis of National Certificate of Educational Achievement (NCEA) results, the Principal stated that the results from this evaluation were inconclusive.
The Principals and Senior Leaders from both schools were all able to discuss how they had used evaluation practices to improve student outcomes. School A had surveyed their students on the use of technology in classrooms. The Senior Leader from School A described their findings:

*We had feedback from students about their time off task and on task, being honest and self-evaluative and that actually gave us a bit of a shock.* (IA2)

The results from this survey allowed School A to have honest conversations with teaching staff which ultimately changed teaching practice. The Principal from School B described how the results for all levels of NCEA had increased by 10 percent from the previous year, however, the Principal was reluctant to attribute this solely to the increased use of technology in the school. The Principal of School A and the Senior Leader at School B both described the increased engagement levels of students that had been observed as a result of technology being introduced. They both acknowledged that no formal evaluation process had been carried out, their statements were based on informal observations of classes within their school.

The Principals from both schools and the Senior Leader from School A could give explicit examples of how pedagogy had changed as a result of evaluation. One Senior Leader described how the evaluation results were used to change practice:

*I know that, for example, departments responded to that either thinking are we using it more than other departments or are we under-utilising it. We had information about how much work students were doing, what sorts of things they were doing in each subject. That was useful for departments to see. Each of those things changed practice.* (IA2)

Alternatively, School B had focused their evaluation on NCEA results, their Principal made the following statement:

*I am convinced although I can’t prove it, better pedagogy that has been sustained by better using of technology and blended learning did play a major role in the improvement of results.* (IB1)
The improvement in certain subject areas in NCEA results have allowed School B to use these subject areas as exemplars for other departments.

**Key findings**
Links with tertiary institutions had influenced the way schools had conducted their evaluations of innovations that support technology enhanced teaching and learning. Surveys were used as part of evaluation practices to collect specific data to inform decision making throughout the school. The evaluation of innovations had been incorporated into the school appraisal process.

The ability to target specific subject areas or individual teachers who needed further support was seen as one of the benefits of evaluating innovations. The evaluation of innovations also enabled student outcomes to improve by teachers modifying their pedagogy.

**Middle Leader findings**
Middle Leaders were able to describe and comment on the current practices of evaluating innovations being used in their schools. Middle Leaders from School A were able to articulate how they used tertiary providers to assist in the evaluation of innovations. The use of surveys, teacher appraisal system and student voice to evaluate innovations was also discussed by the Middle Leaders.

**Use of tertiary institutions for evaluation**
Middle Leaders from School A described how a lecturer from AUT was used to evaluate innovations and the benefit of this evaluation. A Middle Leader described the benefit of having AUT coming in with an outside perspective:

*We also had that AUT evaluation third party thing which gave objective responses as to how it was going rather than us saying how we thought it was going, which was interesting. (AM3)*
Middle Leaders from School B did not discuss the use of tertiary institutions for evaluation purposes.

Teacher appraisal and evaluation
The Middle Leaders at School B described how the evaluation of innovations was linked to teacher appraisal. As part of the appraisal system at School B, teachers identify key students who they monitor closely.

Middle Leaders at School A and B could describe how their school is currently collecting student voice as part of the teacher appraisal process. School A is collecting student voice through online surveys, ongoing throughout the year. Middle Leaders from School A also commented on how student voice was heard informally in the classroom. Middle Leaders from School B also acknowledged the importance of student voice but agreed it was not currently being used in a formal way at their school.

Benefit of evaluating innovations
Middle Leaders from School A discussed student outcomes as a benefit of evaluating innovations. Much of the discussion focused on how writing outcomes for students had improved as a result of evaluating innovations such as Google documents.

The Middle Leaders at School A could give examples of how pedagogy had changed as a result of evaluation. One Middle Leader described how evaluation results were used to change practice:

For us, in the first couple of years that we had these Chromebooks we went holus bolus and wanted to use them as much as we could. We discovered that we were going backwards and the kids weren't learning like they used to before we had them so we cut back on the use of them and tried to use them where they actually added value to the teaching rather than trying to use them for the teaching. (AM3)
The Middle Leaders at School B were unable to give any examples of how pedagogy had changed as a result of evaluation.

**Key findings**
Links with tertiary institutions had influenced the way one school had conducted their evaluations of innovations that support technology enhanced teaching and learning. The evaluation of innovations had been incorporated into the school appraisal process. Student voice was seen as crucial part of the school appraisal process.

The ability for students to improve their writing skills was seen as one of the benefits of evaluating innovations. The evaluation of innovations also enabled teachers to modify their pedagogy.

**Classroom Teacher findings**
Classroom Teachers were able to describe and comment on the current practices of evaluating innovations being used in their schools. Classroom Teachers from School A were able to articulate how they used tertiary providers to assist in the evaluation of innovations. The use of surveys, teacher appraisal system and student voice to evaluate innovations was also discussed by Classroom Teachers.

**Use of tertiary institutions for evaluation**
Classroom Teachers from School A described how a lecturer from AUT was used to evaluate innovations and the benefit of this evaluation. In the words of one of the Classroom Teachers:

*We had AUT coming, he’s worked with groups of students, he’s worked with parents and he’s come up with some pretty definite conclusions about what we’re doing right and wrong and we’ve started to act on them. (AC1)*

The Classroom Teachers at School A had found this experience incredibly valuable and used the findings from the evaluation to inform their teaching practice. Classroom
Teachers from School B did not discuss the use of tertiary institutions for evaluation purposes.

**Surveys for evaluation purposes**
The Classroom Teachers from both schools discussed how they were using online surveys to evaluate innovations. In the words of one Classroom Teacher:

> Every time something new comes up. I think that one of the things that I’ve tried to do in my role is do a lot of short surveys and get that data out to ELT (E-Learning Team) to make some decisions about it but it’s in that constant fashion, it’s not something that’s a big evaluation. (AC5)

The Classroom Teachers from School B discussed how they have just started using Google forms to evaluate and how they were finding this more efficient than pen and paper surveys. The Classroom Teachers from School A had used Google forms more extensively and as a result could describe in greater detail how they were able to use the results to improve the teaching and learning experience for their students.

**Teacher appraisal and evaluation**
The Classroom Teachers from School B described how the evaluation of innovations was linked to teacher appraisal. As part of the appraisal system at School B, teachers identify key students who they track closely. One Classroom Teacher described this process:

> Then through our inquiry learning we’ve got key students that we’re looking at in our classes so we can talk more in depth when we interview them about what’s working for them, what’s not working etc. It’ll go to the whole class so the whole class will evaluate but for other purposes we’ll focus on our key students. (BC2)

Classroom Teachers from School A could describe how their school is currently collecting student voice as part of the teacher appraisal process. Student voice was
not discussed by the Classroom Teachers at School B. School A is collecting student voice through online surveys on an ongoing basis throughout the year. A Classroom Teacher from School A gave an example of student voice they had observed in the classroom:

“We don’t want to write on our Chromebooks, we use it to find stuff to make things and share documents but if we have to write anything down, we wanna do it in our books” (AC5)

Classroom Teachers from School B also acknowledged the importance of student voice but agreed it was not currently being used in a formal way at their school. They expressed a desire to use student voice more formally in the future.

