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Evaluating the effect of the digital divide between teachers and students on the meaningful use of information and communication technology in the classroom

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Evaluating the Effect of the Digital Divide between Teachers and Students on the Meaningful Use of Information and Communication Technology in the Classroom.

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ABSTRACT

In recent years the usage of Information and Communications Technology (ICT) in schools has become more prominent (Pegrum, Oakley, & Faulkner, 2013), with the majority of the focus being on hardware implementation (Hunter, 2013). However, teachers have generally struggled to integrate the use of ICT fully to promote learning in their classrooms (Sipilä, 2014). Therefore, schools may need to develop teachers' ICT skills; this also being in response to students demonstrating higher levels of ICT skills within schools (Morgan, 2012). The well documented limitations in ICT skills of many teachers, and the likely increasing ICT skill levels of students' is creating the potential for a digital divide between the teacher and his/ her students.

A digital divide is normally identified between developing countries that lack the resources and financial support when compared to developed countries (Shih, Kraemer, & Dedrick, 2008). However, there is a concern regarding the knowledge and skills of teachers to make use of ICT in the classroom (Asia Society, 2012). In addition, it is likely that as teachers get older the ICT knowledge and skills gap between them and younger people will widen (Department of Education and Training in Western Australia, 2006). Is this widening skills gap creating a critical digital divide between teachers and students in the classroom? It has been argued that students have lived in a world of technology since a young age, and therefore, have developed a natural ability to use technology to communicate and find information (Groff, 2013). Is this natural ability exploited in the classroom and do the students exhibit higher-levels of ICT knowledge and skills than the teacher? If a digital divide exists, would this affect the way in which ICT is used by students in the classroom? This study sought to investigate this question.

The environment for this study was a Western Australian secondary school, with the participants being teachers and students. The study implemented a quasi-ethnographic multiple case studies approach to research, with multifactorial surveys and interviews, was implemented for the study. The primary sample for the study comprised eight teachers, two from each of the core learning areas of Mathematics, English, Science, and History and Social Sciences. Each teacher sampled, allowed access to one of his/her student classes, resulting in a sample of 154 students from Year Seven to Year Eleven, therefore there were eight distinct case studies. Initially, the students and teachers participated in a survey to establish the extent and nature of the potential digital divide

(the first construct) between the teacher and his/her class. This construct analysed the ICT competence by assessing the level of *ICT Skills*, *Application* and *Attitude* for each of the students and teachers. The responses to the teacher interview questions and some of the questionnaire items were also used to determine the extent of the *Meaningful Use of ICT* (the second construct) with each class. Finally, this was compared with the extent and nature of the digital divide for each case study class to investigate whether there was likely to be a qualitative connection between the two constructs. That is, the study aimed to investigate whether a digital divide existed, and whether it was likely that this affected the use of ICT in the classroom. The intention of the study was to assist in directing teacher professional learning practices, and policies to support enhanced learning with ICT.

The study found that both the sample of teachers and sample of students had varying levels of ICT competence. However, there was little difference in the student mean for each class on the measures of ICT competence. For some case study classes, it was determined that there was a digital divide in favour of the students, and for others the divide was in favour of the teacher. This outcome was determined by the ICT competence of the teacher, not the students, because there wasn't a significant difference between the student means for the eight class. The study found that when the digital divide for a class was in favour of the students there was limited evidence of *Meaningful Use of ICT*. However, when the divide was clearly in favour of the teacher for the class, there was a noticeable level of *Meaningful Use of ICT* with the students. The results of the study suggested that the difference in ICT competence of the teacher compared with students was likely to affect the *Meaningful Use of ICT* in the classroom. Therefore, it is recommended that policies and practices in schools and school systems be enacted with the aim of increasing the ICT competence of teachers.

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CHAPTER 1
INTRODUCTION

Computer technology has evolved at a rapid pace, particularly within the last decade with Australian schools. This amplified when schools received additional funding from the government to provide a computer for each secondary school student (Rudd, Smith & Conroy, 2007). This funding made computer technology a more prominent feature within schools, thus changing the expectation levels for the use of ICT for teaching in the classroom (Pegrum, Oakley, & Faulkner, 2013). Therefore, it is important that current data is collected to investigate the effectiveness in the use of these technologies by the teachers and students. This study sought to contribute to this area of investigation by considering the potential influence of the competence of teachers in using these technologies.

This chapter establishes the rationale for the study, and discusses the purpose and direction of the research. The overarching research question is presented and followed by the subsidiary questions. Key terminology used throughout the study is discussed and clarified.

Background to the Study

Over the last decade, there has been an exponential growth in the quantity and range of Information and Communications Technologies (ICTs) in schools and homes, largely because of availability at affordable prices (Australian Bureau of Statistics, 2011). From the day Australian children are born, most are immersed in the use of these computer technologies; whereas the majority of teachers have had to learn and evolve with the technologies (Groff, 2013). There has been a concern that teachers may not have the ICT skills to match, or extend their students (Department of Education and Training in Western Australia, 2006). The 2012 International Summit on the Teaching Profession stated that, "We are trying to teach twenty-first century skills with twentieth-century teachers in nineteenth-century learning environments." (Asia Society, 2012, p. 7). Such a situation creates a perceived gap between teachers and students in the use of ICT, which will be referred to as a *Digital Divide* (Vie, 2008). The increased availability of the Internet in schools, portable devices for collecting and gathering information, use of Interactive White Boards (IWB), and the increased usage of hand held devices may

amplify the effect of any such gap. This gap demonstrates the importance of collecting current, up-to-date data, especially with the required levels and types of ICT skills a teacher should possess. This study set out to investigate the extent and nature of this divide, and to consider whether it affected the *Meaningful Use of ICT* (see definition of terms at the end of the chapter) (Ertmer & Ottenbreit-Leftwich, 2010) in a secondary school classroom.

It is posited that the success of how a teacher integrates ICT into the classroom will depend to some extent on how experienced and skilled the teacher is in the use of that technology. Does a teacher's competence in using ICT influence the use of ICT to support learning experiences of the students? Teacher ICT competence may not be necessary if the students themselves are confident and competent in the use of ICT. Perhaps teachers can rely on the competence of the students rather than on their own competence? This study sought to investigate this situation.

Purpose/ Aims of Study

The purpose of the study was to investigate whether differences in ICT competence between teachers and their classes affected the extent to which meaningful use of ICT was used in their classes. To achieve this, the study set out to determine the ICT competence of the teacher and his or her students. The ICT competence was used to establish whether a *Digital Divide* (Vie, 2008) existed, and if so, whether it was in favour of the teacher or students. Finally, the study sought to identify whether any such digital divide would be reflected in the *Meaningful Use of ICT* in the class (Ertmer & Ottenbreit-Leftwich, 2010).

Rationale and Significance of the Study

If teachers are confident in their use of ICT it may be logical to assume that when they integrate technology into the classroom the impact on the learning experiences of students would be maximised. However, teacher confidence and competence in the use of ICT (Males, 2014) may not be necessary if the students themselves are confident and competent (Hunter, 2013). The relationship between the confidence and competence of teachers and their students, and the effect this may have on the use of ICT in the classroom is not clear, and was investigated in this study. The research resulting from this study will be beneficial for schools deciding upon the relative importance of

developing the teachers' or students' ICT competence. Pickett (2009) established that the ICT skills of the teacher were a factor when successfully integrating technology into the classroom. The current study considered not only ICT skills, but also attitudes and applications as components of ICT competence of the teacher. The alternative is to consider whether it is more important to focus on the teachers' pedagogical teaching knowledge rather than the teachers' ICT competence.

Over the years a strong emphasis has been placed on hardware implementation (Hunter, 2013). This study investigated the use of educational technology (hardware and software) used by the teachers and students in the classroom to establish whether a *Digital Divide* would have any effect on the meaningful use of the technology in the classroom. The study sets in place a method that schools could adopt to quantify the level of *Digital Divide* and *Meaningful Use of ICT*.

Due to the ever changing environment of educational technology, and the increased prevalence of the technology in the classroom from government investment (Rudd, Smith & Conroy, 2007) previous research has quickly become outdated. In particular, with the increased accessibility of the Internet in schools, and the availability of portable devices (e.g. tablets and laptops) for students. Therefore, it is important to update regularly research into the connections between the technology, its roles in supporting pedagogies, and the skills teachers and students have in applying the technology. This research will add to current knowledge on whether the *Digital Divide* in a classroom affects the *Meaningful Use of ICT* in the classroom.

Statement of Research Problem

The research problem was to determine whether a teacher's ICT competence, when compared with their students, significantly affects the way ICT is applied in the classroom to support learning. If the teacher was more competent with ICT, would there be more meaningful use of ICT with the class than for a teacher who was less competent in using ICT? Furthermore, was this mainly determined by their absolute competence, or was this modified by their relative competence compared to their students?

Research Questions

The overarching research question was:

> Does the level of digital divide between a teacher and his/her students affect the meaningful use of ICT in the classroom?

Four subsidiary questions were addressed to clarify aspects of the overarching question.

1. What level of competence do teachers have in using ICT?
2. What level of ICT competence do students bring to the classroom?
3. What level of digital divide exists between students and teachers?
4. What meaningful uses of ICT are evident in the classroom?

Definition of Terms

According to Ertmer and Ottenbreit-Leftwich ***Meaningful use of ICT*** refers to "...that which enables students to construct deep and connected knowledge, which can be applied to real situations." (2010, p. 257). In the case of this study it refers to how the ICT can be used meaningfully by the teacher with the students to enhance learning in the classroom. This is measured by three LEA attributes: *Knowledge Building, Active Learning and Engagement, Motivation* and *Challenge*.

Digital Literacy "…is the underpinning influence that sustains an individual's competent and purposeful use of digital technology in education, in the workplace and in his/her daily activities." (Ng, 2015, p. 125).

The ***Digital Divide*** for this study was defined not in terms of the access to the technology, but to the digital literacy of the students and teachers.

Web 2.0 is the use of blogs, wikis and social networking sites.

ICT Competence refers to the level of understanding a student or teacher has in the use of a particular application. In this study, the ICT competence consists of three scales: *ICT Skills, Attitude and Application*.

ICT Skills is one of three scales used to assess the *ICT Competence* of a teacher or student. The *ICT Skills* are a set of skills required to use an application. The scale is measured by four levels: *Limited, Basic, Competent and Highly Competent.*

ICT Attitude is one of three scales used to assess the *ICT Competence* of a teacher or student. This assesses the student or teachers' opinion in the use of computers. The scale is measured by five opinions: *Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree.*

ICT Application is one of three scales used to assess the *ICT Competence* of a teacher or student. This assesses how often a teacher or student uses a particular computer task through a year. The scale is measured by four frequencies: *Daily, Each Week, On Occasion and Never*.

Learning Environment Attributes (LEA) measure the level of *Meaningful Use of ICT* occurring in a class. There are three attributes: *Knowledge Building, Active Learning and Engagement, Motivation and Challenge.*

Knowledge Building is a *Learning Environment Attribute* where students investigate the real world using current information and tools to analyse, interpret and present this information.

Active Learning is a *Learning Environment Attribute* where students are active participants in their own learning and learn by doing.

Engagement, Motivation and Challenge is a *Learning Environment Attribute* where students are engaged with their own learning through being motivated and challenged by learning experiences.

A ***Case Study*** is a sampled secondary school class consisting of a teacher and his or her students.

Summary of Chapter and Outline of Report

This chapter introduced the study by defining the purpose, aims, rationale, significance, questions and keywords for this research. It has stated the importance of comparing teachers' *ICT Competence* to their students' *ICT Competence,* and considering whether this may influence the use of ICT in the classroom. It has set the question, 'If there is a difference between the two, does this influence the use of ICT for learning in the classroom?'.

In Chapter 2, the literature review establishes the importance of assessing the use of ICT in schools, and the ICT competence of current teachers and students. The chapter also explains the conceptual framework for the study. In particular, it clarifies points that must be incorporated within the study when assessing the *Digital Divide* and *Meaningful Use of ICT* in the classroom. Chapter 3 defines the methodology of the study and the results of the pilot study are presented and discussed. Chapter 4 discusses the results from the quantitative and qualitative analyses of the data. Data from each of the eight case studies are summarised and analysed. Chapter 5 addresses and discusses the overarching research question and the subsidiary research questions in the light of the results from data analysis. Chapter 6 summarises the findings, and discusses the limitations, implications for policy and practice, and implications for future research.

CHAPTER 2
LITERATURE REVIEW

This chapter presents a review of the literature on the ICT competence of teachers and students, and the meaningful use of ICT in secondary schools. The review explores the ICT competence of the student/teacher, and discusses factors that could influence this competence, such as attitudes, experiences, age, and the type of technology. The review discusses the technology available at home and school, and the students and teachers' competence in the use of this technology. Furthermore, the review highlights applications of these technologies that teachers have applied in their classrooms.

The review initially discusses the meaningful use of ICT in schools, followed by the importance of ICT competence for students and teachers. The concept of a digital divide and the influence of barriers to ICT use are discussed, and how this relates to ICT competence. In conclusion, the conceptual framework for the study is explained, clarifying how ICT competence, differences in competence between teachers and students, and meaningful use of ICT are related.

Meaningful Use of ICT in Schools

Computer technologies have been used in schools for over the last three decades to support teaching and learning, and have been shown under various conditions to improve teaching and learning of the student in the classroom (Salehi & Salehi, 2011; Schrum et al., 2007). In particular, the time spent and quality of technology use has shown to impact on student achievement, where the term 'meaningful use' has been used to describe the quality (Robertson, 2011, p. ii). For a teacher to integrate technology into the classroom meaningfully he/she has to make sure that the technology use has significance, purpose and value to enhance the students learning. As emphasised by Lei and Zhao "...this kind of research is important in that a sound understanding of the quality of technology use is the premise for any effort to promote meaningful technology use." (2007, p. 294).

For a lesson to be effective, a teacher must not only possess the knowledge on best practice in delivering the content, but be clear in how the content and pedagogical knowledge interact within the classroom (Linton, 2012; Males, 2014; Ng, 2015). Shulman (1986) discussed this point three decades ago, and called it Pedagogical

Content Knowledge (PCK). The PCK was further developed by Koehler and Mishra (2009) who integrated Technology Knowledge as a third knowledge domain that teachers should possess. The framework model then became known as the Technological, Pedagogical, and Content Knowledge framework (TPACK). The framework supports a teacher in effectively integrating ICT with purpose and value – promoting meaningful use of ICT, emphasising that not all use of the technology will have a beneficial impact.

There are varying reports on the effectiveness in the use of these technologies in the classroom (Lei & Zhao, 2007; Robertson, 2011; Pickett, 2009). The factors that appear to affect the effectiveness in the use of ICT by the teacher are technology access, teacher competence and appropriate preparation (Gupta & Lee, 2001). Robertson found that "The lack of meaningfully technology use in classrooms indicates a need for increased teacher preparation." (2011, p. ii). He expressed that using technology meaningfully was a necessary ingredient for increasing student motivation, learning and engagement. Using technology meaningful would require planning and preparation by the teacher. Teacher preparation was further explored by Males (2014), whose research found that the creation of a digital repository (e.g. Learning Management System or Google Drive) for classes was an effective tool in aiding a teacher to implement a 1:1 device into the classroom.

When integrating ICT into the classroom there is a wide range of tools available for teachers to use (Johnson et al., 2013). The success of how these tools are applied and integrated into the curriculum by the teacher vary in the extent to which they are meaningful for learning. Laliberte (2009) explored the idea of how teachers could integrate educational technology tools to improve the learning of the students. His research established some variety in the integration of technology, which was primarily projects, internet research, and differentiated instruction methods. Similarly, Sipilä found that "educational institutes have not advanced in parallel with technological advances; teachers in basic education are still using ICT mainly for informational, organizational, evaluative, and lesson planning activities." (2011, p. 39). Canada Newswire (2012) revealed a considerable variation between teachers and students in motivation when teachers used the 'usual' tools (presentation software and email) on a daily basis. They considered these tools ineffective for learning by the teachers; nevertheless, the students stated that the more useful the technology, the more

significant the lesson was in learning. Therefore, the selection of technology by the teacher is important, and must engage meaningful learning of the students within the classroom.

The study by Lei and Zhao (2007) demonstrated that not all ICT use has a beneficial impact on student learning. The research found popular technologies used by students such as, 'surfing' the Internet, emailing friends and word-processing for notes probably had little beneficial impact on student academic performance. The educational technologies that did have a positive outcome (meaningful use) on student achievement were the least popular by the students. Figure 1 illustrates the point where the technologies on the left are the most well liked, and the technologies on the right had an encouraging effect on student achievement. Emphasising the ICT tools, which are meaningful, are not always the most popular, and vice versa. Lei and Zhao's study is becoming seminal with the journal officially recognising 62 citations to their work, including by Ertmer and Ottenbreit-Leftwich (2010), and Livingstone (2012).