Benefits of evaluating innovations
The Classroom Teachers at School A discussed technology usage as a benefit of evaluating innovations. The discussion was on how students were using devices and how that had changed as a result of evaluation. In one Classroom Teacher’s words:

When we started it was, yep, we’re going to use the Chromebooks and then we’ve sort of come back more towards blended learning from the feedback that we’ve had. They’ve said that they would like to do both so we’ve gone back to that. (AC5)

The Classroom Teachers at School A discussed how students were opting to use both devices as well as traditional resources for their learning.

Classroom Teachers from both schools could give examples of how pedagogy had changed as a result of evaluation. One Classroom Teacher described the benefit of evaluation:

There’s lots of surprises, little surprises you think kids would’ve enjoyed or found beneficial but they didn’t and vice versa so it’s really useful. (AC2)
Another teacher puts it very simply when asked “What did you learn from evaluating these innovations?”:

*What not to do! (AC4)*

The Classroom Teachers from both schools felt that the main benefit from evaluation was that they could then modify their teaching practice to make lessons more enjoyable and engaging as a result of the student feedback received.

**Key findings**

Links with tertiary institutions had influenced the way one school had conducted their evaluations of innovations that support technology enhanced teaching and learning. Online surveys were used as part of evaluation practices to collect specific data to inform their teaching. The evaluation of innovations had been incorporated into the school appraisal process. Student voice collected by online surveys was seen as a crucial part of the school appraisal process. The evaluation of innovations had enabled teachers to modify their pedagogy to make lessons more enjoyable and engaging for students.

**Section 3: Barriers to evaluations**

Within each heading the findings are then presented under the following themes: the barriers to evaluating innovations and the next steps for schools to evaluate innovations.

**Principal and Senior Leader findings**

The Principals and Senior Leaders were able to describe and comment on the barriers to evaluating innovations that support technology enhanced teaching and learning. They were also able to articulate what the next steps were in terms of evaluating innovations that support technology enhanced teaching and learning in their schools.
Barriers to evaluating innovations

The Senior Leader at School A identified that access to technology in order for students to complete online surveys was a barrier. However, this Senior Leader made the following acknowledgement:

*A barrier that is increasingly disappearing is that, as far as evaluations, last year we had to put Year 11 to 13s through a computer room because they didn’t have their own device but eventually that problem will be gone so that’ll make it easier.* (IA2)

The Principal at School B identified that due to the difference in technology use across classrooms and departments it was difficult to compare and therefore evaluate technological innovations.

School A had recently used quite a number of surveys and had identified several barriers. The Principal was concerned about survey design and discussed this at length. The Principal and Senior Leader from School A also described survey fatigue as a major barrier to the school being able to evaluate effectively. In their words:

*As with anything, the in-depth evaluation takes a lot of time and teachers who’ve also had various surveys done, here we go, here’s another survey. How quickly can I get it over and done with?* (IA1)

*One of them is survey fatigue. The fact that it’s now really easy to survey students means that students are getting surveyed a lot and I’ve noticed in the last five years that when you issue a survey we get a lower return than we used to because it’s happening too often.* (IA2)

School B described the lack of evaluation framework in their school as a barrier to being able to evaluate innovations that support technology enhanced teaching and learning. The Senior Leader described what this framework could potentially look like:

*I think if staff could buy into those milestones as part of an ongoing cyclical self-evaluation tool that the school has, e-learning framework was a nice tool for*
that purpose and if that was continually reviewed as part of the charter for the
school, that would be something that I think staff would understand where they
were going and the direction that they were going in by pulling in PD technical
innovation, infrastructure, pedagogy – all of that sort of thing in one common
document or one common policy. (IB2)

The Principal also acknowledged that most of the evaluation happening in the school
around technology innovations was informal due to a lack of a structured evaluation
framework. The Principal of School B expressed a desire to see a more formal
approach to evaluation happening within their school. The Principal described the
need to create a control group so that a comparison could be done between students
using technology and those not using technology in the classroom. The Principal
suggested that this could be done through the use of pre and post tests.

**Next steps for schools to evaluate innovations**

The Principal from School A identified the need to keep in contact with the lecturer
from AUT to help with their evaluation processes. The Principal at School A also
identified the need to create more time and space for staff to enable them to evaluate
more effectively. School B had used a 21st Century skills rubric, the Senior Leader
described the need to use this tool more effectively so that the Senior Leadership team
could target individuals or departments who needed further support. In the words of
the Senior Leader:

> So using that and sharing that with staff as an average score and training them
to use that as a driving force for senior leaders to say, “We need to be
encouraging more PD in this department or for these people,” or putting
sessions on for them on Saturdays or on holidays for those members of staff.
(IB2)

The Senior Leaders at both schools discussed the need for evaluation to be built into
the framework of the school. One of the Senior Leaders articulated the following:
As barriers to evaluation I think that just build it into the schedule and make it a part of the culture where students know that as part of your classroom work that you’re gonna tell us how things are going with your learning and using your device. (IA2)

The Principals at both schools described the importance of providing an environment where teachers felt safe to innovate. In the words of the Principal from School A:

Safe to fail, we’re all learning this. There’s no real right answer because all of us are different in the way in which we teach, we never use textbooks in the same way so we’re not going to use devices in the same way. Telling people that it’s okay to say, “It didn’t work,” but having said, “It didn’t work,” don’t throw it all out the window, talk with somebody, toss some ideas around, try again. (IA1)

The Principal from School B discussed the importance of getting teachers to start innovating:

Just make a start. Just bite the bullet. It’s more important that you sit and decide what you want to do and then see what happens. (IB1)

Although both Principals discussed the need to provide a safe environment for teachers to innovate, Senior Leaders did not mention this during their interviews.

Key findings
The barriers to evaluating innovations that support technology enhanced teaching and learning were: poor survey design, survey fatigue and limited access to technology. An established evaluation framework in a school was seen as key to ensuring effective evaluation of innovations occurred. The Senior Leaders also felt that providing an environment where teachers felt safe to innovate was a necessary next step for their school.
Middle Leader findings
The Middle Leaders discussed the barriers to evaluating innovations that support technology enhanced teaching and learning. They were able to articulate what the next steps were in terms of evaluating innovations that support technology enhanced teaching and learning in their schools.

Barriers to evaluating innovations
The Middle Leaders at School A felt that connectivity was a barrier. In the words of one Middle Leader:

I think initially we had problems with the wireless connectivity so we couldn’t actually complete the surveys that we had Year 9s going through and doing. That was the most obvious one. (AM6)

The Middle Leaders from School A also identified that lack of allocated time was a significant barrier to evaluating innovations. One Middle Leader described the predicament:

I think one of the problems is that it’s not until later in the year that we have the time to evaluate them but, in fact, what we need to do is have time to evaluate them as you go and say, “This isn’t working – throw it out.” Suddenly change your programme to suit. Most of these questions is about the evaluation of them and I think we do not, anywhere near as much. We move on to the next thing, got that topic, got that assessment, whatever, move on to the next thing and then when you sit down and have time to think about it later, I think time is a big thing on an ongoing basis. (AM8)

Time was also seen by the Middle Leaders at School B as a barrier to formal evaluation practices being more prevalent in their school. In the words of one Middle Leader:

I would say first of all time and I think having insufficient time after you’ve completed something to do a full formative evaluation. That’s why informal student voice, feedback, observation etc has been the order of the day. (BM1)
The majority of the discussion had by the Middle Leaders at both schools focused on the lack of time available to evaluate. They also spoke of the need to have this time allocated throughout the year so that evaluation could occur immediately after an innovation had been introduced. Middle Leaders from both schools felt that given more time they would be able to evaluate innovations more effectively.

Next steps for schools to evaluate innovations
The Middle Leaders from School B discussed the formation of a generic survey to be used across the school to evaluate innovations. They also suggested sharing this information to enhance students learning. In the words of one Middle Leader:

_ I think making a tool available for the evaluating and then encouraging people to utilise it and then I think collation of the results and then, number four, sharing that with others. I would say like a four step process. (BM1)_

A Middle Leader from School A thought it would be useful to specifically allocate time for evaluation:

_The PLD sessions – maybe allocate some of those for evaluation? (AM8)_

Middle Leaders at School A also spoke about the desire to use professional development time to focus on fewer innovations. They felt that by doing this they would be able to implement the innovations more effectively as they would have time to evaluate each one as they went.

Key findings
The barriers to evaluating innovations that support technology enhanced teaching and learning were: poor connectivity and time. More time needed to be allocated to the evaluation of innovations that support technology enhanced teaching and learning. Time needs to be allocated throughout the year to ensure effective evaluation occurs. The formation of a generic survey to be used school wide would help teachers evaluate innovations.
**Classroom Teacher findings**
The Classroom Teachers discussed the barriers to evaluating innovations that support technology enhanced teaching and learning. They were also able to articulate what the next steps were in terms of evaluating innovations that support technology enhanced teaching and learning in their schools.

**Barriers to evaluating innovations**
The Classroom Teachers at School B identified that access to technology in order for students to complete online surveys was a barrier. Whereas the Classroom Teachers from School A discussed the limitations of the surveys they were currently using. One Classroom Teacher had this to say:

> I think one of the things, too, is the questions that we’re actually asking cos I think good questions are part of those barriers, they’re not necessarily evaluating the technology as how it’s enhancing, they’re evaluating just the use.

(AC4)

The Classroom Teachers at School A thought that the current surveys were conducted on an ad hoc basis. Classroom Teachers at School B spoke of the need to produce a generic online survey that could be used for evaluating innovations.

**Next steps for schools to evaluate innovations**
The Classroom Teachers at School B had an in-depth discussion about how the appraisal system and student voice could be used to evaluate innovations. One teacher described how this could be achieved in the appraisal system:

> In our appraisal there’s just this old school form that’s meant to be given out, you can do what you want but that’s the suggested method and then you can choose what you want to do. If we looked at that maybe, we’ve got a new appraisal cycle coming up so maybe if they looked within our appraisal document with more structure around Student Voice and evaluation and then teachers might do it more.

(BC2)
Another Classroom Teacher from School B described the importance of student voice and collecting their own evaluative data. In the words of a Classroom Teacher:

*I think having that Student Voice. We’ve been allowing students to tell us the best ways that help them to learn so I think finding out as teachers for themselves what works best within their own classroom and being able to target something towards that.* (BC1)

Classroom Teachers from School A not only wanted to collect more student voice but also parent voice. They felt that parents needed to have an opportunity to be more involved in the students learning.

**Key findings**
The barriers to evaluating innovations that support technology enhanced teaching and learning were: poor survey design and access to technology. Adapting the teacher appraisal system to incorporate the evaluation of innovations was seen as a next step for schools. Extending the use of student voice in the appraisal system was also seen as an important next step for schools.

**Consolidated key findings**

**Innovations**
The need for schools to maintain good infrastructure is seen as being key to ensuring that innovations that support technology enhanced teaching and learning can be implemented. Innovations such as Google applications have been the most significant innovation involving technology that schools have introduced in the past five years. In particular the Middle Leaders had observed the introduction of Google classroom and Google sites into classroom practice. The introduction of these applications had allowed teachers to monitor student progress and students to collaborate with one another.

Pedagogy change had occurred as a result of introducing innovations involving technology. This pedagogy change had come about as a result of professional
development opportunities which have allowed teachers to build expertise and confidence using technology.

Teachers being able to captivate their students was the most important factor that influenced teacher’s decisions to implement innovations. Increased student engagement and enjoyment in their learning was the most notable student outcome from implementing innovations involving technology.

*Practices of evaluating innovations*

Links with tertiary institutions had influenced the way schools had conducted their evaluations of innovations that support technology enhanced teaching and learning. Surveys were used as part of evaluation practices to collect specific data to inform practice throughout the school. The evaluation of innovations had been incorporated into school appraisal processes. Student voice was seen as a crucial part of the school appraisal process.

The ability to target specific subject areas or individual teachers who needed further support was seen as one of the benefits of evaluating innovations. The evaluation of innovations had enabled teachers to modify their pedagogy to make lessons more enjoyable and engaging for students.

*Barriers to evaluations*

The barriers to evaluating innovations that support technology enhanced teaching and learning were: poor survey design, survey fatigue, time and limited access to technology. An established evaluation framework in a school was seen as key to ensuring effective evaluation of innovations occurred. The evaluation framework should include the allocation of time for evaluation. A next step for schools would be the incorporation of the school appraisal system within an evaluation framework.
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Introduction
This chapter draws together the literature discussed in Chapter Two and the findings in Chapter Four from the data collected from Principals, Senior Leaders, Middle Leaders and Classroom Teachers. The discussion of findings will be presented under the following headings: innovations, practices of evaluating innovations, barriers to evaluations and next steps for schools. The conclusions are presented under the following headings: explosion of technology and poor evaluation processes. The recommendations for further research are then presented.

Discussion
This research has been conducted as I have witnessed an explosion of technology being used in my school. The use of technology throughout the school has been varied in terms of frequency and how it is being used in the classroom. Teachers within the school have reported mixed student outcomes as a result of using technology in their classrooms. I have also observed that the evaluation of innovations that support technology enhanced teaching and learning is poor. Much of the evaluation of these innovations has been done by individual teachers through the ‘Teaching as Inquiry’ cycle.