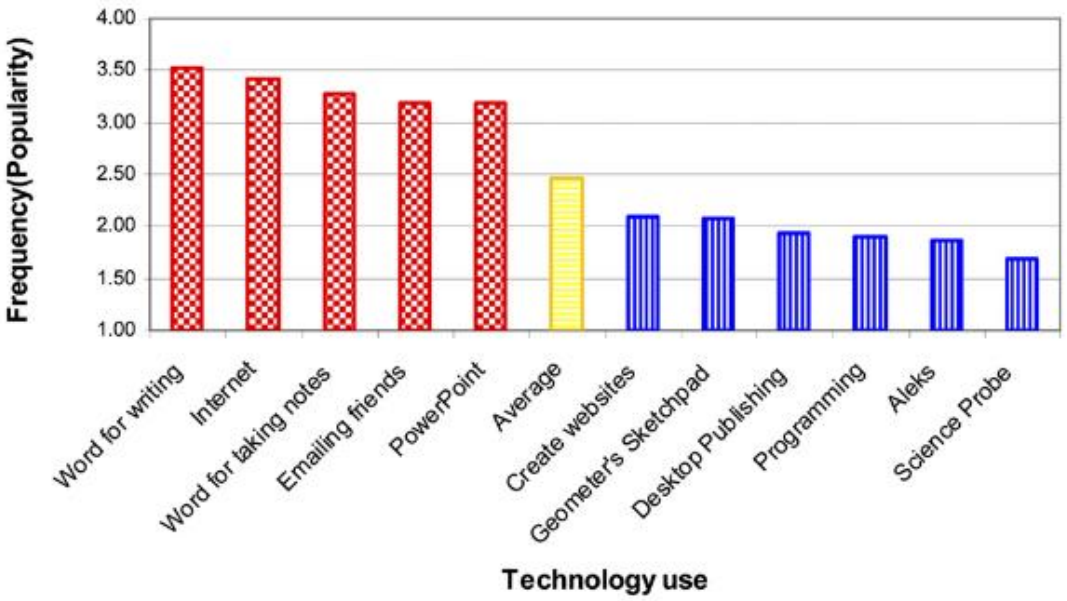

Figure 1. Frequency of most popular technology uses and meaningful technology uses (Lei & Zhao, 2007, p. 293).

Similar findings concerning the use of ICT emerged from Weinberg's (2010) research where students' perceptions of classroom use of ICT revealed that students held optimistic perceptions. Students in the research stated that "technology makes their school work more enjoyable as well as improving its quality." (p. x). Students may find a fun element in the use of technology; however, does it improve the quality in teaching

the curriculum in the classroom? This question was highlighted by Loveless (2007) whose research established a weak didactic relationship in the use of ICT, and the possible creation of an environment that distracts from meaning. An ICT tool can easily become an instrument for entertainment and divert attention away from the learning objectives of the lesson. The research findings of Lei and Zhao (2007), Loveless (2007) and Weinberg (2010) are now becoming somewhat dated, in that educational technology is continuing to evolve rapidly (Johnson et al., 2013; Pegrum et al., 2013). While it is likely that such foundational conceptual findings will endure, these need to be tested through research in more contemporary contexts. The importance of regular updated research supports the necessity for further research, such as the present study, to establish whether the results are continuing to evolve.

According to Kale and Goh " it is not clear whether teachers are well equipped with the necessary skills, support, and positive attitudes toward integrating them in their practices." (2014, p. 41-60). To use ICT meaningfully in a lesson requires appropriate planning by the teacher. Similarly, Pickett (2009) emphasised the importance of investigating a teachers' ICT skills and the impact it has on the integration of technology in the classroom. His study recognised that improving the teachers' ICT skills would probably reinforce technology integration into the classroom. The research emphasises the importance of assessing the teachers' ICT skills and evaluating the use of ICT with students in learning (Ng, 2015).

Newhouse and Clarkson (2008) developed a rubric-based tool to measure the *Meaningful Use of ICT* within a class. The rubric-based tool was developed to measure the Learning Environment Attributes (LEA), a key dimension in describing, evaluating and promoting the use of ICT in schools. The LEA used ten attributes and was found to be an effective tool in evaluating whether ICT had been integrated meaningfully into a class. The rubric-based tool was incorporated into this study, but modified to measure the *Meaningful Use of ICT* for the study.

Barriers to Meaningful Use of ICT

Even though teachers may be willing to use ICT, MacDonald (2008) established that barriers can exist that inhibit teachers in the use of ICT through, filtering, blocking, limited access to computers, poor infrastructure and bandwidth. These barriers was

recognised by the former Prime Minister of Australia, who in 2007 instigated the Digital Education Revolution (DER). The aim of the DER was to provide high school students in year Nine to Twelve with access to a computer through the National Secondary School funding. The funding boosted support in the use of ICT resources and infrastructure, and provided support in the use of ICT for the Australian Curriculum. However, with the majority of the focus being on hardware implementation (Hunter, 2013), have schools invested enough in the professional development of teachers to use the technology effectively? With the improvement of the ICT infrastructure, other factors have been highlighted as possible barriers.

Tondeur, van Keer, van Braak, and Valcke (2008), found barriers that could affect the *Meaningful Use of ICT*. These barriers were ICT planning, support and training, which had a significant effect on the use of ICT, and school policies that were often underdeveloped and underutilised in this area. Mumtaz (2000) acknowledged other barriers that could prevent teachers from using ICT effectively. These barriers were the ICT experience of the teacher, onsite support for teachers, supervision of students while using ICT, lack of ICT specialised teachers and the time required to integrate technology into the curriculum and financial support.

Competence in Using ICT

Students and teachers in secondary schools bring varying levels of competencies in the use of ICT. Sleezer, Russ-Eft and Gupta generally define competency as "knowledge, skill, attitude, or behaviour that enables a person to perform effectively the activities of a given occupation or to function to the standards expected in employment" (2014, p. 146). Therefore, they argue that ICT competency can have many meanings and incorporate various concepts; however fundamentally it concerns being able to use the technology effectively. In relation to this study, competence will mean the level of understanding, and skill that a student or teacher has in the use of certain ICT applications.

ICT has become embedded in our society, where over the past decade students have been immersed in environments filled with digital technologies, and enriched in a world of digital information from birth (Ministerial Council on Education, Employment, Training and Youth Affairs, 2005, p. 4). While students may need secondary schools to

prepare them adequately for the future, teachers themselves may have limited confidence in applying technology that facilitates specific skills, supports creativity and teaches students complex concepts (Kafyulilo & Keengwe, 2014). It is important that teachers and students extend upon traditional ICT skills taught in schools to create learning environments where both are learning and are partners (Stefl-Mabry, Radlick & Doane, 2010).

The Horizon Report produced annually by the News Medium Consortium (NMC), identified several significant challenges that secondary schools might encounter (Johnson et al., 2013). The first significant challenge was that digital literacy continued to be an important factor, and a key skill in every discipline. The report found that institutions were restricting their students by not assisting them to develop and make use of digital literacy skills across the curriculum. The NMC recognised that formal training for teachers was not sufficient, and basic training in digital supported teaching techniques was inadequate. Wang, Hsu, Campbell, Coster, and Longhurst, (2014) discussed that teachers were likely to use technology to solve their own academic/curriculum problems rather than allow students to use technology to solve academic problems.

In Australia, the importance of a students' ICT skills and capabilities was recognised in the new Australian Curriculum, which was guided by the Ministerial Council on Education, Employment, Training and Youth Affairs Melbourne Declaration paper on 'Educational Goals for Young Australians'. The Ministerial Council on Education, Employment, Training and Youth Affairs paper recognised that "rapid and continuing advances in information and communication technologies are changing the ways people share, use, develop and process information and technology." (2008, p. 5). In this digital age, students need to be accomplished in the use of ICT and this was recognised in the new Australian Curriculum ICT General Capability. Which states that

> Students develop ICT capability as they learn to use ICT effectively and appropriately to access, create and communicate information and ideas, solve problems and work collaboratively in all learning areas at school, and in their lives beyond school. The capability involves students in learning to make the most of the digital technologies available to them, adapting to new ways of doing things as technologies evolve and limiting the risks to themselves and others in a digital environment. (Australian Curriculum Assessment and Reporting Authority, 2013, para. 1)

The new ICT General Capability indicates that the Australian Government recognises the importance of ICT competencies for students, and its uses through all learning areas, and beyond school.

Student ICT Competence

What ICT competencies do students bring to the classroom? Are the ICT skills learnt outside the school enough to make students effective ICT users? These ICT competencies and skills were addressed by Abbott, Blakeley, Beauchamp, Cox and Webb who found that "using informal settings (home, etc.) can contribute to the learning experiences of pupils, but many pupils have not yet integrated such uses with their school experiences." (2004, p. 47). However, Eynon (2009) discovered growing evidence that home was the primary source of ICT engagement. Recent Australian statistics (Australian Bureau of Statistics, 2012) demonstrated that 82% of households had computers and 79% had internet access. The research demonstrates clearly that most students have access to technology at home. Pullen when investigating Australian students' use of ICT at school and home found that "students who used ICT at home more frequently tended to use the same technologies at school and were more confident users." (2012, p. iv). When at home, Internet usage increased with age and 60% of 5 to 8 year olds used the internet regularly increasing to 96% of 14 to 15 year olds. The same trend was demonstrated by the Australian Bureau of Statistics (2009), where social networking sites were becoming more popular. One in five children visited or used a social networking site. The age with the highest usage was found to be the 12 to 14-year age group at 48%. In the same report a similar trend was observed with online media.

Morgan (2012) found that students possessed a high skill level in the use of Web 2.0 tools for learning. However, the research highlighted that explicit teaching from the teacher was important to meaningfully reach the full potential of these Web 2.0 tools. A similar conclusion was echoed by Wang, Hsu, Campbell, Coster and Longhurst (2014) who explained that students were adept in using the Internet. However, does this home use significantly increase their level of competence? Do these web 2.0 skills learnt from home contribute to the meaningful use of ICT in the classroom, or is explicit teaching required from the teacher?

Teacher ICT Competence

What *ICT Skills*, *Application* and *Attitude* do teachers bring to the classroom? Some teachers may use ICT at home for personal purposes; they may have used ICT in pre-service teacher education or accessed professional learning and support at their school. The age of the teacher varies greatly (Department of Education and Training in Western Australia, 2006) and so do the experiences (skills) in the use of ICT. When teachers apply their skills they may be enthusiastic, only use when required, or be opposed to using these skills to support their teaching and learning in the classroom. Some research has shown that if teachers do possess the necessary ICT competence (operational and social media skills) students develop more confidence in their use of ICT (Wastiau et al., 2013).

Hastings research indicated that "teachers are competent in using lower level technologies more frequently to accomplish everyday tasks for self-use." (2009, p. 124). In this context "lower level technologies" refers to the use of technology in "…maintaining class records, attendance, and grading…." (Mirsha and Koehler, 2006, p. 1028). Furthermore, Hastings (2009) emphasised that teachers mainly used technology for instructional (presentation) purposes rather than for meaningful student learning. Pickett (2009) interviewed a student focus group, and found students saw the importance of an ICT literate teacher. Though the students were concerned with the imbalance of ICT knowledge between teachers and students.

This lack in the use of technology was illustrated further by Laliberte (2009) investigation into web-based applications (educational websites and video streaming). He found that among the 48 participants who were interviewed there was little or no use of web-based applications. In the research, all teachers, as part of their teaching, were provided with a classroom website to use with their students; however under half of the teachers utilised this resource. Wanago emphasises the importance of web 2.0 technology in schools because it "...encourages students to interact through collaboration and sharing rather than simply accessing information online." (2013, p. 2). Though, teachers may not include the use of these web 2.0 technologies for teaching in the classroom if they are not adequately proficient in their use.

A report compiled by Pegg, Reading and Williams (2007) emphasised more teacher training was required for teachers in the use of ICT. The report discovered that about a third of classroom teachers were poised and skilful enough in applying ICT. Current research is required to consider whether these findings still apply. In addition, the report illustrates the importance to evaluate the ICT competence of the teacher over a wider range of *ICT Skills*. These *ICT Skills* set should not just include productivity and document creation applications, but include Web 2.0 technology. The instrument applied in assessing the teachers' and students' ICT competence should incorporate Web 2.0 technology skills.

Research conducted by the Australia Communication and Media Authority (ACMA) (2011) found a generational shift in the use of online media. It established that as people increased in age the less inclined they were to use online media. Table 1 emphasises this point when referring to social networking activities. As the age rises, the percentage of activity drops substantially and was a similar trend for all media activity. This raises the question: Does age affect the ICT competence of the teacher?

Table 1
Summary of Responses Concerning the Online Media Activities by Age (ACMA, 2011, p.12)

Media Activity	18 – 29 (n=262)	30-44 (n=353)	45-54 (n=233)	55+ (n=402)
	%	%	%	%
Undertaken other social networking activities, (e.g. browsing others' profiles, staying in touch with friends)	71	49	41	41
NET viewing online video content	68	50	34	32
Watched video content from the internet from sites like YouTube	53	36	23	22
Watched video content through a social media website such as Facebook	45	25	20	14
Watched video content from the internet from sites like Bit Torrent or Pirate Bay or other peer-to-peer networks.	26	15	7	6
Played games on the internet (online games)	41	31	25	25
Accessed the news through a social website (e.g. Facebook, Twitter, MySpace, Bebo – not YouTube).	36	25	15	13
Watched catch-up TV over the internet (e.g. iView, Plus 7, FIXplay)	31	17	13	11

An evaluation by the Department of Education and Training of Western Australia (2006, p. 22) on teacher ICT competence found that a relationship existed between age and ICT competence. As the age of the teacher increased, the average ICT competence

decreased. In addition, the report highlighted that 69.5% are between 40 and 65 years old, and that the age differences would range between 25 to 50 years between the teacher and student. Likewise, the Department of Education and Training in Western Australia (2006) research established a relationship between a teacher's ICT competence and their age. The research highlighted that most teachers had a lower ICT competence compared to their students (Department of Education and Training in Western Australia, 2006, p. 22). Figure 2 illustrates that a teacher could have an average ICT competence difference of up to 22% less when compared to an average student in their class. The figure demonstrates as the age of the teacher raises from 24 the ICT competence decreases.

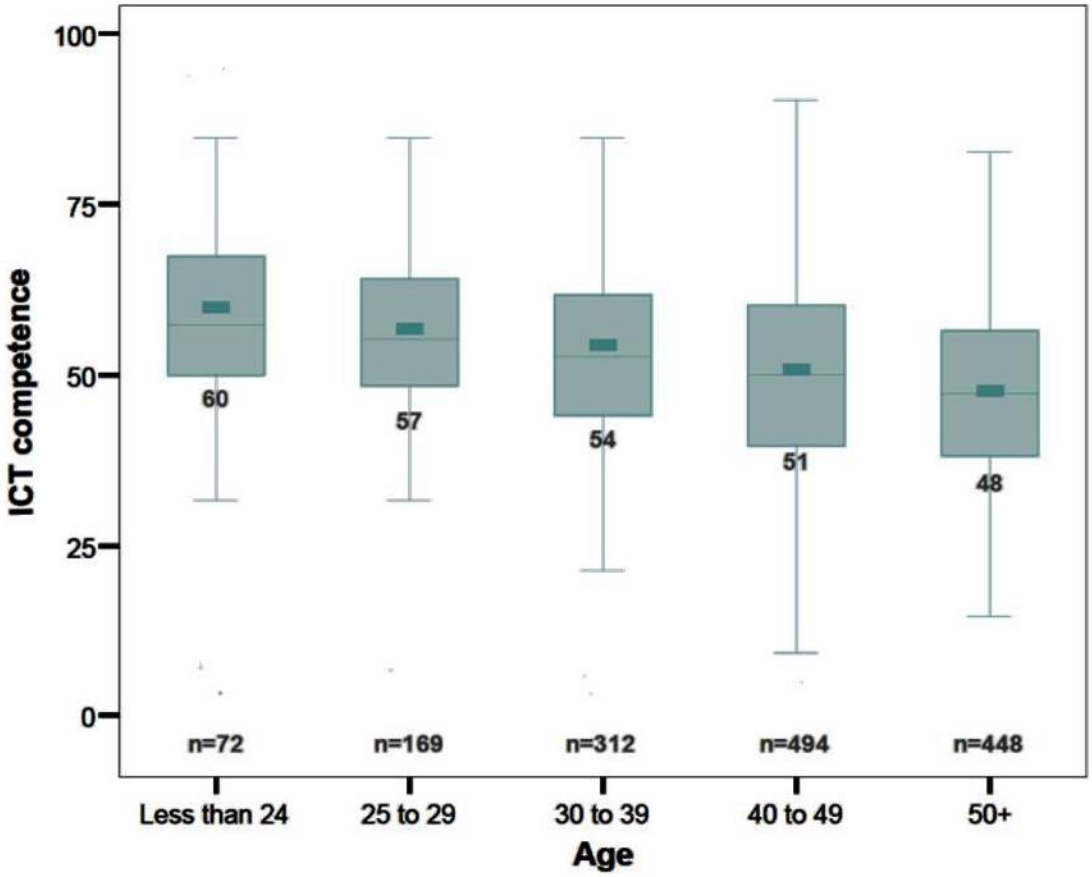

Figure 2. ICT competence index by age for Western Australian teachers (Department of Education and Training in Western Australia, 2006, p. 22).

The age difference between teacher and student has steadily risen (Struht & Collord, 2011) over the last two decades and perhaps this has contributed to a digital divide. A profile produced by the New South Wales Government (2012, p. 2) on the permanent school teachers' ages, showed that for 2012 69.5% of teachers were between the age of 40 and 65 and 30% were between the age of 50-65. Fewer younger people are entering

the teaching profession, and the average age of the teacher tends to be getting older. This trend was predicted to change marginally over the next five years.