This research project investigated the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools. Three research questions were proposed at the beginning of this research project. Throughout this research project it was evident that participants from both schools were able to discuss the innovations that supported technology enhanced teaching and learning in greater depth than practices that had been used to evaluate these innovations. Therefore the amended research questions include an additional question about the technology innovations that have been implemented into the two Auckland secondary schools used in this research project. The amended questions are:
1. What are the innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

2. What are the practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools?

3. What are the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning?

4. What are successful evaluation practices of innovations that support technology enhanced teaching and learning?

**Innovations**

**Recent innovations**

In the literature chapter innovations that support technology enhanced teaching and learning was defined as when either significant changes are made to educational practices or when a new practice emerges which involves the use of technology. All participants in this research were able to describe the innovations that support the technology enhanced teaching and learning that they had implemented in their school or classroom during the past five years. The discussion focused on the introduction of Google applications and Bring Your Own Device (BYOD) into their respective schools. This highlighted the fact that participants in the research had a narrower definition of innovations that support technology enhanced teaching and learning than the broad definition proposed in the literature. Within the literature, innovations that support technology enhanced teaching and learning were described as: the grouping of students, the timings of the school day, modern learning environments, pedagogy change and changes in assessment practices (OECD, 2014; OECD, 2013a). It would appear that the participants in this research project had focused on the word ‘technology’ rather than the words ‘innovations that support technology’. Therefore, what they described to the researcher was the technology innovations that had recently been introduced into their schools.
Principals, Senior Leaders, Middle Leaders and Classroom Teachers from both schools used in this research were able to describe in detail the innovations that had been implemented in their schools during the past five years. The number of innovations they described was surprising given the *Measuring Innovation in Education* report released by The Organisation for Economic Co-operation and Development (OECD, 2014) which listed New Zealand in the bottom four nations for innovation in the education sector. This report lists several types of innovations introduced into schools and classrooms. They can be broadly listed under the following categories: pedagogy, technology, learning environments, assessments and professional development of staff. In this research project, participants focused on describing technological innovations. It was obvious from the focus group discussions and interviews that all participants were convinced that technology could be used to enhance teaching and learning within their school. Very few of the participants in this research focused on innovations involving pedagogy, learning environments, assessments or professional development of staff. This is contrary to the findings presented in the *Measuring Innovation in Education* report released by OECD in 2014 where they found that innovations which focused on pedagogic practice had become more prevalent in schools. Wastiau et al. (2013) conducted a survey which discovered schools that focused on putting support measures in place, such as reduced teaching loads and financial incentives, showed the highest frequency of technology use.

Google applications was identified as one of the most significant innovations recently introduced into the two schools used in this research project. This finding is consistent with the literature which identifies that there is an emerging worldwide theme of innovations where students can interact globally (Centre for Education Innovations, 2015). The use of Google classrooms and Google sites has allowed teachers to change and adapt their teaching practice. The Principals and Senior Leaders from both schools identified that BYOD was also a significant innovation introduced in their schools in the past five years. School A had made BYOD compulsory from Year 9 and were currently in their third year of implementation. School B had not made BYOD compulsory, however, students were encouraged to bring their own devices. School B had therefore focused on making sure that sufficient technology was available
throughout their school for student use. Teachers at both schools had identified that BYOD or having school devices available had meant that teachers were able to modify their teaching practices.

The Senior Leaders and Principals from both schools identified the need for the school to have sound technological infrastructure to successfully implement innovations. These leaders were keen to have teachers implementing technology into their schools and were acutely aware of trying to minimise any barriers involved in doing so. This is consistent with research conducted by Ehrlich et al. (2013) who concluded that teachers are more frequent users of technology in schools where the barriers to using technology are minimised. This is also consistent with the report *Students, Computers and Learning* released by OECD in 2015 which identified that poor investment in infrastructure was a barrier to successfully implementing technology into the classroom.

Throughout this research it was evident that all participants were eager to talk about the innovations that they had recently introduced in their schools and classrooms. However, most participants found it much easier to discuss these innovations compared to discussing how they evaluated these innovations. As a result, a large proportion of the interviews and focus group discussions were dominated by the types of innovations introduced into their respective schools. These innovations have impacted on teaching style, instructional practice, availability of technology, class organisation and student collaboration (OECD, 2014).

*Factors that influenced their decision to implement innovations*
Several factors were identified in this research as to why leaders and teachers had implemented innovations that support technology enhanced teaching and learning. The most frequent factor identified by both Principals, one Senior Leader, four Middle Leaders and two Classroom Teachers that influenced schools decisions to implement innovations was the ability to captivate learners. This finding supports research
conducted by Tosheva and Martinovska (2012) who found that students engaged in technology innovations were highly motivated to learn in class. The schools that participated in this research were aware of the technology rich environment that their students immersed themselves in. Wenworth and Middleton (2014) confirmed the viewpoint held by schools that secondary students are among the most active users of technology. The willingness displayed by the majority of participants from both schools to integrate technology into classroom practices could be as a result of teachers being faced with students who are digital natives. Ehrlich et al. (2013) support this notion that teachers are more likely to integrate technology into their classrooms when they are faced with students who are frequent users of technology.

Principals, Senior Leaders, Middle Leaders and Classroom Teachers from both schools identified that it was no longer acceptable to teach the same way you used to teach in the past. This finding is supported by Leadbeater (2011) who states that we need innovation to “create ways of learning that are much more productive and effective, for children but also for society” (p.1). The report Future focused learning in connected communities produced by the 21st Century Learning Reference group in 2014 also supports the participants’ viewpoint that change is needed “Equipping learners with 21st century skills and digital competencies will require a significant programme of change in education” (p.4). However, as the OECD report Students, Computers and Learning: Making the connection published in 2015 suggests, positive student outcomes from using technology are limited to specific outcomes and use of technology. In particular the literature states that the effect of technology on student outcomes is dependent on whether students spend longer on learning objectives as opposed to using technology as a straight replacement for traditional tasks (Hattie & Yates, 2014; OECD, 2015a).

The Principals from both schools and the Senior Leader from School A identified the need to prepare students for work and study in the 21st Century as an important factor that influenced their decision to implement innovations. This finding is supported by the literature that states that schools must innovate if students are to develop skills
valued in the 21st Century (Means et al, 2015). The report *Future focused learning in connected communities* produced by the 21st Century Learning Reference group in 2014 further supports the viewpoint of the Principals and Senior Leader. This report states that “to prosper, grow and innovate, New Zealand needs highly-skilled people – people with increasingly sophisticated skills and digital competencies” (p.4).

The introduction of innovations that support technology enhanced teaching and learning has meant that teachers are able to monitor student progress. Most of the Middle Leaders and Classroom Teachers from both schools identified that the Google classroom application was a particularly useful tool when tracking student progress. This finding is supported by Means et al. (2015) who state that technology can be used to promote learning through monitoring students and by providing them with ample and useful feedback. The tracking and monitoring of students was also identified in the *Educational Technology* report released in May 2015 by the Centre for Education Innovations as an emerging educational technology model. This research highlights that the way that teachers are able to monitor students has changed dramatically. Teachers in this research project described how they are able to monitor student progress through Google applications in real time, this has allowed for quality feedback to be given to students instantaneously.

The introduction of innovations that support technology enhanced teaching and learning has also led to an increased amount of student collaboration. Senior Leaders, Middle Leaders and Classroom Teachers from both schools identified that collaboration between students had increased due to the introduction of Google applications, particularly Google documents. This finding matches the literature which states that by using technology, students can leverage social interactions and build knowledge together (Centre for Education Innovations, 2015; Hipkins, 2006; Means et al, 2015; Noeth & Volkov, 2004; OECD, 2015b; Sharples et al, 2015). The literature also identifies that technology has enabled students to receive, interact, and engage with materials, teachers and peers differently than in the past (Megeid, 2014; Noeth & Volkov, 2004).
The implementation of these innovations has enabled changes in pedagogy to occur. Many of the participants from School B and some Middle Leaders from School A identified that expertise and confidence using technology in their classroom had increased when teachers were given professional development opportunities. Research conducted by Hayes (2007) supports this notion that technology use in classrooms increases when schools have a comprehensive professional development programme combined with time for teachers to reflect on their pedagogy. This is also support by Wastiau et al. (2013) who recommended that policy makers invest in professional development of teachers to increase the use of technology in classrooms. The literature highlights that professional development is not only needed to increase the use of technology but to also ensure that teachers have the necessary skills to make the most of the technology available to them (Noeth & Volkov, 2004).

The two Auckland secondary schools used in this research were eager to captivate students in their learning and believe that innovations involving technology can enable this to happen. These two schools were also aware of the need to prepare students for work and study in the 21st Century and are mindful that this involves developing digital competencies (21st Century Learning Reference Group, 2014). There is a strong belief across the two schools that technology alone will not improve student outcomes and changes from traditional teaching practices are needed (Hattie & Yates, 2014).

**Practices of evaluating innovations**

*Current evaluation practices*

In this research, the Principal from School A and the Senior Leaders from both schools recognised the importance of connecting to tertiary institutions to help with evaluating technology innovations. These findings support the research conducted by Devos and Verhoven (2003) which found that the use of external agencies are vital to ensure that blind spots are not missed during evaluations. School A had made use of a lecturer from Auckland University of Technology (AUT) whereas School B had sent teaching staff to complete the Mindlab course run by Unitec. Modifications were made to the
way that both schools evaluated innovations that supported technology enhanced teaching and learning as a result of these links to tertiary providers. Most of the Middle Leaders from School A were able to articulate how the connection with the lecturer from AUT was vital to ensure that they had an outside perspective when evaluating innovations. Some of the Classroom Teachers from School A found that the use of the AUT lecturer allowed them to identify what was working well and what was not. This feedback was used by teachers to modify their teaching practice. The AUT lecturer questioned why the school was not getting students to publish their work online and suggested that students would produce a higher quality of work when they knew it was going to be seen by a wider audience.

Devos and Verhoven (2003) also acknowledge that schools should rely on both internal and external review processes if they wish to improve student outcomes. This finding is also evident in the literature that states, schools must engage in continuous self-review processes and form connections with outside agencies to improve student outcomes (Devos & Verhoeven, 2003). The self-review models proposed by the Education Review Office (ERO) do not explicitly mention the need for schools to engage in external review processes. However, the ERO report *Evaluation Indicators for School Reviews 2011*, states the following about internal and external review processes, “Theorists argue that both types of evaluations are important and can benefit each other” (p.7). In this research it was clearly evident that schools were aware of the importance of internal and external review processes, however, reviews currently carried out were not done in a systematic manner.

In this research, the Principal from School A and the Senior Leaders from both schools identified the importance of collecting data through surveys to inform decision making at all levels of the school. Technology usage and accessibility of learning has been the type of data collected from students at both schools. These findings correlate with the literature from Means et al. (2015) who assert that both teachers and school leaders have a role to play in data collection and research. This finding also supports the literature by Fullan (2011) which states that organisations must have access to good
data for improvement to occur. The literature also clearly articulates that there is a clear link between evaluation, data and school improvement (Bernhardt, 2013; Fullan, 2009). It is also clearly evident in the National Administration Guideline One that student outcomes should be evaluated by collecting and analysing assessment data (Ministry of Education, 2013).

Middle Leaders from both schools were unable to comment on the use of surveys to collect data to inform practice. However, most Classroom Teachers at both schools had used online surveys, and they had predominantly used Google forms to collect data to improve teaching practices. One Middle Leader from School B described how using Google forms at the end of the topic in Statistics allowed formal feedback to be collected and how this could inform the next topic being taught. No explicit mention of the ‘Teaching as Inquiry’ cycle was made by the teachers or leaders at either school. The ‘Teaching as Inquiry’ cycle gives teachers a framework to inquire into their practice. In particular this cyclic model would enable teachers to inquire into strategies or innovations that they have implemented into their classroom. New Zealand teachers are also expected to collect evidence to meet the requirements of the Practising Teacher Criteria (PTC). Evidence should be collected that shows that teachers have reflected, evaluated and refined their practice to meet the requirements of PTC 11 and 12. The PTC was not mentioned by any of the participants in this research project.

The use of surveys for evaluative purposes has been well documented throughout this research. In particular, the use of online surveys is increasing within the two schools used in this research. These online surveys gave schools quick access to a vast amount of data referring to technology usage and the impact on teaching and learning. This data allowed schools to improve student outcomes and formulate future action plans (Fullan, 2009). Specific data distinct to their own unique context has been collected through surveys at each school, this data allowed the schools to identify areas that need further support. The online surveys conducted at School A focused on computer usage across departments which they found both interesting and concerning. Some subjects had integrated technology into their classes a lot more
than others. The schools in this research project have shown a willingness to make changes based on evidence rather than solely on professional judgements (Hattie, 2008). Surveys for evaluative purposes could be used for school wide review, department wide review and individual self-review. Currently surveys are being used sporadically as part of the review processes within each of the schools in this research project.

Benefits of evaluating innovations
This research has highlighted several ways in which the evaluation of innovations has informed teaching and learning. The Senior Leader from School A and the Principal from School B acknowledged that they were able to gain information on technology usage rather than the effectiveness of technology through evaluation practices. This corresponds to the viewpoint held by Boyd (2002) that the focus has been on increasing the amount of technology available to students and not on how it can be best used for learning. This research has further highlighted that collecting data on technology usage would appear to be easier than collecting data on student outcomes as a result of using technology. This is supported by Livingstone (2012) who states “that convincing evidence of improved learning outcomes remains surprisingly elusive” (p.9). The information collected from evaluations allowed the Principal from School B to target specific subject areas and teachers that needed further support. The Principal from School B described how they put extensive support in place for the Cook Island Maori Language teacher so that they were able to start introducing technology into their classroom. This Principal was also aware that in certain subjects like Statistics this level of support was not needed as they were already using technology significantly in their teaching. The Principal from School B also acknowledged the benefit of being able to identify individuals and departments that had successful practices. Subjects like Statistics were then used as exemplars for other subjects so that best practice could be shared throughout the school. These findings are consistent with the viewpoint of Razik and Swanson (2001) who state “Evaluation reveals how well educational programs are working and provides insight into how they can be improved” (p.222). Baker (2014) and OECD (2015a) found that organisations must continue to learn through recognising the pitfalls and challenges of the innovations they have implemented.
Principals and Senior Leaders from both schools all gave examples of where evaluation had been used to modify and improve teaching practice. Some Middle Leaders and Classrooms Teachers were also able to give examples of where evaluation had been used to modify and improve their teaching practice. This is consistent with the need to build a robust evidence base which includes examples of best practice is vital for teaching and learning to occur (21st Century Learning Reference Group, 2014). In particular the Middle Leaders from School B discussed the improved writing outcomes for students by using technology in the classroom and how they could share strategies across the school. The use of evaluation to identify best practice is supported by the viewpoints expressed by Noeth and Volkov (2004) that “evaluation must pay careful attention to local program contexts” (p.11). The report published in 2015 by the OECD, Students, Computers and Learning: Making the Connection states that technology is only linked to improved student outcomes in certain contexts. In particular this report identifies that outcomes are improved when collaboration, connection to the outside world and study and practice time is increased. Many of the Middle Leaders and Classroom Teachers in this research were able to articulate that collaboration and connection to the outside world had increased as a result of using technology in the classroom. However, none of these Middle Leaders or Classroom Teachers in this research described increasing the study and practice time available to students.