The indication is that on average students could have a higher ICT competence than the teacher, particularly with the increasing age profile of teachers (Department of Education and Training in Western Australia, 2006). The increasing age of teachers is likely to create a wider gap in ICT competence (*Digital Divide)* in favour of the students. Does this difference (divide) affect the way in which ICT can be used in the classroom across the learning areas of a school? Research needs to be conducted to assess the teachers' and students' ICT competence to examine whether a level of difference exists between the two. That is, establishing whether a digital divide exists between the teacher and their students. Hunter's (2013) research suggested the need for further case studies research into the teachers' knowledge of technology integration, but from dissimilar disciplines (learning areas). Thus, any research conducted should include a range of learning disciplines, such as Mathematics, English, Science and History and Social Sciences. The research highlights the importance of conducting current research in Western Australia to establish whether such a digital divide is evident today.

Digital Divide

In the 1990's and early 2000's the *Digital Divide* was mainly portrayed as the gap in technology access. Cullen described eloquently the *Digital Divide* as "...the gap that exists in most countries between those with ready access to the tools of information and communication technologies, and the knowledge that they provide access to and those without such access or skills." (2001, pp. 311-320). That changed in the latter part of 2000 where the focus moved away from access and towards digital literacy. As highlighted by Vie "... we now face a new instantiation of the digital divide where students are often more technologically adept than their instructors." (2008, p. 9). The argument was that instructors (teachers) had to get closer in digital literacy to their students, especially in the use of Web 2.0 technology such as podcasts, blogs, wikis and social networking sites. Vie (2008) discussed that did not so much concerning the access to technology, but rather the level of digital literacy, competence or capability.

Wastiau et al. (2013) surveyed the importance of digital literacy in schools. The investigation analysed thirty-one European countries, finding teachers mainly used ICT to prepare for lessons, and rarely used ICT in the classroom. In addition, the study mentioned the importance of improving ICT use at school to reduce the gap between home and school for students. As mentioned by Kale and Goh (2014), if teachers lack the necessary ICT skills and attitude, would this contribute to the *Digital Divide*? Therefore, in the study it was important when assessing the ICT competence to include the skills and attitude of the teachers and students.

Conceptual Framework for the Study

The study considered the ICT competence of the teacher and the students, and whether differences between these, termed a *Digital Divide*, affected the *Meaningful Use of ICT* in teaching and learning. Any effect seen in the learning environment would ultimately determine the student learning outcomes. Figure 3 schematically illustrates the connection between the constructs within the study.

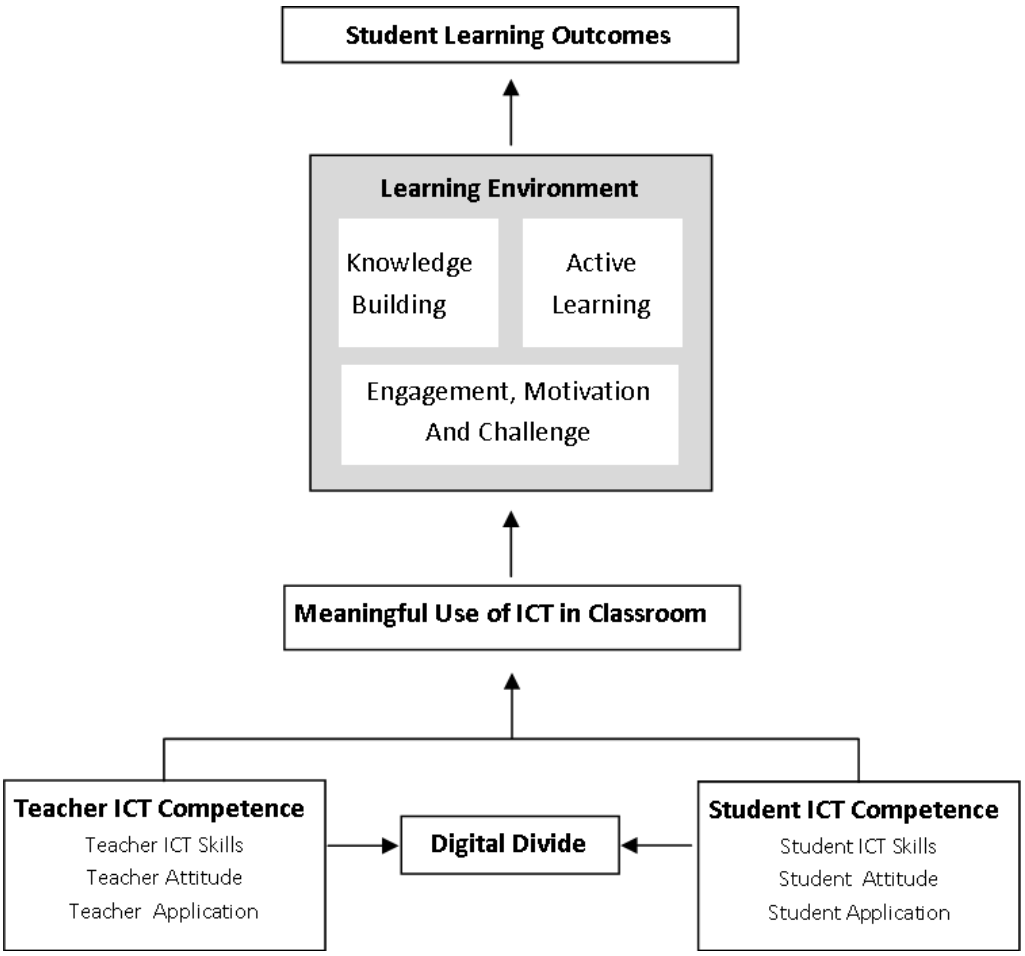

Figure 3. A conceptual schematic showing the dimensions of the meaningful use of ICT in the classroom, and the connection with a potential digital divide between the ICT competence of the teacher and students.

The teachers' and students' *ICT competence* concerns their *ICT Skills*, *Application* and *Attitude* (as represented in the bottom corners of the diagram in Figure 3). When compared against each other (teacher and students) these determine the extent and nature of a digital divide. In this study, the *Meaningful Use of ICT* was represented by three of the LEA attributes (Newhouse & Clackson, 2008) (Appendix 1): *Knowledge Building*, *Active Learning* and *Engagement, Motivation and Challenge*. The appropriate use of ICT to improve the learning environment through these three attributes may lead to improved learning outcomes as represented at the top of Figure 3.

Summary of Chapter

The review aided in establishing points and questions to consider when investigating the constructs of *Digital Divide* and *Meaningful Use of ICT*. While investigating the *Digital Divide* the review established the importance of assessing current teachers' and

students' ICT competence. The review highlighted the importance of gathering current data to be analysed, particularly since the types of teacher skills, and the use of ICT for teaching has changed in the last 10 years. Therefore, when assessing ICT competence, the skills, applications and attitudes of the teacher and student should be included. In addition, questions were raised about age affecting the ICT competence of the teacher and the level of ICT competency a teacher brings to the classroom. Age will not be a factor researched in this study, due to the small sample size of the teachers (eight).

The review of *Meaningful Use of ICT* highlighted the importance of using the technology to increase student motivation, learning and engagement. The literature review emphasises that the more useful (educationally) the technology is in the classroom with the students, the more impact that pedagogy has on the technology of the teaching. However, not all technology use has been found to have a beneficial impact on student learning. ICT tools could easily become an instrument for entertainment, and divert attention away from the learning objectives. Applications of ICT that are popular are not necessarily effective for learning or meaningful uses. In addition, the review recognised that the ICT experience of the teacher, onsite support, time, and management of ICT activities were possible barriers that could influence the *Meaningful Use of ICT* (Mumtaz, 2000).

Chapter 3 defines the methodology of the study with the research design, samples, data collection and analysis of the study explained. A pilot study was performed prior to the data gathering to test the validity of the methodology, and therefore is discussed in the chapter.

CHAPTER 3
METHOD

This chapter outlines the methodology applied in the study; discussing the research design, samples, data instruments, analysis of data and pilot study. The study focused on two types of participants: teachers and the students. The environment was secondary school classrooms with access to ICT for the teacher to employ with students. The research was conducted at a private secondary school in Perth, Western Australia, sampling eight teachers from four learning areas (Mathematics, English, Science and History and Social Sciences). A quasi-ethnographic multiple case studies approach was appropriate for this study, because of the distinct characteristics as defined by Angrosino (2007); field-based, surveys, interview and personalised through face-to-face contact with teachers and students. The data were multifactorial and comprised of two forms of data collection: surveys (teacher and student) and an interview (teacher).

Research Design

Research has established that a qualitative or a mixed methods approach is often the most appropriate methodology when researching a classroom setting (Roach, 2010; Laliberte, 2009; Pickett, 2009). Greene, Caracelli and Graham (1989) confirm that mixed methods add scope and breadth to a study. Therefore, the overarching method was a quasi-ethnographic multiple case studies research design with quantitative and qualitative data collection through interviews and surveys. A multiple case studies design was considered most appropriate for this study, that allows for a more depth understanding of the manifestation of the main concepts (Yin, 2009). The boundaries of a case being a teacher and his/her class of students. Having multiple case studies then facilitated some investigation of the basis of differences between the individual entities. The design was only quasi-ethnographic because the immersive requirements for a purely ethnographic study were not appropriate (Angrosino, 2007). Interpretative techniques were applied to analyse the data in order to investigate the use of ICT with a set of classes of students and the ICT competence of participants.

Participants and Sampling

Fundamentally the study used a case studies methodology because the purpose was to compare individual teachers with their classes. Therefore, the sample comprised eight teachers and for each one of their classes of students. The primary data sample comprised eight teachers purposefully selected from four core learning areas: Mathematics, Science, English, History and Social Sciences. Two teachers were chosen from each learning area based on their level of ICT competence, with one considered to be relatively more competent than the other. The selection of the teachers was determined by the researcher in consultation with the supervisor from initial conversations with each teacher. The researcher had been employed at the school for sixteen years, the last five years as the Learning Technologies Manager, and therefore had a good understanding of the level of ICT competence of teachers employed by the school. The sample of students comprised a class of students (from either Year 7, 8 or 11) from each of the teachers, totalling 154 students. The selection of the Year groups was dependent upon the availability of the teacher. The samples of teachers and students were all from the same school.

Research Setting

The school involved in the study had substantially invested in ICT infrastructure over the five years preceding this study. The ICT investment consisted of a campus wide wireless network with Internet access supporting 34 laptop pods (16 laptops to a pod) and 120 iPads with approximately 1,300 users in total (teachers and students). The majority of the classrooms had access to the laptop pods and fixed classroom projectors. The College had ten fixed interactive whiteboards, six dedicated computer labs, access to ClickView (high quality digital media application) and a Learning Management System (LMS) that were utilised for the students by the teachers. The College provided an ICT Learning Technologies Manager to aid the teachers of the school with the integration of ICT into the classroom. The College employed a Network Administrator with three Information Technology (IT) support personnel.

Ethics

Once ethics clearance was granted by the University, the Catholic Education Office (CEO) of Western Australia was contacted for permission to conduct the research

within one of their Catholic schools. Once permission was obtained, the Principal of the school was contacted by letter (Appendix 2) to obtain permission for the research. Teachers were selected purposely from four Learning Areas: Mathematics, English, Science and Society and Environment (refer to Table 2 for sample sizes). The class of students for each teacher was selected by the teacher based on the availability of the class, and whether the teacher perceived that he/ she was integrating ICT into their lesson. That is, the intention was for the teacher to select a class that best illustrated how well they could integrate ICT use. Permission to participate in the study was obtained from the teachers (Appendix 3), and parents and students (Appendix 4).

Table 2
A Summary of the Samples Over the Learning Areas

Learning area	No. of teachers	No. of students
Mathematics	2	52
English	2	33
Science	2	41
Society and Environment	2	28
Total Number (N)	8	154

Instruments

The instruments consisted of two questionnaire surveys; teacher and student, and an interview with the teachers. All three instruments were constructed using items from existing instruments created for projects conducted by the Centre for Schooling and Learning Technologies at Edith Cowan University (CSaLT, 2008b). The two questionnaires provided data to make judgements about the *Digital Divide* and the *Meaningful Use of ICT*, while the interview only provided data for the latter. Each of these data related to the two central constructs of the study as illustrated in the conceptual framework (Figure 3).

The two survey questionnaires were similar in structure, but were constructed separately for the teachers and students, and provided data related to ICT Competence and the use of ICT in the classroom (Appendices 5 and 6). Items in the questionnaires addressed the students' and teachers' level of *ICT Competence* by providing items associated with three scales: *Attitude*, *Application* and *ICT Skills*. These scales were modified from those on an instrument developed by the Centre for Schooling and Learning Technologies (CSaLT, 2008b). For example, the *ICT Skills* scale was constructed from items associated with a list of common types of ICT applications (software/ hardware)

used in schools. Responses were made in terms of specific skills in using each application. The skills list was adapted to include skills in using a Learning Management System (LMS), podcasting, video sharing and content hosting services that were utilised at the school. In addition, as highlighted in the literature review, Web 2.0 technology was perceived as part of the ICT competence and experience of the teacher, the uses made of the technologies in their teaching, and in particular uses that may contribute to social networking (e.g. blogs and wikis). Data from these questionnaires aided in establishing the nature and extent of *Digital Divide* between each teacher and his/ her class.

Particular items in the questionnaires and questions in the teacher interview were designed to provide data on the use of ICT in the classroom. They were related to three of the ten attributes from the LEA (Learning Environment Attributes) dimension developed by Newhouse and Clarkson (2008). Each of the LEA attributes were assessed for relevance to the *Meaningful Use of ICT* in the classroom with students. In consultation with the supervisor for this research, three of the LEA attributes were determined to be applicable; *Knowledge Building*, *Active Learning* and *Engagement, Motivation and Challenge*. These are described in Table 3. The purpose of the teacher interview (Appendix 7) was to identify the use of ICT with the class and how meaningful this use was likely to be for learning. Questions 2, 3 and 5 were cross-referenced with Questions 5 and 6 of the student survey responses to check for reliability of data between the students and teachers.

Table 3
Descriptions of the Learning Environment Attributes Used in the Study to Judge the Meaningful Use of ICT (Extracted from Newhouse and Clarkson (2008, p. 143))

Attribute	Description
Knowledge Building	Students investigate the real world using current information and tools to analyse, interpret and present this information
Active Learning	Students are active participants in their own learning and learn by doing.
Engagement, Motivation and Challenge	Students are engaged with their own learning through being motivated and challenged by learning experiences.

Teacher Survey

The survey used a paper-based questionnaire (Appendix 5) completed by the teacher prior to the surveying of the students. Three scales were constructed from sets of items:

*Teacher ICT Skill*s, *Teacher Attitude* and *Teacher Application*. These aided in determining the level of *ICT Competence* for that particular teacher. Each of the scales was linked directly to questions within the survey (Table 4). Questions 7 and 8 related to the *Meaningful Use of ICT* construct. Question 7 gauged the teacher's perceptions of the outcomes when students used ICT in lessons. Question 8 related to the teacher's perceptions of how the students interacted with the applications used in the classroom.

Table 4
Sources of Data for the Three Scales Used to Assess Teacher ICT Competence

Scale	Sources of data
Teacher ICT Skills	Data from the teacher survey: Question 4. The items in the question rated the teacher's ICT Skills over a range of applications (e.g. Word processing) using a 4 point Likert scale from no skill to advance skills
Teacher Attitude	Data from the teacher survey: Question 2. The items in the question rated the teacher's attitude from eight statements using a 5-point Likert scale: Strongly Disagree, Disagree, Undecided, Agree and Strongly Agree.
Teacher ICT Application	Data from the teacher survey: Question 3. The items in the question rated the teacher's application of specific computer tasks using a four point Likert scale: Daily, Each Week, On Occasion and Never.

Student Survey

The survey used a paper-based questionnaire (Appendix 6) completed by the students in class and supervised by the researcher without the presence of the class teacher. The survey was primarily designed to establish the *ICT Competence* of the students, but questions also contributed to determining the *Meaningful Use of IC*T. The three scales used for the student *ICT Competence* were; *Student ICT Skill*s, *Student Attitude* and *Student Application*. These scales for the LEA attributes were linked directly to questions in the questionnaire (Table 5). All of which aided in determining the level of competence for the students. The student scores of the three scales for the class were compared with the teacher to determine whether it was likely that a *Digital Divide* existed. In addition, particular questions contributed to the analysis of the LEA attributes: *Knowledge Building, Active Learning* and *Engagement, Motivation and Challenge*. Thus assisting in determining the level for the *Meaningful Use of ICT* construct.

Table 5
Sources of Data for the Three Scales Used to Assess Student ICT Competence and the Three LEA Attributes Used to Judge the Meaningful Use of ICT

Scales/ learning attribute	Sources of data
Student ICT Skills	Same as Teacher ICT Skills in Table 4.
Student Attitude	Same as Teacher Attitude in Table 4.
Student ICT Application	Same as Teacher ICT Application in Table 4.
Knowledge Building	This attribute was obtained from Question 6 of student survey, if the example related to a Knowledge Building application. The question asked students to respond to four specific questions about where they have enjoyed using computers in the classroom.
Active Learning	Same as Knowledge Building, but only used if student comments were related to an Active Learning.
Engagement, Motivation and Challenge.	Same as Knowledge Building, but only used if student comments were related to Engagement, Motivation and Challenge.