**Barriers to evaluations**
Ironically, access to technology was identified as a barrier to evaluating innovations by the Principal from School B, the Senior Leader from School A, two Middle Leaders from School A and one Classroom Teacher from School B. The two Middle Leaders from School A focused on the issue of connectivity (wifi access) and felt that this needed to be improved throughout the school so that students could answer online surveys. These findings are consistent with the research conducted by the OECD in 2015 Students, Computers and Learning where they identify both access to devices and connectivity issues as barriers to implementing technology in the classroom. However, this contradicts the findings in the Educational Technology report released in May 2015 by the Centre for Education Innovations, where they identify that many of the innovations recently implemented worldwide had provided students with greater
access to technology. This research highlights that access to technology is still variable across and within schools Auckland secondary schools. The Principal from School B also expressed difficulty in evaluating innovations across classrooms and departments due to the huge variability in computer usage. This is consistent with the viewpoint expressed by Selwyn (1999), that teachers felt that technology was more suited to some subject areas than others. However, Hayes (2007) had a different perspective that the apathy of teachers to adopt technology was due to teachers trying to work out what the best use of technology was in their classroom.

Four major barriers to the use of surveys for evaluative purposes were identified: the design of surveys, access to technology, inconsistent response rate and survey fatigue. The design of current surveys was questioned by the Principal at School A, who asked the following questions: ‘Are the surveys measuring what we want them to measure?’ and ‘Are they measuring what we actually need to know?’. The design of surveys must be carefully planned as the data collected should inform decision making throughout all levels of the school (21st Century Learning Reference Group, 2014). Regular access to technology for students to complete online surveys is still a concern at both schools used in this research project. It is evident, however, throughout this research that in both participating schools this barrier is slowly dissipating. Currently there is still some variability with student access to technology within each school, this has meant online surveys have been used more frequently by some teachers than others. This has led to the third barrier which is inconsistent response rate to surveys. The inconsistent response rate can be attributed to many factors. Students within each school have been given more access to technology than other students at the same school, this has meant that completing surveys for some students is practically easier than others. This inconsistent response rate might impact on the quality of data available to teachers and leaders. The issue of survey fatigue was the fourth barrier identified by the Senior Leader at School A that prevented the collection of rich and relevant data for evaluative purposes. The Senior Leader felt that students had been exposed to numerous surveys. Most Middle Leaders from School B felt that they would benefit from having a generic school wide survey that they could use for evaluation of innovations. As Means et al. (2015) suggests, teachers and school leaders all have a
part to play in the collection of data and research. The research clearly states that schools need to engage in continuous self-review if they are going to improve student outcomes (Noeth & Volkov, 2004; OECD, 2013; OECD, 2014). The models proposed by ERO and the Ministry of Education (MOE) provide a framework for schools and teachers to evaluate, however, they do not give explicit instructions as to how to collect data for evaluation purposes. It appears to be the responsibility of each school and teacher to decide what evidence they will use for self-review purposes.

The Principal and Senior Leader from School B acknowledged that the lack of an evaluation framework in their school had resulted in the majority of evaluations being done informally within their school. Research conducted by Baker (2014) recommended that evaluation plans should be developed for innovations at the time of implementation. This viewpoint was supported by the Classroom Teachers at School B who felt that currently evaluation was being done on an ad hoc basis within their school.

Interesting to note, only the Middle Leaders at both schools recognised time as a barrier to the evaluation of innovations. It is clearly evident in the literature that for schools to be effective they must engage in highly effective self-review (Education Review Office, 2014; Razik & Swanson 2001; OECD, 2013a). As Fullan (2011) purports we must be careful when making generalisations based on one particular context. It is therefore imperative that each school allows time for teachers and leaders to engage in their own continual evaluation processes.

**Next steps for schools**
The Middle Leaders from School B thought that the creation of a generic survey for evaluating innovations was an important next step. The need to then use and share this information with colleagues was also seen as a vital by these Middle Leaders. These findings are consistent with MOE and ERO requirements of school self-review, in that self-review should be continuous and evidence based. In particular the focus of
self-review should be on improving teaching and learning outcomes for students (Education Review Office, 2014). This finding is also supported by PTC 12 which states that teachers need to engage in a systematic and critical self-review process that is evidence based (Education Council of Aotearoa New Zealand Teacher, 2015).

Some of the Middle Leaders from both schools thought the professional development offered to teachers should be altered so that during professional development time they could focus on fewer innovations in greater depth. Many of the Middle Leaders from both schools wanted to spend more time on each innovation being introduced so that they could implement more effectively and evaluate in greater depth. This finding is consistent with Hattie’s (2008) research that technology is effective in classrooms when teachers are given appropriate professional development on how best to use the technology. The research conducted by Wastiau et al. in 2013 also found that schools “should invest in teachers’ professional development in order to increase the number of digitally confident and positive teachers” (p.22).

The Classroom Teachers at School B discussed the need to use the appraisal system to evaluate innovations. This finding is consistent with the research conducted by Baker (2014) who suggested that the evaluation of innovations could be done as part of the appraisal system which already exists within a school. In particular they expressed the desire to increase the amount of student voice collected. Classroom Teachers at School A discussed wanting to get parents more involved in students learning by collecting parent voice.

It was interesting to note that both Principals described the need to create a safe environment for teachers to innovate, however, Senior Leaders, Middle Leaders and Classroom Teachers from either school did not mention this. Hayes (2007) stated that for technology to be implemented effectively into the classroom, teachers need to be in a supportive school environment, this is consistent with the Principals’ viewpoint.
Conclusions
This research concludes that there has been an explosion of technology innovation in schools, however, the evaluation practices used to assess the effectiveness of these innovations has been poor.

**Explosion of technology**
The explosion of technology into secondary schools has been driven by demands placed upon teachers to captivate learners, improve their pedagogy and develop 21st Century learning skills in their students. This explosion of technology can be seen through the increased investment in infrastructure and hard technology by schools and families. There has also been an explosion of soft technology being introduced into schools.

As a result, schools have implemented too many innovations involving technology without first researching and evaluating the impact that they are going to have on student learning. Whilst limited research has been done on innovations involving technology prior to implementation, formal evaluations of these innovations has not been done. This reckless practice of acquiring multiple innovations involving technology at one time has meant that it has been impossible for leaders and teachers to ascertain which if any of these innovations are actually improving teaching and learning.

**Poor evaluation processes**
This research has highlighted that the evaluation of technology innovations is poorly addressed and is currently being done on an ad hoc basis in schools. School wide evaluation frameworks have not been set up at the time of implementing innovations. It has therefore been difficult to formally evaluate these innovations. This has led to a lack of accountability for the time and money that schools have invested. Leaders within each school are unable to ascertain whether they are getting ‘bang for buck’ or if the innovation is enhancing teaching and learning. They are also unaware of the size of the impact that each technology innovation is having on teaching and learning.
Due to limited and ad hoc evaluations of technology innovations, leaders and teachers are making decisions on students’ learning based on inadequate information. Decisions are being made with limited evidence and what evidence is available is anecdotal or observational. As decisions are being made with inadequate evidence this is setting the implementation of technology innovations up for failure.

**Recommendations**
The following recommendations are based on the findings of this research. They offer suggestions that may help schools evaluate innovations that support technology enhanced teaching and learning.

The main recommendation is that there should be a school wide evaluation framework within each school. It was clearly identified by the Principal, Senior Leader and Classroom Teachers at School B that they felt that evaluation practices within their school would improve if they had an established framework within which to work. A proposed school evaluation framework for technology innovations is given in Figure 5.1 which is made up of three types of evaluations or self-reviews: evaluation of innovations prior to implementation, school wide self-review and department wide self-review. The evaluations and self-reviews conducted within this framework would involve using ERO’s cyclic process of self-review. The types of self-reviews conducted within this framework would be: strategic, regular and emergent. Within each of these self-reviews there would be five stages: considering, planning, implementing, monitoring and informing. At each stage key questions need to be answered by leaders and teachers to ensure that the self-review is effective. As part of the evaluation framework schools should also make connections with outside evaluators.
The evaluation of innovations prior to implementation would allow schools to decide whether to go ahead and implement the technology innovation. It is recommended that leaders and teachers select innovations to be implemented into their school, departments and classrooms based on sound research. Leaders and teachers should spend time evaluating these innovations prior to implementation to ensure that they are enhancing teaching and learning. This type of evaluation would be strategic or emergent. Leaders and teachers must make strategic decisions on whether to
implement technology innovations based on whether they are going to enable the school to meet its mission, vision and strategic goals. As technology innovations become available to schools there will be times when emergent self-review must be used by leaders and teachers to ascertain whether to implement an innovation.

The school wide and department wide self-reviews must be strategic, emergent and regular in order to meet the needs of the school. Strategic self-review is needed to ensure that the school and individual departments within the school are achieving the schools mission, vision and strategic goals (Education Review Office, 2014). It is also imperative that regular self-review is conducted as the evidence from this type of review will feed into the strategic self-review (Education Review Office, 2014). Regular self-review allows leaders and teachers to focus on what is happening in a school on an ongoing basis. The school wide and department wide self-review must also have the ability to encompass emergent self-review so that schools and departments can respond to spontaneous events that occur, once again this type of self-review should supplement the strategic self-review (Education Review Office, 2014). The school wide and department wide self-reviews would feed into a comprehensive professional development programme which would allow for improved teaching and learning. However, depending on what is found in the school wide and department wide self-reviews, these findings could lead directly to improved teaching and learning without the need for additional professional development.

A comprehensive professional development programme informed by self-review and appraisal would allow schools to increase the effective use of technology within their school (Wasitau et al, 2013). This evidence based professional development approach will be key to supporting effective teaching and learning (21st Century Learning Reference Group, 2014). This research has also highlighted that the professional development opportunities offered to teachers should focus on fewer innovations. This would allow more time for the implementation and evaluation of each innovation. The allocation of more time on each innovation would enable teachers the ability to work out the most effective use of the innovation in their classroom (Hattie, 2008). The ability
for teachers to spend time developing their expertise in using technology would then transform and change their teaching practice (Ely, 1990; Wasitau et al, 2013).

Within this school evaluation framework for technology innovations it is recommended that Senior Leaders allocate time for evaluation. The allocation of time for evaluative purposes and professional development purposes was identified as vital throughout this research. This time should be built into school routines and the evaluation framework to ensure that evaluation can occur effectively. The allocation of time for evaluation purposes should be ongoing and regular throughout the year. In conjunction with allocating time for teachers to evaluate, support must also be provided to ensure teachers have appropriate evaluations tools and skills.

Senior Leaders as part of the school evaluation framework for technology should develop the use of surveys within their school. Senior Leaders must spend time on survey design so that they can collect information that can inform strategic and regular self-review processes. The creation of a generic school wide survey that could be used ‘as is’ or adapted should be a high priority for Senior Leaders. It would also be advantageous to Classroom Teachers if Middle Leaders customised the generic school wide survey to meet the needs of their department. Surveys must be incorporated into the school wide evaluation framework to ensure that teachers and leaders collect quality information. Incorporating surveys into the evaluation framework of the school should give schools the ability to control the frequency of surveys being administered. A school wide plan for the use of surveys should be developed to avoid survey fatigue amongst students, teachers, and parents. Senior Leaders should also continue to find solutions to ensure that students have access to technology in order to complete surveys.
**Recommendations for further research**  
Possible suggestions for further research include:

- This research was limited to two secondary schools in Auckland. A larger sample size including primary, intermediate and area schools as well as schools outside of Auckland could be carried out;
- Google applications was identified throughout this research as the most common innovation introduced into schools in the past five years. Further research could be carried out focusing on this specific innovation and how it has impacted on student outcomes;
- In this research Principals and Senior Leaders identified that good infrastructure was key to ensuring that technology innovations were implemented successfully. More research into the exact infrastructure needed in a school to implement technology innovations would be advantageous to schools looking to implement these innovations;
- One of the findings of this research was that pedagogy has evolved as a result of evaluating innovations that support technology enhanced teaching and learning. An area for further research would be the change in pedagogy as a result of technology innovations;
- This research has also highlighted that increased student engagement and motivation has been observed by teachers as a result of the increased use of technology in the classroom. Further investigation into engagement and motivation levels as a result of technology use in the classroom would be advantageous to schools;
- Survey design was highlighted in this research as an area of concern. Research into the type of data to collect, how to collect it and then how to interpret it to inform practice would be beneficial for school leaders wanting to make informed decisions as to what innovations or strategies are being successful in their schools.
References


Alberta Education. (2012). *Bring your own device; A guide for schools*. Alberta, Canada.