Teacher Interview

The teacher of the class participated in a recorded and annotated structured interview (Appendix 7). The interview addressed the perceived *ICT Competence* and experience of the teacher, the uses made of the technologies in their teaching, and in particular, uses that may contribute to the LEA attributes. Some questions in the interview were designed to gauge their perceptions of the students' overall attitudes towards using ICT. Further questions sought to determine how the teacher was using ICT to build knowledge with the students, increase the level of active learning, and better engage, motivate and challenge them. Table 6 presents the questions that related to each of the LEA attributes used in the study to indicate the likely level of *Meaningful Use of ICT* with the class.

Table 6
Questions From Teacher Interview That Contributed to Judgements of the Three LEA Attributes

Learning environment attribute	Sources of data
Knowledge Building	Responses from questions 2b, 2d, 2e, 2f, 5.
Active Learning	Responses from questions 4a, 4b, 4c, 4d, 4e, 4f, 4g, 4h and 5.
Engagement, Motivation and Challenge	Responses from questions 2a, 2g, 3bi, 3bii,3biii, 3biv, 3bv, 3c, 3d, 3ei, 3eii, 5.

Analysis of Data

Each of the classes was defined as a *Case Study* and numbered accordingly (1 to 8). The study utilised multiple methods for gathering data from teachers and students. Analyses of these data were used to quantified both of the constructs: *Digital Divide* and *Meaningful Use of ICT*.

The rubric applied in the research to evaluate the *Meaningful Use of ICT* in the classroom was a modification of that developed for Newhouse and Clarkson's (2009) Learning Environment Attributes (LEA) dimensions (CSaLT, 2008b). The rubric comprised three of the LEA attributes and was designed to provide a multifaceted method to assess the use of ICT (Appendix 1). All data from the questions in the interview and two questions in each of the teacher and student questionnaires contributed to determining the level of *Meaningful Use of ICT* with the class. The *Meaningful Use of ICT* construct was assessed using some of the teacher/student survey responses and the teacher interview data. The data were rated by using the modified LEA Rubric (Appendix 1). The *Knowledge Building*, *Active Learning* and *Engagement, Motivation and Challenge* attributes were rated individually: *Not Used*, *Developing*, *Routine* and *Comprehensive* (see Appendix 1 for rubric). The data collected were summarised into a table format using the *LEA Rubric* (refer to Appendix 8). The table was sub-divided into three parts: *Source*, *Evidence* and *Rating*.

- *Source* – this identifies the question and the source of the data: teacher survey, student survey or teacher interview.
- *Evidence* – data collected from that specific source.
- *Rating* – each of the independent sources for that particular scale were rated as *Not Used*, *Developing*, *Routine* and *Comprehensive*.

The rating was quantified by using the terms: *Developing*, *Routine* and *Comprehensive* as used in the original framework. *No Use* was added to the terms of the modified rubric to demonstrate no evidence. These were summarised to give an overall rating for that specific LEA attributes and then an overall judgement was deduced from the ratings for the three attributes. A final overall rating was applied to the *Meaningful Use of ICT* for the class (*Case Study*): *No Use; Limited*; *Developing*; and *Routine*. The critical evaluation was performed twice by two separate reviewers: researcher and principal supervisor.

The teacher and student survey data were analysed descriptively with the Statistical Package for the Social Sciences (SPSS) (IBM Corporation, 2013) to produce histograms, frequency (counts and percentages), descriptive statistics (e.g. mean, median and standard deviation), and one sample t-tests. Likert responses (four and five point) were coded and combined to create the three scales used to evaluate the level of *Digital Divide.* Table 7 describes how each of the scales within SPSS were coded. Descriptive statistics were generated for each separate item and each scale, and the reliability of each scales was tested.

Table 7
Coding of Scale Items Used to Judge the Digital Divide

Scales/learning attribute	Description of coding
Teacher and Student ICT Skills	The question was sub-divided into 16 applications. Each of the questions rated the specific skill of a particular application by using a four-point Likert scale. The skill level started from 1 to 4, l being the lowest and 4 the highest skill level.
Teacher and Student Attitude	The question was sub-divided into eight statements using a five-point Likert scale. Statements 1, 4, 5, 6, 7 and 8 were positive statements and the responses were coded 1 to 5 i.e. Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4) and Strongly Agree (5). Where statement 2 and 3 were negative statements and the responses were reverse coded i.e. 5, 4, 3, 2, 1.
Teacher and Student Application	The question was sub-divided into eight tasks using a four point Likert scale. Each of the tasks was rated by Daily, Each Week, On Occasion and Never. These were coded for the SPSS from 1 to 4 i.e. Never (1), On Occasion (2), Each Week (3) and Daily (4).

The *Digital Divide* construct was assessed through the three scales constructed from items in the teacher and student questionnaires: *Attitude*, *Application* and *ICT Skills*. A one-sample t-test (SPSS) was performed for each of the three scales from the students' survey for each class with the test value being the teacher's scale score. That is, the class mean for the students was compared against their teacher's individual score. A two-tailed t-test was used to test the significance of the difference between the class students' mean and the teacher's score for each scale, with any probability value higher than 5% being rejected as not significant difference. The practical significance (d) was calculated as the effect size. The results of the t-test analysis for each of the scales for the *Digital Divide* construct for each of the case studies were tabulated. Table 8 gives a description of how the Digital Divide results were gained for each of the *Case Studies.*

Table 8
Descriptions of How Each of the 'Digital Divide' Results Were Calculated for the Classes

Result Name	Description
Teacher Score	The teachers' score for that scale.
Class Mean	The class mean for the students of the case study.
t-test (n)	A one-sample t-test (performed in SPSS) calculated for that scale. n the number of students in the class. The class mean for the students was compared against their teacher's individual score.
Significant	The probability of the result occurring by chance. If the value is less than 5%
Effect Size	The mean difference between the teacher and students of the class. This was calculated by the mean difference of the two groups divided by the standard deviation.
Favour	This was deduced using the result of the effect size: <0.2 was small, 0.2 - 0.5 was moderate and >0.5 was large.

Pilot Study

A pilot study was performed prior to the commencement of gathering the data. The pilot study tested the validity and reliability of the instruments, and the analysis of data, prior to commencement. The pilot study was performed on one of the eight teachers (chosen randomly), and his or her class of students. A Cronbach's Alpha analysis was performed for the three scales to test internal consistency. The three instruments were tested on the students/teacher, and a t-test analysis was performed to test the *Digital Divide*. The *Meaningful Use of ICT* was evaluated by applying the modified LEA rubric.

Reliability and validity of instruments

A Cronbach's Alpha analysis was performed on each of the scales *Attitude*, *Application* and *ICT Skills* of the student survey using SPSS to test the internal consistency of the scales. The Alpha coefficient for *Application* and *ICT Skills* was 0.711 and 0.852 respectively indicating a relatively high internal consistency. The *Attitude* scale had an Alpha coefficient of 0.666, however; this could be improved by omitting part c of the question whereupon the value increased to 0.717. Part c of the question asked the student a negative question, 'It is difficult to use technology.' The response was on a five point Likert scale of *Strongly Disagree* to *Strongly Agree*. This particular statement was important in assessing the attitude of the teacher or student towards the use of

technology. The reliability coefficient of 0.666 for the item was considered acceptable, and therefore, the item was not omitted (Kline, 2000).

The validity of the instruments was tested by using the surveys and interview with the students and teacher, and seeking their feedback. They raised no specific concerns about the meaning of the questions, and as a result no changes were made to the instruments. The questions for the teacher interview were unchanged; however the questions were re-grouped and categorised into each of the learning attributes and scales. This simplified the process when rating each of the LEA attributes for a *Case Study*. The processes as described in the Analysis of the Data (p.27) to evaluate the *Digital Divide* and *Meaningful Use of ICT* was applied to the test data to check reliability.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales of the *Digital Divide* construct for the pilot study are displayed in Table 9. It should be noted that the assumption of normality of these data is discussed at the beginning of the next chapter in the context of all the survey data.

Table 9
Summary of Results From T-Test Analysis for the ICT Competence Scales for Teacher 1 for Pilot Study

Scale	Teacher Score	Class Mean	t-test (22)	Sig.	Effect Size	Favour
Attitude	4.6	3.6	-13.6	0.000	-2.8	Teacher
Application	3.8	2.8	-11.8	0.000	-2.5	Teacher
ICT Skills	2.9	2.7	-7.0	0.096	-0.4	Teacher

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(22) = -13.6$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(22) = -11.8$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *ICT Skills* score was slightly higher when compared to the *Class Mean*, however, there was no statistically significant difference ($t(22) = -1.7$, $p=<0.096$, two-tailed test). The effect size was small and moderately in favour of the teacher.

The effect size for the *Attitude* and *Application* scales were large and in favour of the teacher. The significance (2-tailed) for both fell within the acceptable margin of less

than 5%. However, the effect size of the *ICT Skills* scale was small but in favour of the teacher. The significance (2-tailed) was above the acceptable margin and therefore, not significant. Due to the *Attitude* and *Application* scales, having large effect sizes, and although there was only a non-significant marginal difference between the teacher and students' means for the *ICT Skills* scale the *Digital Divide* for this class would be assessed to be in favour of the teacher.

Assessing the Meaningful Use of ICT

Details of the results from the analysis of the data from the interview of the teacher and both surveys are provided in Appendix 9. The evaluated ratings for each of the LEA attributes are illustrated in Table 10. The results indicate that at least a *Developing* level of *Meaningful Use of ICT* was occurring within this class.

Table 10
Summary of Results of Analysis for the Meaningful Use of ICT for Teacher 1 for the Pilot Study

Scale	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Each of the processes applied to evaluate the *Digital Divide* and *Meaningful Use of ICT* were used and considered to be reliable and valid. Therefore, this data set was included as part of the main study and renamed *Case Study* 1.

Summary of Chapter

The method applied by the study was multiple case studies and quasi-ethnographic in nature; field based, and the sample group being a combination of classes of students with their teachers from within a secondary school environment. The samples comprised eight teachers with one class of students for each teacher, giving a total of 154 students. The study was a mixture of qualitative data (teacher interview), open-ended questionnaire items, and quantitative (student and teacher questionnaire items). The quantitative data were analysed using SPSS, in particular a t-test comparing class means with teacher scores, and the qualitative data were evaluated using the modified LEA rubric (Appendix 1).

A pilot study was initiated to test the reliability and validity of the data. Reliability was investigated by performing a Cronbach's Alpha analysis on each of the *Digital Divide* scales producing acceptable results for the reliability coefficients for the scales: *Attitude* ($\alpha = 0.717$), *Application* ($\alpha = 0.852$) and *ICT Skills* ($\alpha = 0.666$). For each of the scales one-sample t-test was conducted for the mean of the student scores with the teacher's score as the test score. The result was that for all scales the teacher's score was nominally greater than the students' mean for the class, however only two were significantly different. The modified LEA rubric was applied to evaluate the attributes of the *Meaningful Use of ICT* construct. The results produced evidence that demonstrated a rating of *Developing* or above for each of the LEA attributes. The data and results of the pilot study were added to the main sample of the study, becoming *Case Study 1*. The next chapter discusses the results from the analysis of all the data from the eight case studies.

CHAPTER 4
RESULTS FROM DATA ANALYSIS

Data were collected from eight teachers and students from one of their classes from four core-learning areas: Mathematics, English, Science and History and Social Sciences. Each learning area was sampled twice with different teachers. The teachers were numbered from 1 to 8 and the students from 1 to 154. A teacher's class with his or her students was classified as a *Case Study* and numbered from 1 to 8. The analysis for each *Case Study* determined the teachers' and students' scores on the *ICT Skills* scale, *Attitude* scale and *Application* scale and assessed the extent of *Digital Divide* and *Meaningful Use of ICT* in the class. Prior to presenting the results of analysis for each of the case studies an analysis was presented of the quantitative data for the combined dataset. This provided as a backdrop to the main case studies analyses and begins with an investigation of the assumption of normality of these data.

Normality Assumption

The normality of variance assumptions was investigated by performing a Shapiro-Wilk test on both the student survey (Question 2, 3 and 4) and teacher survey (Question 2, 3 and 4) distribution using SPSS. These questions were used to construct the scales used to judge ICT competence. The summary of the results are listed in Table 11, and the descriptive statistics for each are presented in Appendix 10.

Table 11
A Summary of the Normality Assumption Findings

Question	Scale	Mean	Median	Standard Deviation	Skewness	Shapiro-Wilk Test		
						Statistic	df	Sig.
Students_Q2	Attitude	3.5382	3.6250	0.5639	-0.5130	0.9720	154	0.0040
Students_Q3	Application	2.7272	2.7500	0.4045	0.0590	0.9780	154	0.0160
Students_Q4	Skills	2.6087	2.6250	0.4419	-0.0840	0.9930	154	0.6710
Teacher_Q2	Attitude	4.0781	4.1250	0.3057	-0.2010	0.8420	8	0.0780
Teacher_Q3	Application	3.1094	3.1875	0.5322	-0.8180	0.9500	8	0.7100
Teacher_Q4	Skills	2.6172	2.5313	0.7215	0.3390	0.9530	8	0.7460

The significant results from the (Shapiro-Wilk) tests for the items Students_Q4, Teacher_Q2, Teacher_Q3 and Teacher_Q4 were greater than 0.05, demonstrating that these distributions are normal. For the items Students_Q2 and Students_Q3 there were significance values less than 0.05. However, the absolute value of skewness for the items Students_Q2 and Students_Q3 was less than 1; therefore, according to Morgan

(2012) the distribution can be considered approximately normal. The z-scores of the skewness were analysed further (Field, 2013; Morgan, 2012; Tabachnick & Fidell, 2007) by dividing the skewness value by its standard error. If the resultant absolute values are less than 2.58, the distribution can be considered approximately normal. The absolute values for the items Students_Q2 and Students_Q3 were 0.9097 and 0.1459 respectively; therefore, can be considered adequately normal for the application of the relatively robust t-test statistic.

Results of Analysis of Scales from Teacher Survey Data

The analysis of the teacher survey data involved generating the descriptive statistics for each of the teacher's scores on the *Application*, *Attitude* and *ICT Skills* scales. The descriptive statistics focused on the *Range*, *Teacher Mean Score*, *Teacher Median Score* and *Standard Deviation*. The analyse of these data are firstly presented for all teachers to provide a comparative backdrop to later analyses for each case study.

Teacher ICT Skills Scale

Figure 4 presents a graph of the teacher score for each teacher for the *ICT Skills* scale, and classifies the scores in terms of level of competence of a teacher when using specific ICT applications. Out of the eight teachers 12% were adjudged to be *Highly Competent*, 50% *Competent*, 38% *Basic* and 0% *Limited* skill. Therefore, 62% of the teachers were judged to have an overall *ICT Skills* level of at least *Competent*.

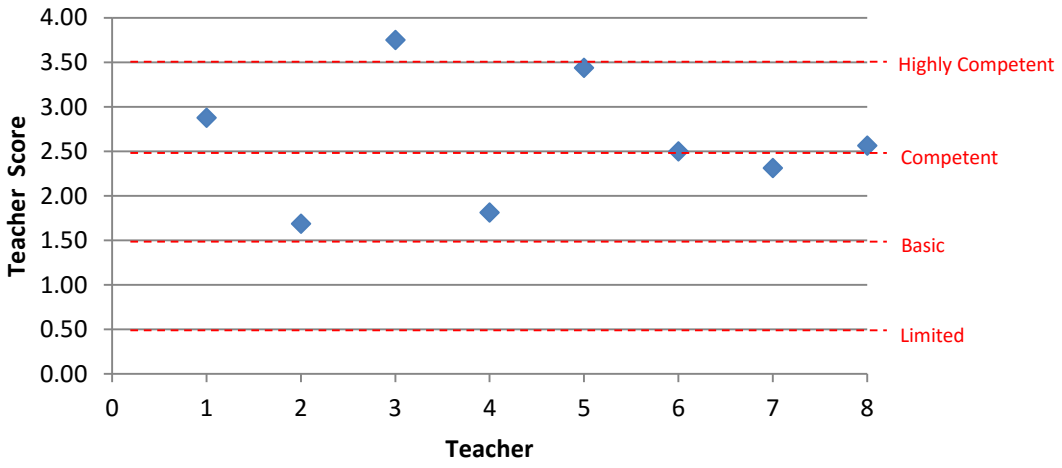

Figure 4. Plot of ICT Skills scale scores for the eight teachers.

The *ICT Skills* scale comprised sixteen common computer applications (Appendix 5 Teacher Survey Question 4). Each computer application was assessed by a four-point

Likert scale, ranging from *can't do much* to *high skills*. Table 12 summarises the results by using the *Teacher Mean Score* for each of the applications. The *Teacher Mean Score* result was ranked from highest skill to lowest to illustrate applications with the best skill level.