Galletta, A. (2013). Mastering the semi-structured interview and beyond from research design to analysis and publication (Qualitative Studies in Psychology). New York: NYU Press.


Sharples, M., Adams, A., Alozie, N., Ferguson, R., FitzGerald, E., Gaved, M., McAndrew, P., Means, B., Remold, J., Rienties, B., Roshelle, J., Vogt, K.,


Appendix A: Semi structured interview – Question schedule (Principal/Senior Leader)

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MODEL (SEMI-STRUCTURED) INTERVIEW SCHEDULE

Principals and Senior Leaders are the target audience of the semi-structured interview.

1. What innovations that support Technology Enhanced Teaching and Learning (TETAL) have you implemented in your school in the past five years?
2. What factors influenced the schools decision to implement these innovations?
3. What influence has educational research or latest pedagogical theory had on the implementation of these innovations?
4. What influence has your wider school community had on the implementation of these innovations?
5. When were these innovations evaluated?
6. How did you evaluate these innovations?
7. Who was involved in the evaluation of these innovations?
8. Describe some of the ways that evaluation practices have had a positive effect on student outcomes school wide?
9. What were the barriers that prevented you from evaluating innovations that support TETAL?
10. What would help the school to evaluate innovations that support TETAL?
11. What advice would you give to other Principals or Senior Leaders to help them avoid the barriers that inhibit evaluation?
12. What do you think the next steps for the school should be concerning the evaluation of innovations that support TETAL?
13. What did you learn from evaluating innovations that support TETAL?
14. What advice would you give other Principals or Senior Leaders looking to implement innovations that support TETAL?
15. Are there any innovations that support TETAL that you have implemented that you have now discarded?
16. What information did you use to support this decision?
17. Describe some of the ways that innovations that support TETAL have had a positive effect on student outcomes?
18. What do you see as your schools next steps?
Appendix B: Focus group discussion – Question schedule (middle leaders/classroom teachers)

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MODEL FOCUS GROUP DISCUSSION SCHEDULE

The target audience is middle leaders/classroom teachers who have been involved in implementing innovations that support technology enhanced teaching and learning. The questions in this focus group discussion will be open ended so that participants can interact in order to answer my research questions. There will be two focus groups in each school, one for classroom teachers and one for middle leaders.

1. What innovations that support Technology Enhanced Teaching and Learning (TETAL) have you implemented in your department/ Faculty in the past five years?
2. What factors influenced your decision to implement these innovations?
3. What influence has educational research or latest pedagogical theory had on the implementation of these innovations?
4. What influence has your wider school community had on the implementation of these innovations?
5. When were these innovations evaluated?
6. How did you evaluate these innovations?
7. Who was involved in the evaluation of the innovations you participated in?
8. Describe some of the ways that evaluation practices have had a positive effect on student outcomes in your department?
9. What were the barriers that prevented you from evaluating these innovations that support TETAL?
10. What would help you to evaluate innovations that support TETAL?
11. What advice would you give to other middle leaders/teachers to avoid the barriers that inhibit evaluation?
12. What do you think the next steps for the school should be concerning the evaluation of innovations that support TETAL?
13. What did you learn from evaluating innovations that support TETAL?
14. What advice would you give other middle leaders/teachers looking to implement innovations that support TETAL?
15. Are there any innovations that support TETAL that you have implemented that you have now discarded?
16. What information did you use to support this decision?
17. Describe some of the ways that innovations that support TETAL have had a positive effect on student outcomes?
18. What do you see as your faculty’s next steps?
Appendix C: Research Information sheet

INFORMATION SHEET FOR PARTICIPANTS

Title of Thesis: Investigating practices of evaluating innovations that support technology enhanced teaching and learning.

My name is Rachel Williams. I am currently enrolled in the Master of Educational Leadership and Management degree in the Department of Education at Unitec Institute of Technology and seek your help in meeting the requirements of research for a Thesis course which forms a substantial part of this degree.

The aim of my project is to investigate practices of evaluating innovations that support technology enhanced teaching and learning in two Auckland secondary schools. The second aim is to investigate the barriers and challenges that inhibit the evaluation of innovations that support technology enhanced teaching and learning. The last aim is to identify successful evaluation practices of innovations that support technology enhanced teaching and learning.

I request your participation in the following way. I will be collecting data using interview schedules and focus group discussions and would appreciate your contribution as a member of the group. I will also be asking you to sign a consent form regarding this event. The interview or focus group interview venue will be SCHOOL NAME and the duration of the interview or focus group will be one hour. The focus group will consist of middle leaders or classroom teachers. I anticipate having 6-8 participants take part.

Neither you nor your organisation will be identified in the thesis.

Either: I will be audio recording your contribution and will provide a transcript (or summary of findings if appropriate) for you to check before data analysis is undertaken. The transcript will be kept confidential to myself and my supervisor. You can withdraw yourself or any information from the research anytime up to 2 weeks after the verified return of the transcript. If you have
any queries about the project, you may contact my supervisor at Unitec Institute of Technology.

OR: I will be asking all focus group participants to maintain confidentiality regarding all discussion that occurs within the focus group event. I will be audio recording your contribution and will provide a summary of findings for you to check before data analysis is undertaken. The transcript will be kept confidential to myself and my supervisor. You can withdraw yourself or any information from the research anytime up to 2 weeks after the verified return of the summary. If you have any queries about the project, you may contact my supervisor at Unitec Institute of Technology.

The transcription of this focus group will be conducted by Purple Giraffe transcription online who have signed a confidentiality agreement regarding this data. The findings from this study may be used to write a paper for publication in an academic or professional journal.

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

Yours sincerely
Rachel Williams
Phone: 021 132 7700 Email rwilliams@mcauleyhigh.school.nz

UREC REGISTRATION NUMBER: 2015 - 1068
This study has been approved by the Unitec Research Ethics Committee from (date) to (date). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Appendix D: Consent form - adult

INTERVIEW CONSENT FORM – ADULT PARTICIPANTS

RE: Master of Educational Leadership and Management
THESIS TITLE: Investigating practices of evaluating innovations that support technology enhanced teaching and learning.

RESEARCHER Rachel Williams

Participant’s consent

I have been given and have understood an explanation of this research and I have had an opportunity to ask questions and have had them answered. I understand that neither my name nor the name of my organisation will be used in any public reports. I also understand that I will be provided with a transcript of the interview for verification and that I may withdraw myself or any information that has been provided for this project up to two weeks after the return/confirmation of my verified transcript.

I agree to take part in this project.

Signed: _________________________________

Name: _________________________________

Date: _________________________________

UREC REGISTRATION NUMBER: 2015 - 1068
This study has been approved by the Unitec Research Ethics Committee from (date) to (date). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
Full name of author: Rachel Diana Williams

Full title of thesis/dissertation/research project ("the work"): Technology innovations that support technology enhanced teaching and learning and their evaluation in two Auckland secondary schools.

Practice Pathway: 

Degree: Master of Educational Leadership + Management

Year of presentation: 2016

Principal Supervisor: Professor Carol Cardno

Associate Supervisor: Martin Bassett

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