Table 12
Ranked Order of Mean Score for the Teacher Applications Scale

Rank	ICT Application	Mean Teacher Score for the Application	Median Teacher Score for the Application	Standard Deviation
1	Internet	3.38	3.50	0.0565
2	Word-processing	3.38	3.50	0.0535
3	Email	3.25	3.00	0.6690
4	LMS (Moodle)	3.13	3.00	0.0505
5	Digital Photography	3.13	3.00	0.7691
6	Slideshow	3.00	3.00	0.0501
7	Computer File Management	2.88	3.00	0.0602
8	Image Editing	2.75	3.00	0.0666
9	Content Hosting Service	2.63	3.00	1.0718
10	Video Sharing	2.50	2.00	0.0784
11	Spreadsheets	2.38	2.00	0.0592
12	Social Networking	2.38	2.50	0.0755
13	Video Recording and Sharing	2.25	2.00	0.0784
14	Webpage Authoring	1.88	2.00	0.0599
15	Podcasting	1.76	1.50	1.0110
16	Database	1.25	1.00	0.0510

There were no *Highly Competen*t (above 3.5) mean skill levels for any of the application skills. However, the top ranked applications with *Competent* skill levels above a *Teacher Mean Score* of 2.5 were Internet, Word-processing, Email, LMS, Digital Photography, Slideshow, Computer File Management, Image Editing and Content Hosting Service. *The Median Teacher Score* confirms the ranking of the *Application Scale* when compared to the *Mean Teacher Score*. Possible examples of how these applications would be applied by the teacher , and are from the researcher's own experiences in teaching at the school for sixteen years, are:

- The Internet to research for resource(s) in relation to the teacher's curriculum learning area (Laliberte, 2009).
- Word-processing for document creation such as worksheets and notes (Sipilä, 2011; Hastings, 2009).
- Email being a popular form of communication for teachers (Purcell, Heaps, Buchanan, & Friedrich, 2013).
- The school's LMS would be a valuable tool for a teacher to distribute information and interact with the students (Giers & Kreiner, 2009).

- Digital Photography maybe more of a personal than a productive tool for teachers within schools (Loveless, 2007).
- Slideshows being an ideal method for presenting work to students in the classroom or learning tools for the schools LMS (Giers & Kreiner, 2009).

Teacher Attitude Scale

Figure 5 presents the score for each teacher on the *Attitude* scale and classifies each in terms of agreement (Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree) with a specific statement. Out of the eight teachers, only one teacher had a *Teacher Mean* below 4. This confirms that teachers from the sample range had a positive outlook on the use of technology.

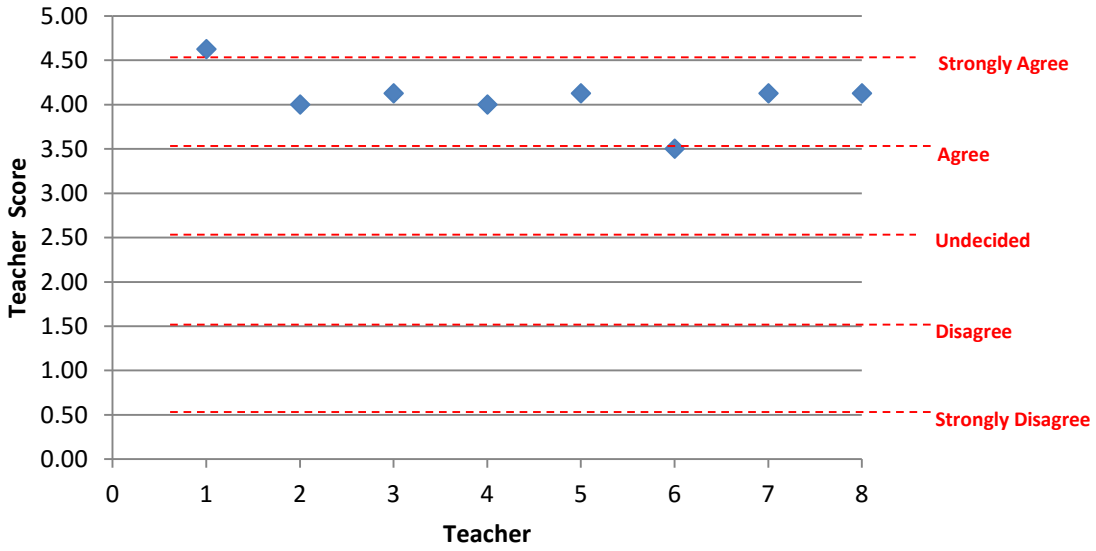

Figure 5. Plot of Attitude scale scores for the eight teachers.

The *Attitude* scale was constructed from responses to eight statements (Appendix 5 Teacher Survey Question 2). Responses for each statement were recorded using a five-point Likert scale, ranging from *Strongly Disagree* to *Strongly Agree*. Statement b and c were negative statements and reversed for analysis. Table 13 summarises the mean responses to the statements by using the *Teacher Mean Score* for each of the statements. The *Teacher Mean Score* results were ranked from highest to lowest highlighting the statements with the most positive responses.

Table 13
Ranked Order of the Mean Score for the Items Used to Construct the Teacher Attitude Scale

Rank	Question 2 Item and Statement	Range	Teacher Mean Score	Teacher Median Score	Std. Deviation
1	a - I see a need to use computers	4-5	4.88	5.00	0.3536
2	f - I complete more work with a computer	1-5	4.38	4.50	0.7440
3	h - By using computers I think in different and interesting ways	2-5	4.38	4.50	0.7740
4	d - Computers help me to learn	3-5	4.13	4.00	0.6409
5	g - I enjoy learning with a computer	2-5	4.00	4.00	0.7559
6	c - It is difficult to use technology	3-5	3.75	4.00	0.8864
7	b - Using computers takes away time.	3-5	3.62	4.00	1.4079
8	e - I learn more quickly with computers	3-5	3.50	3.50	0.9258

As the results demonstrate, the statement with the highest mean and lowest standard deviation was for the item *I see a need to use computers.* The high *Teacher Mean Score* reinforces the point that teachers commonly agree that using computers is important (Voogt, Knezek, Cox, Knezek, & Brummelhuis, 2013). The lowest rated *Attitude* statement and second largest standard deviation was for the item *I learn more quickly with computers.* The low rating for *I learn more quickly with computers* illustrates that teachers have mixed feelings about computers saving time (Sipilä, 2014). The *Teacher Median Score* confirms the ranking of the *Attitude Scale* when compared to the *Teacher Mean Score*.

Teacher Application Scale

Figure 6 presents the score for each teacher on the *Application* scale and classifies each task in terms of regularity *(Never, Each Week, On Occasion* and *Never*). Out of the eight teachers 25% (2) were *Daily*, 62.5% (5) *Each Week*, 12.5% (1) *On Occasion* and 0% (0) *Never*. Therefore, 87.5% (7) of the teachers used computers regularly.

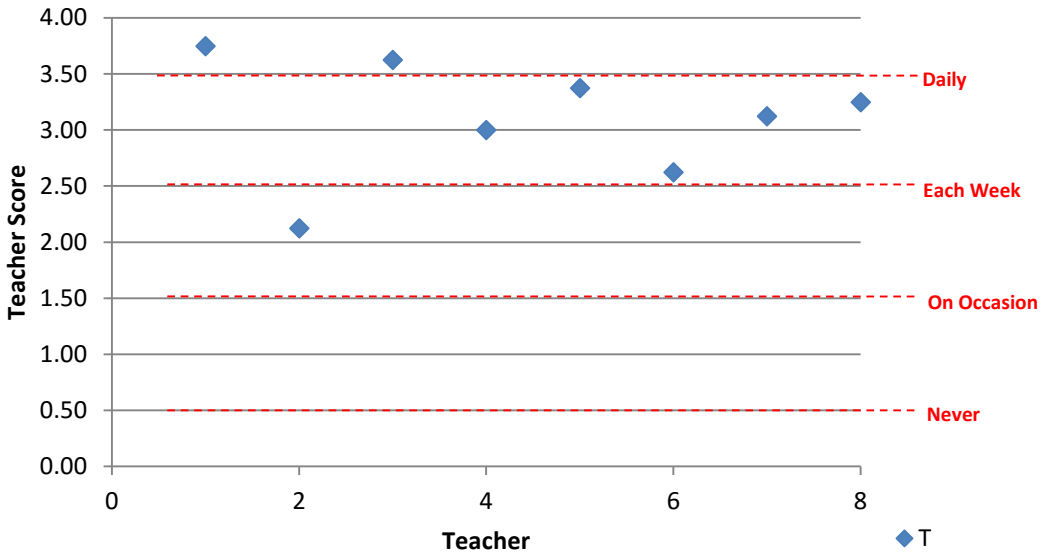

Figure 6. Plot of Application scale scores of the eight teachers.

The *Application* scale constructed with reference to eight computer-based tasks (Appendix 5 Teacher Survey Question 3). Responses for each computer task were made using a four-point Likert scale, ranging from *Daily* to *Never*. Table 14 summarises the mean responses to the computer tasks by using the *Teacher Mean Score* for each of the statements. The *Teacher Mean Score* result was ranked from highest to lowest.

Table 14
Ranked Order of the Mean Scores for Items Used to Construct the Teacher Application Scale

Rank	Question 3 Item	Range	Teacher Mean Score	Teacher Median Score	
1	a - type work (e.g. word-processing, publisher)	3-4	3.75	4.00	0.4629
2	e - store information (e.g. hard-disk drive, thumb-drive, CD)	2-4	3.75	4.00	0.4629
3	b - access information (e.g. internet search, CD's, blogs)	1-4	3.63	4.00	0.7440
4	h - access the schools LMS (e.g. Moodle)	2-4	3.13	3.50	1.1260
5	d - present information (e.g. PowerPoint, posters)	3-4	3.00	3.00	0.7559
6	g - develop a skill (e.g. typing, tables)	1-4	2.88	3.00	0.8345
7	c - analyse information (e.g. statistics, graphs)	2-4	2.50	2.50	0.9258
8	f - make a product (e.g. brochure, video, website)	1-4	2.25	2.50	1.1650

The top ranked applied tasks with the lowest standard deviation were producing documents and storing information. The more meaningful uses of ICT tasks of developing a skill (*Knowledge Building*), analysing information (*Active Learning*) and

making a product (*Engagement, Motivation and Challenge*) where only used on average *On Occasion*. The *Teacher Median Score* confirms the ranking of the *Application Scale* when compared to the *Teacher Mean Score*.

Results of Analysis of Scales from Student Survey Data

The analysis of the student survey data investigated the descriptive statistics for each of the students' *Application*, *Attitude* and *ICT Skills* scales. The results focused on the *Range*, *Student Mean Score, Student Median Score* and *Standard Deviation*. The analyse of these data are firstly presented for all students to provide a comparative backdrop to later analyses for each case study.

Student ICT Skills Scale

Figure 7 presents a frequency distribution for the *ICT Skills* scale scores for all students. Out of the 154 students 2% (3) were *Highly Competent*, 63% (97) *Competent*, 35% (54) *Basic* and 0% *Limited*. Therefore, 65% of the students had an *ICT Skills* level of *Competent* throughout all of the eight classes.

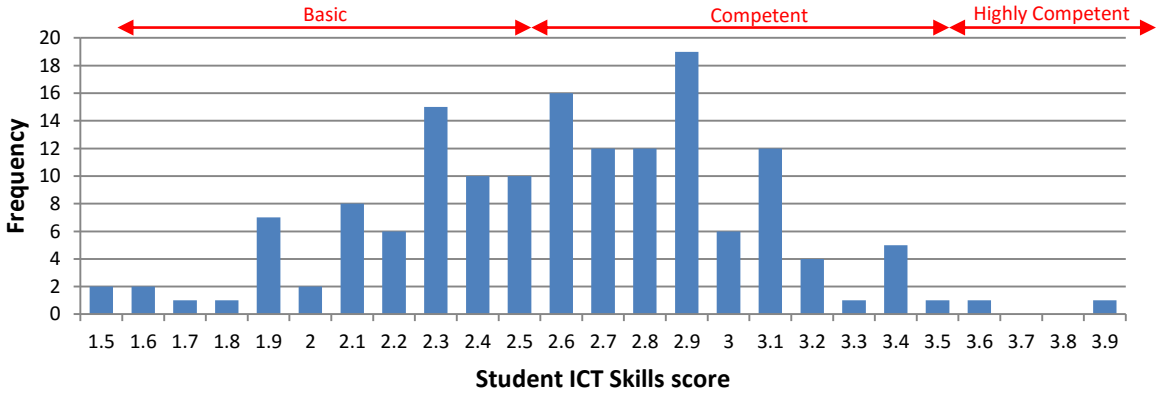

Figure 7. A frequency chart for the ICT Skills scale scores for all students in the sample.

The *ICT Skills* scale comprised of sixteen items concerning the skill in the use of common computer applications. Table 15 summarises the mean responses by students to these 16 items that were ranked from highest to lowest by the student mean score.

Table 15
Ranked Order of the Mean Scores for Items on the Student ICT Skills Scale

Rank	ICT Skills Area	Mean Score	Median Score	Standard Deviation
1	Slideshow	3.41	3.00	0.6220
2	Internet	3.41	4.00	0.7010
3	Social Networking	3.38	4.00	0.9370
4	Word-processing	3.29	3.00	0.6640
5	Digital Photography	3.22	3.00	0.7690
6	Video Sharing	2.98	3.00	0.9730
7	Image Editing	2.88	3.00	0.8270
8	Email	2.87	3.00	0.6690
9	Computer File Management	2.68	3.00	0.7470
10	Video Recording and Editing	2.50	3.00	0.9510
11	Learning Management System	2.33	2.00	0.6270
12	Podcasting	2.06	2.00	1.0010
13	Spreadsheets	1.95	2.00	0.7350
14	Content Hosting Service	1.68	1.00	1.0718
15	Web Authoring	1.61	1.00	0.7440
16	Database	1.42	1.00	0.6340

The top ranked applications with the highest mean skill levels above the mid-point of 2.5 (ICT *Skills* scale) were Slideshow, Internet, Social Networking, Word-processing, Digital Photography, Video Sharing, Image Editing, Email and Computer File Management. The Slideshow, Internet and Word-processing applications are examples of productivity software. These types of applications let the teacher move away from textbooks to make a lesson more appealing to students (Wastiau et al., 2013). The Social Networking, Digital Photography and Video Sharing are likely to be applications of a more social/ personal usage (ACMA, 2011). The ICT skills of the Slideshow had a median value of 3.00, which is below Internet and Social Networking ICT skills. However, the Slideshow ICT skills was still ranked in the top five when the *Median Student Score* is considered. The *Median Student Score* confirmed the ranking of the *ICT Skills* when compared to the *Mean Student Score*.

Student Attitude Scale

The *Attitude* scale question was sub-divided into eight statements (Appendix 6 Student Survey Question 2). Responses to each statement were made using a five-point Likert scale, ranging from *Strongly Disagree* to *Strongly Agree*. Statement b and c were negative statements and reversed for analysis. Figure 8 presents the *Attitude* scale scores

for the students. Out of the 154 students 4% (6) *Strongly Agreed*, 59% (60) *Agreed*, 32% (50) *Undecided, 5% (8) Disagreed* and 0% (0) *Strongly Disagreed*. Therefore, 62% of the students generally *Agreed* with the statements.

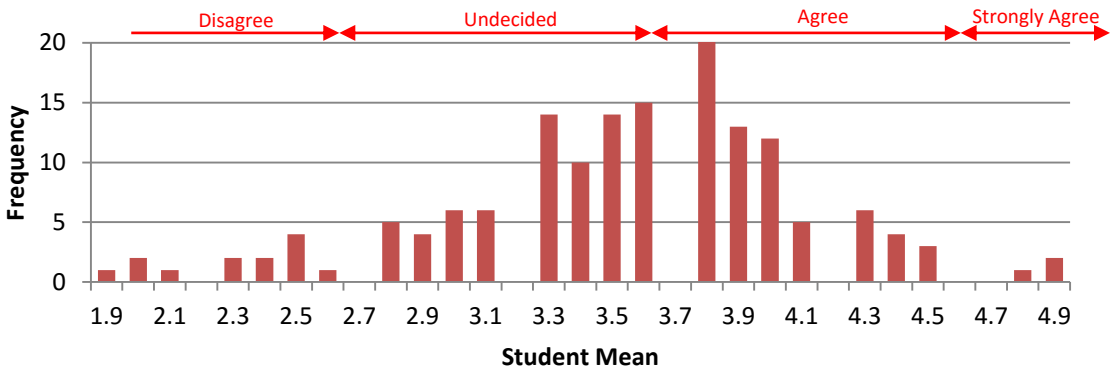

Figure 8. A frequency chart for the Attitude scale scores for all students in the sample.

Table 16 summarises the mean responses to the statements by using the *Student Mean Score* for each of the statements. The *Student Mean Score* result was ranked from highest to lowest highlighting the statements with the most positive responses.

Table 16
Ranked Order of the Mean Scores for the Items Used to Construct the Student Attitude Scale

Rank	Question 2 Item and Statement	Range	Student Mean Score	Student Median Score	Std. Deviation
1	a - I see a need to use computers	1-5	3.93	4.00	0.8640
2	g - I enjoy learning with a computer	1-5	3.82	4.00	1.0298
3	d - Computers help me to learn	1-5	3.75	4.00	0.9025
4	c - It is difficult to use technology	1-5	3.52	4.00	1.2484
5	f - I complete more work with a computer	1-5	3.51	4.00	1.0679
6	h - By using computers I think in different and interesting ways	1-5	3.49	4.00	1.0432
7	b - Using computers takes away time.	1-5	3.14	3.00	1.0358
8	e - I learn more quickly with computers	1-5	3.14	3.00	1.0443

As the results demonstrate, the statement with the highest mean and lowest standard deviation was, *I see a need to use computers.* The high rating for *I see a need to use computers* reinforces the point that students commonly agree that using computers is important (Osodo, Indoshi, & Ongati, 2010). The lowest rated *Attitude* statement with a standard deviation of 1 was the statement, *I learn more quickly with computers.* This illustrates that students also had mixed feelings about computers saving time while

learning (Stefl-Mabry, Radlick & Doane, 2010). The *Student Median Score* confirms the ranking of the *Attitude Scale* when compared to the *Student Mean Score*.

Student Application Scale

The *Application* scale question in the questionnaire was sub-divided into eight common computer tasks (Appendix 6 Student Survey Question 3). Responses for each computer task were made using a four-point Likert scale, ranging from *Daily* to *Never*. Figure 9 presents the score for each student on the *Application* scale and classifies the responses in terms of regularity *(Never, Each Week, On Occasion* and *Never*). Out of the 154 students 4% (6) were *Daily*, 74% (114) *Each Week*, 22% (34) *On Occasion* and 0% (0) *Never*. Therefore, 78% (148) of the students used computers regularly.

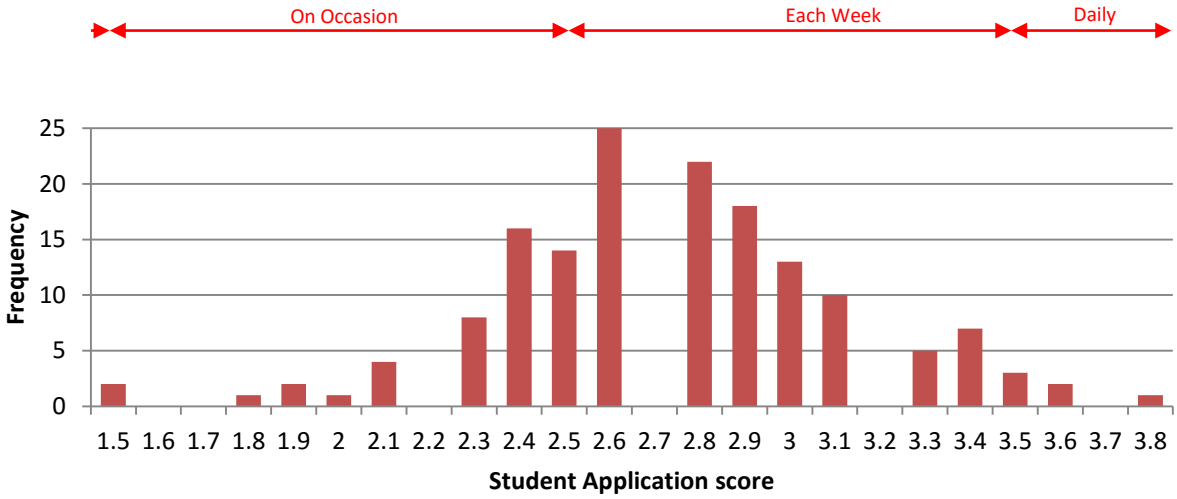

Figure 9. A frequency chart for the Application scale scores for all students in the sample.

Table 17 summarises the mean responses to the computer tasks by using the *Student Mean Score* for each of the statements. The *Student Mean Score* result was ranked from highest to lowest *Application* highlighting the statements with the most regular applied tasks.

Table 17
Ranked Order of the Mean Scores for the Items Used to Construct the Student Application Scale

Rank	Question 3 Item	Range	Student Mean Score	Student Median Score	Std. Deviation
1	b - access information (e.g. internet search, CD's, blogs)	1-4	3.51	4.00	0.6882
2	e - store information (e.g. hard-disk drive, thumb-drive, CD)	1-4	3.26	3.00	0.8482
3	a - type work (e.g. word-processing, publisher)	1-4	3.16	3.00	0.6679
4	h - access the schools LMS (e.g. Moodle)	1-4	3.13	3.00	0.7327
5	d - present information (e.g. PowerPoint, posters)	1-4	2.36	2.00	0.6843
6	g - develop a skill (e.g. typing, tables)	1-4	2.17	2.00	0.8642
7	f - make a product (e.g. brochure, video, website)	1-4	2.12	2.00	0.6735
8	c - analyse information (e.g. statistics, graphs)	2-4	2.08	2.00	0.5053

The top ranked applied task, with a standard deviation less than 1, was accessing information. The more *Meaningful Uses of ICT* tasks of developing a skill (*Knowledge Building*), analysing information (*Active Learning*) and making a product (*Engagement*, *Motivation* and *Challenge*) where only used on average *On Occasion* (i.e. a score of 2). The *Student Median Score* when compared to the *Student Mean Score* confirms the ranking of the *Application Scale*.

Case Studies

The data were analysed for each of the Case Studies to determine the nature and extent of a *Digital Divide,* and the extent to which *Meaningful Use of ICT* was present within the classroom. A one-sample t-test was performed on each of the three scales used to determine the *Digital Divide,* with the test value being the teacher's scale score. A two-tailed t-test was used to test the significance of the difference between the teacher's score and the student class mean, with any probability value higher than 5% being rejected. The practical significance (d) was calculated as the effect size and the Digital Divide was stated as being in favour of either the teacher or students. The *Meaningful Use of ICT* was determined by the data gathered from the interview of the teacher and both surveys. These were summarised into a LEA Rubric (Appendix 8) table format. When the modified LEA rubric was applied to each of the column sources, each source was rated as one of: *No Use, Developing, Routine* and *Comprehensive*. The ratings for each of the LEA attributes were determined by the researcher, and checked by the supervisor, whereupon an overall rating was deduced for the LEA attributes at the end

of the LEA Rubric. The overall ratings adopted were: *No Use*; *Limited*; *Developing*; *Routine*; and *Comprehensive*.

Case Study 1

The learning area for *Teacher 1* was Science, and the class was taught in a typical Science laboratory. This case study was the pilot study for which some of the data analysis was presented at the end of the previous chapter. *Teacher 1* did state in the interview that the students in the class had a reasonably high level of engagement, were willing, and displayed very good behaviour. The computer technology accessible in the laboratory was a laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a laptop with the choice to connect to a digital projector. The laboratory had Wi-Fi access to the school network, Internet and the school's Learning Management System (LMS). There were 33 students in the class, 10 of whom brought their own iPads to the laboratory. The teacher had 19 years of teaching experience and had spent an estimated 660 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT*.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales of the *Digital Divide* construct for the pilot study are displayed in Table 9 (Pilot Study, p. 30).

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(22) = -13.6$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(22) = -11.8$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *ICT Skills* score was slightly higher when compared to the *Class Mean*, however, there was no statistically significant difference ($t(22) = -1.7$, $p=0.096$, two-tailed test). The effect size was small and moderately in favour of the teacher.

The effect size for the *Attitude* and *Application* scales were large and in favour of the teacher. The significance (2-tailed) for both fell within the acceptable margin of less than 5%. The effect size of the *ICT Skills* scale however, was small but in favour of the

teacher. The significance (2-tailed) was above the acceptable margin and therefore, not significant. Due to the *Attitude* and *Application* scale, having a large effect size and a marginal difference between the teacher and student mean for the *ICT Skills* scale the *Digital Divide* for this class would be assessed to be in favour of the teacher.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher and both the surveys are tabulated in Appendix 9 and the evaluated results of the LEA attributes in Table 10 (Pilot Study, p. 31). The results indicated that at least a *Developing* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- "PowerPoint because I learnt new things and my friends helped me learn how to do new things."
- "Create a postcard, I enjoyed it because we got to make and edit our own photos, we also got to create the postcard however I wanted to."
- "Moodle because there is all our information from our class on their [sic] and it has many helpful links that we can click on to help and further our knowledge."
- "Moodle because we can access it easily and can look at all the extra content that we don't open in class with the teacher but can go through it ourselves, it gives me a sense of independence."

Teacher.

- "I mainly facilitate and guide. I wander around the class to see how the students are going. Never stay at the front of the class."
- "Applications we have used are Word, PowerPoint, Google Drive, Edmodo and Moodle. Created an online lesson for the students to follow using the schools [sic] LMS. The online lesson allowed the students to interact with the content and decide which path to take (i.e. had multiple learning paths for students to choose). The students were able to self-pace and had a choice in the learning."
- "Using ICT [sic] it appeals to different learners like visual and variety in use i.e. IWB and websites."

- "Different ways of learning for students and it can circumvent literacy and spelling for some students. ICT helps to reinforce for students, especially learning in a different way."
- "I see a lot of potential for ICT but is very frustrating when we cannot do much."
- "When I teach a topic in Science and see a suitable ICT application that can be used with students, I then incorporate the application i.e. online, etc."

These statements demonstrate that new skills were being developed, and creative methods were implemented in the use of ICT. An example was the postcard activity, which was used to present science information for an assignment. The evidence suggests that the students were being engaged with ICT, examples are on-line lesson Moodle (LMS), PowerPoint, and the use of the IWB. The teacher also incorporated ICT applications into the curriculum, and discovered different ways to motivate the students. The suggestions of Moodle confirm that students were actively engaging in the content of the lessons. Therefore, it was concluded that for the teacher and class, there was a *Digital Divide* in favour of the teacher, and at least a *Developing* level for *Meaningful Use of ICT* had occurred in this class.

Case Study 2

The learning area for *Teacher 2* was Science, and the class was taught in a typical science laboratory. *Teacher 2* did state in the interview that students in the laboratory had a reasonably high level of engagement (small minority not engaged), and students were willing with a good level of behaviour. The computer technology accessible in the laboratory was one laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a laptop with the possibility to connect to a digital projector. The laboratory had Wi-Fi access to the school network, Internet and the school's LMS. There were 32 students in the classroom, half of whom brought iPads to the laboratory. The teacher had 27 years of teaching experience and had spent an estimated 540 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT*.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales are given in Table 18.

Table 18
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 2

Scale	Teacher Score	Class Mean	t-test (22)	Sig.	Effect Size	Favour
Attitude	4.0	3.7	-1.8	0.098	-0.4	Teacher
Application	2.1	2.8	8.7	0.000	2.1	Students
ICT Skills	1.7	2.5	10.7	0.000	2.5	Students

The teacher's *Attitude* score was numerically higher than the *Class Mean,* but was not significantly different (t (17) = -1.8, p = 0.098, two-tailed test). The effect size was moderately in favour of the teacher. The teacher's *Application* score was numerically lower than the *Class Mean,* and significantly different (t (17) = 8.7, p<0.001, two-tailed test). The effect size was large and in favour of the students. The teacher's *Skill* score was numerically lower when compared to the *Class Mean,* and was significant difference (t (17) = 10.7, p<0.001, two-tailed test). The effect size was large and in favour of the students.

The effect size for the *Attitude* scale was small, and in favour of the teacher; however the significance (2-tailed) was greater than 5% and not acceptable. The *Application* and *ICT Skills* scales were both large and in favour of the student, and the significance for both were below 5%. The *ICT Skills* scale had more emphasis than the other two scales; therefore, the *Digital Divide* was in favour of the students.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher, and both the surveys are tabulated in Appendix 11, and the evaluated results of the LEA attributes in Table 19. The results indicated that a *No Use* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Table 19
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 2

Category	*No Use*	*Developing*	*Routine*	*Comprehensive*
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Online Textbooks – "I enjoy using the online textbooks because I don't have to carry my books around to every class, and you can access things quicker. Sometimes there are extra activities within the online textbook that is fun and educational. I can access the book really quickly and I can access different activities within the online book. These activities are fun and educational to use."
- Moodle (LMS) – "Easy to use and find links. Helps me keep up to date on missed items. Can ask questions. Easy to change profile settings. What I did with it was access work/ assignments/ homework, checked safety stuff in my personal settings and easy to find the file."
- PowerPoint – "Helps me present my work clearly and easy to use. I use it to present my assignments and assessments."

Teacher.

- "I have learnt a few tricks myself from the students."
- "I am not teaching them anything."
- "Students used the iPad to create a movie clip of the dissection and upload onto the LMS for the class."
- "I don't know if I have done anything that has been a first time for them. They certainly can use applications to do homework, class activities but it is not me instructing them."
- "I use the prior knowledge of the student for the application."
- "I am occasionally asked the odd question. If I cannot answer, I put it out to the class to see if it can be answered. If not, then usually it is a suggestion to ask IT or go home and ask your parents."
- "No [sic] the teacher doesn't decide on what applications to use with the students."

The main usage of ICT activities in the classroom was the use of the on-line textbook and resources uploaded onto the LMS. The teacher's statements support the judgement that no use of ICT for *Knowledge Building* and *Active Learning* was evident in the class as illustrated by the teacher, "I am not teaching them anything.", in regards to ICT skills. There was some evidence to suggest some engagement; examples are the LMS and the video clip with the students; however, the interests and challenges for the

students was not noticeable. Therefore, it was concluded that for teacher and class, there was a *Digital Divide* in favour of the students, and no significant level of *Meaningful Use of ICT* had occurred in this class.

Case Study 3

The learning area for *Teacher 3* was Society and Environment and taught in a typical classroom. *Teacher 3* stated in the interview that the students in the class had a variable level of engagement, that a small minority could be distracted easily; however, the behaviour for the class was generally good. The computer technology accessible in the laboratory was one laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a laptop with the option to connect to a digital projector. The laboratory had Wi-Fi access to the school network, Internet and the school's LMS. There were 23 students in the classroom, some of whom brought their own iPads to the laboratory. The teacher had 19 years of teaching experience, and had spent an estimated 660 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT.*

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct for the teacher are given in Table 20.

Table 20
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 3

Scale	Teacher Score	Class Mean	t-test (13)	Sig.	Effect Size	Favour
Attitude	4.1	3.3	-4.3	0.001	-1.1	Teacher
Application	3.6	2.7	-8.4	0.000	-2.3	Teacher
ICT Skills	3.8	2.7	-21.3	0.000	-5.7	Teacher

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(13) = -4.3$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(13) = -8.4$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Skill* score was significantly higher when compared to the *Class Mean* of the students, and there was a

statistically significant difference (t (13) = -21.3, p<0.001, two-tailed test). The effect size was large and in favour of the teacher.

The effect size for the *Attitude*, *Application* and *Skill* scales were large and in favour of the teacher. The significance (2-tailed) for all categories fell within the acceptable margin of less than 5%; therefore, it was determined that the *Digital Divide* was in favour of the teacher.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data from the teacher, and both the surveys, are tabulated in Appendix 12, and the evaluated results for the LEA attributes are in Table 21. The results indicate there was at least a *Developing* level of *Meaningful Use of ICT* with some evidence of a *Routine* level of *Meaningful Use of ICT* observed for this *Case Study*.

Table 21
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 3

Category	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Moodle – "I enjoyed using it because it is convenient and easy to use. The wiki it is like a scrapbook and looks cool. What I did was [sic] my wiki page; I upload pictures, videos and create linked pages."
- PowerPoint – "I enjoyed using it because I find it interesting making slides. What I did was make a PowerPoint of the election for politics and law."
- Internet – "I enjoyed using it because it was easy to use and gives me the information I need. What I did was search what I needed for assignments/ helps with tests."

- Moodle (LMS) – "I enjoyed using it because we got to make our own scrapbook (wiki scrapbook). It was fun to post pictures and write what you want. Make your own personal scrapbook online with your things in it. What I did was post images and notes on the 2013 election."
- Moodle (LMS) – "I enjoyed using it because it is easy to get work/ tasks. Find out calendar. What I did was find out tasks and worked on wiki."

Teacher.

- "Do not teach new applications; however, there have been a few moments where I have taught new uses in an application, for instance Adobe reader highlight function. Highlighting the eBook."
- "Taught the students to use Wiki's [sic] for the electoral investigation process on the Moodle (LMS). Each student had to produce their own wiki. The class were taught how to access the wiki, create a wiki and how to continually update the wiki."
- "Students who were not familiar with wikis were taught how to use [sic]. Content copied directly into the wiki. I gauged their engagement by simply seeing if they were doing it by visiting the wiki. That was my measure of success this year."
- "I facilitate the use of computers on a daily basis with the students in the last term."
- "At the moment just extending their abilities in an application they already know i.e. Adobe reader."
- "I haven't really played to their strengths."
- "At the start of the semester I established a protocol where I said if you have got an IT device in front of you, here is what it can be used for – fact checking as I am talking, that's okay, obviously the word-processing, the eBook, and responses that's fine. I said anything else is with permission with the teacher."
- "Stay with what I know with applications."
- "We have done a lot of little things nothing has been a failure i.e. I suppose it would be the electoral investigation process, i.e. the Wiki/ other, some students are progressing further than other, students are compiling information."

The comments demonstrated that activities did take place to support learners in developing their *Knowledge Building* skills, for example extending students' knowledge of Adobe reader and the creation of wiki's through the school's LMS. The use of the wiki scrapbook through the school's LMS displayed levels of active manipulation of objects and tools to display information. Allowing students to use ICT to check facts whilst the teacher was teaching, demonstrated elements of higher *Active Learning* by recognising when more information was required. Some of the ICT activities with the teacher were designed with the students' interests taken into account and involved a degree of challenge. This was observed through the application of the LMS, in

particular the wiki and the internet. Therefore, it was concluded that for the teacher and class, there was a *Digital Divide* in favour of the teacher, and that least a *Developing* with some *Routine* levels of *Meaningful Use of ICT* had occurred in the class.

Case Study 4

The learning area for *Teacher 4* was Society and Environment and taught in a typical classroom. *Teacher 4* stated in the interview that students in the class had a very high level of engagement (some strong academic students), very motivated, pushed each other, had excellent classroom behaviour, and the ICT knowledge/skills of the class were very high. The technology accessible in the laboratory was one laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a laptop with the choice to connect to a digital projector. The laboratory had Wi-Fi access to the school network, Internet and the school's LMS. There were 32 students in the classroom, six of whom brought iPads to the laboratory. The teacher had over 40 years of teaching experience and had spent an estimated 45 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT*.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct are given in Table 22.

Table 22
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 4

Scale	Teacher Score	Class Mean	t-test (13)	Sig.	Effect Size	Favour
Attitude	4.0	3.4	-4.1	0.001	-1.1	Teacher
Application	3.0	2.5	-5.1	0.000	-1.4	Teacher
ICT Skills	1.8	2.3	4.6	0.001	1.2	Students

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(13) = -4.1$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(13) = -5.1$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Skill* score was

numerically lower when compared to the *Class Mean* and there was a significant difference (t (13) = 4.6, p<0.001, two-tailed test). The effect size was large and in favour of the student.

The effect size for the *Attitude*, *Application* scales were numerically large and in favour of the teacher. However, the *Skill* scale was in favour of the student with a large effect size. The significance (2-tailed) for all categories fell within the acceptable margin of less than 5%. The results indicated that the teacher had a better *Attitude* and *Application,* but the *Skill* was significantly in favour of the students with a large effect size. Due to the *ICT Skills* scale being the main determinant of the *Digital Divide,* it was therefore, determined that the *Digital Divide* was in favour of the students.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher, and both the surveys are tabulated in Appendix 13, and the evaluated results of the LEA attributes in Table 23. The results indicated that at least a *Limited* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Table 23
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 4

Scale	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Moodle Test (LMS) – "I enjoy using it as a quick and easy way to do the test with fast results."
- Moodle (LMS) – "I enjoyed using Moodle because it is an easy way to ask teachers about homework and we can have a class chat so you can ask questions."

- Publisher – “I enjoyed using Publisher because it has so many layouts and designs. It was easy to manage and I had plenty of time to use it. I created a small book – let [sic] on medieval knights. Inserting pictures, captions and titles.”
- PowerPoint – “I enjoyed using it because it is easy to use and upload images and sounds. I wrote notes on given tops [sic] like the festivals in Japan.”

Teacher.

- “No, I just assume that they will be able to do it.”
- “If they can’t have to find out how to do it.”
- “I don’t think I really do. I just assume they will be able to do it and up to now they always have.”
- “No ICT knowledge building of the students.”
- “Normally find they can do it and their skills are better than mine. A student showed how a teacher to do something the other day.”
- “Have coming to the terms of the availability of knowledge is so great. The only problem is the ability to select, there is so much there, it is a selection issue but the girls are very good at sifting through stuff especially this class in particular.”
- “Yes, Educreations (video clips). I just love it. Especially with Geography to point out places. Very engaged, I think that they were surprised that I could do it.”
- “Walk around and keep eye on them, especially with the iPads. They are bound by their commitment but they are tempted to flick to something else easily.”
- “I normally give them a variety, as long as they can present something. It’s up to them.”

The comments by the teacher demonstrated that no use of ICT for *Knowledge Building* or *Active Learning* was evident. Examples of these comments are “I just assume that they will be able to do it.”, “If they can’t have to find out how to do it.” and “... their skills are better than mine.”, were stated by the teacher. However, the teacher did show elements of *Engagement/Motivation & Challenge* with the LMS, Publisher, PowerPoint and Educreations. Therefore, it was concluded that for the teacher and class the *Digital Divide* was in favour of the students, and that no significant level of *Meaningful Use of ICT* tended to occur in this class.

Case Study 5

The learning area for *Teacher 5* was English and taught in a typical classroom. *Teacher 5* stated in the interview that the students in the classroom had a high level of engagement, and the student’s behaviour was generally good. The teacher rated the ICT knowledge/ skills of the class as very varied; some had a great deal of *ICT Skills* while

others struggled with basic *ICT Skills*. The technology accessible in the classroom was one laptop trolley (16 laptops) and another laptop trolley could be booked for the class. The teacher had access to a desktop computer on the teachers' desk that had an option to connect to an Interactive White Board (IWB). The classroom had Wi-Fi access to the school network, Internet and the school's LMS. There were 32 students in the classroom and 7 students brought their own iPads to the class. Teacher 5 had 8 ½ years of teaching experience and had spent an estimated 510 minutes (in a week) using the computer at home.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct for this teacher is given in Table 24.

Table 24
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 5

Scale	Teacher Score	Class Mean	t-test (7)	Sig.	Effect Size	Factor
Attitude	4.1	3.6	-3.7	0.008	-1.3	Teacher
Application	3.4	2.5	-7.2	0.000	-2.5	Teacher
ICT Skills	3.4	2.2	-19.8	0.000	-7.0	Teacher

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(7) = -3.7$, $p<0.01$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(7) = -7.2$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Skill* score was considerably higher when compared to the *Class Mean* and there was a significant difference ($t(7) = -19.8$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher.

The effect size for the *Attitude*, *Application* and *Skill* scales were numerically large and in favour of the teacher. The significance (2-tailed) for all scales fell within the acceptable margin of less than 5%; therefore, the *Digital Divide* for the class was determined to be in favour of the teacher.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher and both the surveys are tabulated in Appendix 14. The evaluated results of the LEA attributes are tabulated in Table 25. The results indicated that at least a *Developing* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Table 25
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 5

Category	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- PowerPoint – "I enjoyed using it because it saved me time instead of having to write all of the information out, I could type it. I wrote a speech on it for an English oral then printed out the slides in handouts so they we already the size of palm cards."
- Moodle (LMS) – "I enjoyed using it because it was interesting and was not that hard to use and find things. What I did was print off study sheets for tests coming up and had a look at all my subjects."
- Publisher – "I enjoyed using it to create/ design what you want on it. Can add pictures, change font and change style/ layout. What I did was create a booklet about rust in science. I was able to create what I wanted and what I wanted it to look like."

Teacher.

- "Usual not. In terms of the activity, I will plan to a basic level, then I will go around for 1:1 extension if students require. Not all require extension."
- "Normally to basic level, yes. Just to that, basic level and I try to build on things."

- "No booklets, but I did with Moodle, at the beginning of the year. Some kids said I already got that in S&E, so that was the only thing."
- "I did give students opportunity to extend themselves but probably not enough really thinking about it. I could go further, that is something I really need to explore."
- "Ask another student for help or I will try and find out. Or why don't you Google that and find a forum with some experts. There are a lot of those and you can usually find the answer. I have emailed support before."
- "Guess it is to help the students learn in a different way [sic] to try and tackle in particular kids that learn differently, to really try and engage them and to try and ensure that they can build on their skills as well. And also to present their ideas because it is much easier to present ideas using ICT to the class or small group then it was previously just using paper."
- "I guess I try and leave it open for them and I say find different ways to do this and feel free, and I tend to give examples like PowerPoint. Why not try and use Prezzie and some of these other things and play with the apps. I do tend to keep it a bit rigid and until we get a stable system."
- "They are interested; they are actually talking about the activity, doing the activity. They are discussing the activity or how to change it with people next to them. They are excited, happy buzz in the room."
- "We haven't had any formal assessment is that an ICT assessment. We have focused on more the in class assessment and plagiarism is still an issue. In the year 8 course we did a pamphlet by publisher and so many were plagiarising to a crazy extent and we found that it just was not worth doing it. So we deleted that task so really it is the activities in the class, which becomes a really individual teacher thing."

Knowledge Building was apparent in the class through applications such as, the LMS and PowerPoint/Publisher, though the teacher only planned to a basic level and extended when required. Some opportunities were provided for students to actively manipulate objects and tools through the applications used in the class. The teacher passively taught the students, and didn't usually supply instructional materials. The students enjoyed using the applications in the class, which involved a degree of challenge, but their interests were not generally taken into account. Overall, it was concluded that for the teacher and class, there was a *Digital Divid*e in favour of the teacher, and that a *Developing* level of *Meaningful Use of ICT* tended to occur in this class.

Case Study 6

The learning area for *Teacher 6* was Mathematics and taught in a typical classroom. *Teacher 6* stated from in the interview that there was a fifty percent engagement; the general behaviour of the students was good and rated the ICT knowledge/skills of the class as good. The computer technology accessible in the classroom was one laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a laptop with the choice of connecting to a digital projector. The laboratory had Wi-Fi access to the school network, Internet and the school's LMS. There were 28 students in the classroom, five of whom brought iPads to the classroom. The teacher had 35 years of teaching experience, and had spent an estimated 140 minutes was spent using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT*.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct are given in Table 26.

Table 26
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 6

Scale	Teacher Score	Class Mean	t-test (25)	Sig.	Effect Size	Favour
Attitude	3.5	3.5	0.3	0.746	-0.06	Teacher
Application	2.6	2.7	0.7	0.504	0.13	Students
ICT Skills	2.5	2.6	1.1	0.268	0.20	Students

The significance (2-tailed) result was greater than 5% for the *Attitude*, *Application* and *Skill* scales. Therefore, the *Digital Divide* for this *Case Study* was not determined.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher, and both the surveys are tabulated in Appendix 15, and the evaluated results of the LEA attributes in Table 27.

The results indicated between *No Use* and *Developing* level of *Meaningful Use of ICT* for this *Case Study*.

Table 27
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 6

Category	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Interactive Casio classpad – "I enjoyed using it because it is good to visualise calculations whilst the teacher explains. I find it useful learning things by following along slowly, going step by step. What I did was learnt [sic] new skills, improved old methods of using my calculator, and became more efficient."
- Classpad – "I enjoyed it because it helped show me what to do on my own classpad. It is helpful so I know what to do later on without help. What I did with it was I followed along with the teacher on the screen setting up/ performing steps on my classpad."
- Classpad – "I enjoyed using it because it got me involved, interactively helping me understand how to use the calculator better and more efficiently. What I did with it was I sat in class on my classpad and worked interactively following the teacher on the screen learning functions of the calculator."
- Internet – "I enjoyed it because it is very informative, quick to access information, easy to find information, effortless and versatile. What I did was Google answers to questions I am not sure about or look up definitions to words I don't know."
- Moodle (LMS) – "I enjoyed using it because it allowed me to access exercise answers and working out. So that I could work at my own pace and I could also access it at home and it saved me printing out lots of answers. What I did was download the answers for our maths exercise and saved it to my hard drive so that I could easily access it later."

Teacher.

- "I don't extend the students ICT skills."
- "I don't connect what the students do with ICT to society."
- "Using the projector app for the Casio graphics calculator."
- "No I don't extend the students ICT skills - Students tend to help each other in extension."
- "I don't challenge the students with ICT skills."
- "There is more potential to engage students."
- "Head of Department decides on allocations to use."

The main use of ICT in the classroom was the interactive Casio classpad and the LMS. The classpad was utilised in demonstrating the functionality of the Casio graphics calculator, and students mentioned that they enjoyed this method of teaching. The LMS was mainly employed as a depository of information for assignment sheets and marking keys. Overall, it was concluded that for the teacher and class, there was a marginal *Digital Divide* in favour of the student and *No Use* level of *Meaningful Use of ICT* tended to occur in this class. It should be noted that a *No Use* level did not mean that no use of ICT is occurring, but that use tended not to be meaningful use as defined for this study.

Case Study 7

The learning area for *Teacher 7* was English and taught in a typical classroom. *Teacher 7* stated in the interview that the students were engaged in the classroom, students' involvement was very good and their behaviour was generally good. The teacher rated their ICT knowledge and skills as above average. The technology accessible in the laboratory was one laptop trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a desktop computer on the teachers' desk with an option to connect to an Interactive White Board (IWB). The classroom had Wi-Fi access to the school network, Internet and the schools' LMS. There were 33 students in the classroom, six of whom brought iPads to the laboratory. The teacher had 20 years of experience, and had spent an estimated 240 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of IC*T.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct are given in Table 28.

Table 28

Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 7

Scale	Teacher Score	Class Mean	t-test (22)	Sig.	Effect Size	Favour
Attitude	4.1	3.7	-6.7	0.000	-1.3	Teacher
Application	3.1	2.8	-4.1	0.000	-0.8	Teacher
ICT Skills	2.3	2.6	3.2	0.003	0.7	Students

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(24) = -6.7$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(24) = -4.1$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Skill* score was numerically lower when compared to the *Class Mean* and there was a significant difference ($t(24) = 3.2$, $p<0.01$, two-tailed test). The effect size was moderate and in favour of the students.

The effect size for the *Attitude*, *Application* scales were large and in favour of the teacher. The *Skill* scale however, was in favour of the student with a moderate effect size. The significance (2-tailed) for all scales fell within the acceptable margin of less than 5%. The results indicated that the teacher had a better *Attitude* and *Application,* but the *Skill* was in favour of the students with a moderate effect size. The results of this *Case Study* are similar to *Case Study* 4. Where in *Case Study* 4 the effect sizes for the *Attitude* (-1.1) and *Application* (-1.4) were in favour of the teacher, and the *Skill* (1.2) effect size was large and in favour of the student. In this *Case Study* the *Application* (-0.8) and *Skill* (0.7) effect size are moderate not large as in *Case Study* 4. The *ICT Skills* scale was the main determinant for the *Digital Divide*, therefore in this *Case Study* the *Digital Divide* was marginally in favour of the students.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher and both the surveys are tabulated in Appendix 16 and the evaluated results of the LEA attributes in Table 29. The results indicated that a *Limited* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Table 29
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 7

Category	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Moodle (LMS) – "I enjoyed using Moodle when we do worksheets and assignments at school and at home. On Moodle, you can find valuable information created by your teacher. I used the information to complete worksheets and assignments."
- PowerPoint – "I enjoyed using it because it was very easy and simple.
- Moodle (LMS) – I enjoyed using it because you can see/ make notes of PowerPoint's and word documents you may use in/ during classes. What I did with it was watch PowerPoint's."
- Moodle (LMS) – "I enjoyed using it because it is all already there, I don't have to go searching for it, and if I lose something, it will probably be on Moodle. What I did with it was to view thing [sic] that teachers put upon it."
- Internet – "I enjoyed it because it does help the lesson go by very fast. I liked it because it is way easier to search something up rather than looking in books."
- Microsoft Word – "I enjoy using it because it was easier to complete online or school assignments. It has made my work a lot neater and easy to read. I have used 'Word' for almost all of my assignments."
- Moodle (LMS) – "That my teacher puts a lot of things on Moodle and I love having Moodle. If I forget homework at school, I can go on Moodle and see if it is on there. What I did with it was get stuff for my class from there or sometimes in a class, we have to go onto Moodle and do a lesson on Moodle."

Teacher.

- "I do not access the student's prior ICT knowledge for activities."
- "I do tend to do that and allow them to go away and learn extension by themselves. Simply because they are confident with the computer."
- Used the schools LMS – "Moodle. Extra resources were add [sic] to Moodle for the students to use. They had 24/7 access to the assessment. Students were shown were to access the assessment and allowed to use an application to produce the picture book. No extra skills were demonstrated to the students."
- "Students use their own knowledge when using applications for the first time."
- "I do allow students to select which applications to use."
- "I think for me the main purpose in using ICT is in order to replay information at a faster rate."
- "I sometimes take their interests into account, have to build the activity around the learning process."
- "Well I think it is valuable for supporting learning, just wish I knew how to do more things but it is time, more things with them."
- "Use of Moodle (LMS) internal and external to the class. We access Moodle for sheets to work on, activity sheets, extra reading, mainly a resource."

The statements from the teacher supported the findings of *No Use* in the scales *Knowledge Building* and *Active Learning*. The teacher declared that he/she did not access the students' prior knowledge for activities; instead, students taught themselves extension activities, and used their own knowledge when using applications. The interests of the students were not taken into account when the activities were designed, though some motivation of the students was evident in the use of the LMS. The only challenge apparent within the class was when the students self-initiated to extend their own learning. Overall, it was concluded that for the teacher and class, there was a marginal *Digital Divide* in favour of the students and the *Limited* level of *Meaningful Use of ICT* tended to occur in this class. It should be noted that a *No Use* level did not mean that no use of ICT is occurring, but that use tended not to be meaningful use as defined for this study.

Case Study 8

The learning area for *Teacher 8* was Mathematics and taught in a typical classroom. Students in the classroom were engaged, motivated and involved. *Teacher 8* stated in the interview that students' behaviour was generally good and the ICT knowledge/ skills of the class was unknown; however, it was assumed that it would be medium to medium high. The computer technology accessible in the laboratory was one laptop

trolley (16 laptops) with an option of booking an extra laptop trolley for the class. The teacher had access to a desktop computer on the teachers' desk that had an option to connect to an Interactive White Board (IWB). The classroom had Wi-Fi access to the school network, Internet and the school's LMS. There were 18 students in the classroom, two of whom brought iPads to the laboratory. The teacher had 20 years of experience and had spent an estimated 540 minutes using a computer at home in the previous week. The data gathered from the surveys and interview were analysed to determine the level of *Digital Divide* and *Meaningful Use of ICT*.

Assessing the Digital Divide

The results of the t-test analyses for each of the scales for the *Digital Divide* construct are given in Table 30.

Table 30
Summary of Results From T-Test Analysis for the ICT Competence Scales for Case Study 8

Category	Teacher Score	Class Mean	t-test (25)	Sig.	Effect Size	Scale
Attitude	4.1	3.7	-3.0	0.006	-0.6	Teacher
Application	3.3	2.8	-5.8	0.000	-1.1	Teacher
Skill	2.6	2.8	3.3	0.003	0.7	Students

The teacher's *Attitude* score was numerically higher than the *Class Mean* and significantly different ($t(25) = -3.0$, $p<0.01$, two-tailed test). The effect size was moderate and in favour of the teacher. The teacher's *Application* score was numerically higher than the *Class Mean* and significantly different ($t(25) = -5.8$, $p<0.001$, two-tailed test). The effect size was large and in favour of the teacher. The teacher's *Skill* score was numerically lower when compared to the *Class Mean* and significantly different ($t(25) = 3.3$, $p<0.01$, two-tailed test). The effect size was moderate and in favour of the students.

The effect size for the *Attitude*, *Application* scales were in favour of the teacher. The *Skill* scale however, was in favour of the student with a moderate effect size. The significance (2-tailed) for all scales fell within the acceptable margin of less than 5%. The results of the three scales in this Case Study are similar to the three scales of *Case Studies* 4 and 7. Therefore, when determining the D*igital Divide* for this *Case Study*

taking into account *Case Study* 4 and 7 the *Digital Divide* for this *Case Study* was marginally in favour of the students.

Assessing the Meaningful Use of ICT

The results of the analysis from the interview data of the teacher and both the surveys are tabulated in Appendix 17 and the evaluated results of the LEA attributes in Table 31. The results indicated that at least a *Limited* level of *Meaningful Use of ICT* was tending to occur within this *Case Study*.

Table 31
Summary of Results of Analysis of the Meaningful Use of ICT for Case Study 8

Category	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active Learning				
Engagement, Motivation and Challenge				

Interview and Survey supporting comments

The following statements were direct quotes from the teacher interview and the student survey. These were used as supporting evidence in deciding the outcome of the *Meaningful Use of ICT*.

Students.

- Casio Calculator – "We are shown how to use our calculator to the best of our abilities. I am able to apply it to all my math work and use the knowledge in exams and test."
- Microsoft Excel – "Allowing to see mathematics put into practice using a computer, and instead of being taught from a textbook. I was able to use the application to find out about maths ideas electronically and manipulate the ideas."
- Moodle (LMS) – "I enjoy using it because it's easy to access, neat set up/ layout. What I did with it was access previous exam papers for study."
- Excel – "I enjoyed using it because I am able to view how the graph has been changed and transformed. I used it once at home to complete my homework."
- Word – "Puts on projector and its [sic] more interactive and easier to see. Copied notes off it."
- Moodle (LMS) – "Gives me access to the answers of revision booklets and to obtain more worksheets to prepare me for tests and exams. It is also very easy to use. I checked my answers and printed out past exam papers for practice [sic]."

Teacher.

- "I rarely use ICT activities in my lessons. Might use on occasions throughout the year. Mainly used for demonstration, instruction."
- "I don't access student's prior ICT knowledge."
- "I don't connect what the students do with ICT to society."
- "I don't give students the opportunity to extend themselves with an application."
- "No, with this class they were told specifically that they were going to use Excel."
- "A few areas, my primary one would be in terms of instructions bring up sheets they are working on, working with them on the whiteboard whilst working with that and at the same time I will bring up the Casio Calc up onto the screen at the same time. Just in case we need to some calculations they know which buttons I am pressing because it is a relatively complex device much easier that they can see. That would be my main one from an instruction point of view, there will be times where I will bring up Excel spreadsheets to demonstrate things like gradient of a curve, various content that I have developed for normal distribution curves."
- "I don't challenge my students when using ICT."
- "Basically if they are plugging or if there are there talking to a friend saying how do I do this next bit, if I can see it later on in the task then I will take that as being engaged."
- "I see probably lots of potential for using ICT but the same time I haven't delved too much into the possibilities yet [sic] but I do see a huge potential for it."
- "No haven't got them onto a laptop this term."
- "Only in that if it appears in the syllabus it that particular course i.e. we are modelling spreadsheets. No [sic] we have not done additional on top of that."

The teacher mentioned that he/she rarely used ICT activities in the classroom and when he/she did, it was mainly for instruction and demonstration. Some *Active Learning* was evident with Excel, and to an extent the Casio classpad for the graphics calculator. A degree of motivation with the students was seen with the LMS and the classpad, but no interest or challenge was apparent. Overall, it was concluded that for the teacher and class, there was a *Digital Divide* in favour of the student and a *Limited* level of *Meaningful Use of ICT* tended to occur in this class. It should be noted that a *No Use* level does not mean that no use of ICT is occurring, but that use tends not to be meaningful use as defined for this study.

Comparison between Case Studies

This section discusses the similarities and differences between the results for the case studies. The overall results from the analysis of the case study data in terms of *Digital Divide* and the *Meaningful Use of ICT* are summarised in Table 32. Refer to the *Conceptual Framework for the Study* (Figure 3) and sections in the Method chapter (Tables 7 and 8) for guidance in explaining how the results presented in Table 32 were determined.

Table 32
Summary of Results From an Analysis of the Digital Divide and Meaningful Use of ICT for the Eight Case Studies

Class	Digital Divide				Meaningful Use of ICT			
	Attitude	Application	Skill	Digital Divide in favour of	Knowledge Building	Active Learning	Engagement, Motivation and Challenge	Meaningful Use of ICT in Class
1	Teacher	Teacher	Teacher	Teacher	Developing	No Use/ Developing	Developing/ Routine	Developing
2	Teacher	Student	Student	Students	No Use	No Use	No Use	No Use
3	Teacher	Teacher	Teacher	Teacher	Developing/ Routine	Developing	Developing/ Routine	Devloping
4	Teacher	Teacher	Student	Students	No Use	No Use/ Developing	Developing	Limited
5	Teacher	Teacher	Teacher	Teacher	Developing	Developing	Developing	Developing
6	N/D	N/D	N/D	N/D	No Use/ Developing	No Use/ Developing	No Use/ Developing	Limited
7	Teacher	Teacher	Student	Students	No Use/ Developing	No Use/ Developing	Developing	Limited
8	Teacher	Teacher	Student	Students	No Use	No Use/ Developing	No Use/ Developing	Limited

Note: N.D. indicates that a difference between the teacher and students was Not Determined.

The results indicate that when all three scales of the *Digital Divide* construct were in favour of the teacher, at least a *Developing* level of *Meaningful Use of ICT* tended to occur in the classroom. An example of this can be seen in *Case Studies 1, 3* and *5*, where the *Digital Divide* was in favour of the teacher, and a minimum of *Developing* was identified from the LEA Rubric for each of the attributes for the *Meaningful Use of ICT* construct. Otherwise, where the *Digital Divide* was in favour of the students there was either *No Use* or *Limited Meaningful Use of ICT* as identified in *Case Studies 2, 4, 6, 7* and *8*.

The scale in the *Digital Divide* that appeared mostly to affect the nature and extent of the *Meaningful Use of ICT* was the *ICT Skills*. As demonstrated in *Case Studies 2*, 4, 6, 7 and 8 where the *ICT Skills* scale was in favour of the students. When this tended to occur, there was at least *No Use* in two of the LEA attributes in the *Meaningful Use of*

ICT construct. The effect size (large, medium and small) of the *ICT Skills* scale tended to decide the level (*No Use*, *Limited* and *Developing*) of the scales in the *Meaningful Use of ICT* construct. An example of this was demonstrated with *Case Study 2* where there was a large effect size for the *ICT Skills* scale in favour of the students, resulting in *No Use* for all of the LEA attributes in the *Meaningful Use of ICT*. If the effect size was moderate for the I*CT Skills* scale, as seen in *Case Study 7* and *8* in favour of the student, then the scales for the *Meaningful Use of ICT* construct started to demonstrate *Meaningful Use of* ICT. If two of the scales in the *Digital Divide* were in favour of the student as demonstrated in *Case Study 2*, then there was a definite *No Use* for all the scales of the *Meaningful Use of ICT* construct.

For each of the case studies, the teacher appeared to have a higher mean score for the *Attitude* scale compared to the students' *Attitude* mean score for his/her class. In each of what could be termed the case studies, the scale had an effect size that was either moderate or large and all were in favour of the teacher. This indicates that teachers were more positive in attitude towards computer technology than the students. The scale was divided into seven statements (Appendix 3 Question 2), and the strongest rated statements by the teachers were, "I see a need for the use of computers" and "By using computers I think in different and interesting ways." This emphasises the fact that teachers are positive about using technology in the classroom with the students.

Table 33 illustrates a comparison of applications between the students and teachers from the ICT *Skills* scale tends to demonstrate that teachers are more skilled in the use of productive applications (i.e. Word-processing, LMS, Email and Computer File Management). However, applications used by students for creativity or socialising tended to have the higher skill levels. An example of this was Social Networking, which had the largest difference between students and teachers. A similar result was demonstrated for Word-processing, Email, Computer File Management, Learning Management System and Spreadsheets.

Table 33
Difference in Mean for ICT Application Scales Between Teacher and Students

Application	Mean Score for Application		Difference	In Favour
	Students	Teachers		
Slideshow	3.4	3.0	0.400	Student
Internet	3.4	3.4	0.025	Student
Social Networking	3.4	2.4	1.005	Student
Word-processing	3.3	3.4	0.075	Teacher
Digital Photography	3.2	3.1	0.075	Student
Video Sharing	3.0	2.5	0.500	Student
Image Editing	2.9	2.8	0.150	Student
Email	2.9	3.3	0.350	Teacher
Computer File Management	2.7	2.9	0.175	Teacher
Video Recording and Editing	2.5	2.3	0.250	Student
Learning Management System	2.3	3.1	0.825	Teacher
Podcasting	2.1	1.8	0.350	Student
Spreadsheets	2.0	2.4	0.375	Teacher
Content Hosting Service	1.7	2.6	0.925	Teacher
Web Authoring	1.6	1.9	0.275	Teacher
Database	1.4	1.3	0.150	Student

Summary of Chapter

This chapter presented an analysis of all the qualitative and quantitative data for all the teachers and students, and then for each of the eight independent case studies. For each case study the data were analysed to determine whether a digital divide was likely to exist between the teacher and students, and to evaluate the level of *Meaningful Use of ICT* evident in the classroom. The *ICT Skills* scale scores were similar for the teachers and students as groups, with a level of *Competent* and above for 62% of teachers and 65% of students. The teachers' *Attitude* scale score tended to be moderately higher than the students' *Attitude* scale mean scores towards the use of computer technology. The teachers' *Application* scale score tended to be slightly higher than the students' *Application* scale mean scores in the application of computer technology. From the case study analysis, it was identified that a *Digital Divide* was likely to be in favour of the teachers for three of the classes, and in favour of the students for four of the classes (one class was not rated). The *Meaningful Use of ICT* was judged to be at the *Developing* level for three of the classes, *Limited* for four of the classes and *No Use* for one of the classes. The analysed data from the case studies suggested that where the *Digital Divide* was in favour of the students this was associated with a *No Use* or *Limited* level of *Meaningful Use of ICT*. The following chapter addresses and discusses these results in terms of the overarching research question and the subsidiary research questions.

CHAPTER 5
DISCUSSION

In this chapter, the findings from the results of the data analysis are discussed in terms of the research question. The subsidiary questions were addressed separately.

Overarching Research Question

The overarching research question for the study was; Does the level of *Digital Divide* between a teacher and his/her students affect the *Meaningful Use of ICT* in the classroom?

The results indicate that when the *Digital Divide* construct was determined to be in favour of the teacher, it was likely that more *Meaningful Use of ICT* would tend to occur in the classroom, similar to a finding by Robertson (2011). The factor that appeared to be the most influential in deciding the *Digital Divide* was the level of competence in the *ICT Skills* scale. The *ICT Skills* scale was also a factor in similar research by Pickett (2009) who analysed the ICT skill level of teachers for his research. The *Attitude* and *Application* scale scores only seemed to have a marginal affect on the outcome of the *Meaningful Use of ICT* in the classroom. To discuss this finding in more depth the results are considered in terms of the four subsidiary research questions.

What level of competence do teachers have in using ICT?

The study identified that teachers appeared to have a variety of levels in *ICT Competence*. The *ICT Competence* of the teacher was measured by rating the *Attitude*, *Application* and ICT *Skills* scales from responses in the teacher survey. The scale that seemed to be the most important in determining the *ICT Competence* was the *ICT Skills* scale (scored from 1 to 4). The results indicated that out of the eight teachers, one was greater than 3.5 (*Highly Competent*), four were greater than 2.5 and less than 3.5 (C*ompeten*t) and three were greater than 1.5 and less than 2.5 (*Basic*). No teacher had a scale score less than 1.5 (*Limited*).

With regard to applications, teachers were competent (using the four- point Likert mean score to rank) in using the Internet and Word-processing (3.4), Email (3.4), Digital Photography and LMS (3.1) and Slideshow (3). The standard deviation for the sixteen

applications of the *ICT Skills* scale for the majority of the case studies was similar, very small and within one standard deviation. However, the standard deviation for the applications Podcasting and Content Hosting Services were noticeably larger than the others. Therefore, this indicated a greater skill variation for both of the applications, and the same was demonstrated for students.

What level of *ICT Competence* do students bring to the classroom?

The study found that students brought varied levels of *ICT Competence* to the classroom. The level of *ICT Competence* was justified by the application of three scales: *Application*, *Attitude* and *ICT Skill*s. Each of these scales contributed to establishing the nature and the extent of the *Digital Divide* in the classroom with the teacher.

The *Attitude* scale established if students were positive or negative towards the use of application for computers. Overall 63% of the students generally *Agreed* positively to the eight statements, 32% were *Undecided* and 5% of the students *Disagreed*. Of the eight statements, the two top ranked statements by the student mean score was, "I see a need to use computers", and "I enjoy learning with a computer." This suggests that students do see a need for computers at school. The least ranked statement was, "I learn more quickly with computers." Interestingly, could this statement be due to any of the ICT barriers discussed earlier or the ICT Competence of the teacher? Further study would be beneficial to answering that question.

The *Application* scale was sub-divided into eight common computer tasks, and students had to select how regular they performed each of those computer tasks. Overall 78% of the students *Regularly* performed the computer tasks and 22% *On Occasion*. Of the eight computer tasks, the two top ranked computer tasks by the student mean score were, "Access information (e.g. Internet search, CD's, blogs)" and "Store Information (e.g. hard-disk drive, thumb-drive, CD)." However, the least three ranked computers tasks were, "Develop a skill", "Make a product" and "Analyse Information." These computer tasks link to the LEA *Knowledge Building, Active Learning and Engagement, Motivation and Challenge,* which all contribute to *Meaningful Use of ICT* in the classroom.

The *ICT Skills* scale established the skill level of the student by rating themselves on how well they could use sixteen common applications in education. Overall, 65% (100)

of the students were *Competent* and 35% (54) were *Basic* in skill. Of the sixteen applications, the three-topped ranked applications by student mean score were Slideshow, Internet and Social Networking. The standard deviation for the sixteen applications of the *ICT Skills* scale for the majority of the case studies was similar, very small and within one standard deviation. However, the standard deviation for the applications Podcasting and Content Hosting Services were noticeably larger than the others. Therefore, indicating a greater skill variation for both of the applications, this was the same for teachers.

The main scale that appeared to contribute the most to the *ICT Competence* of the students was the *ICT Skills* as discussed in the section *Comparison between Teachers and Students*. The *Attitude*, *Application* and *ICT Skills* scales reinforced the findings that students had a good attitude and understanding of ICT. In general, two-thirds of the student cohort sample brought a capable level of *ICT Competence* to the classroom. Therefore, with the generally high and consistent level of *ICT Competence* for the students it was likely there would be a digital divide when compared with some of the teachers.

What level of *Digital Divide* exists between students and teachers?

To establish the existence of a *Digital Divide* in the classroom the *Attitude*, *Application* and *ICT Skills* scales mean scores of the teacher and students were compared. The study defined a *Digital Divide* to exist if a significant difference was observed between the scale scores of the teacher and the means of the students in his/her class. The scale that tended to have the greatest effect on the *Digital Divide* construct was the ICT *Skills* scale, as discussed by Pickett (2009). Therefore, when assessing the contribution of the three scales to determine the *Digital Divide* the ICT *Skills* scale was the final deciding factor and carried more weighting. The difference was determined by identifying the effect size as limited, small, moderate or large. The study sampled eight classes, three were determined to have a *Digital Divide* in favour of the teacher, and four were in favour of the students (one class was not rated). As a result, the study found that a *Digital Divide* existed in the majority of the classes sampled, and in favour of the students.

The *Attitude* scale mean score was in favour of the teacher for the majority (7) of the case studies. In each of those case studies, the effect size was large confirming that the teachers had a positive outlook in the use of ICT. The standard deviation for the *Attitude* scale scores for the students in *Case Study* 2, 3 and 8 was nearly double the others. The larger standard deviation for those particular case studies indicated that, unlike the other case studies, students varied more in their attitude towards the use of ICT. In six of the classes, the effect size for the *Application* scale was large and in favour of the teacher.

The *ICT Skills* scale considered sixteen applications when measuring skills. The scale was measured by allowing the teacher/student to rate themselves individually on a four-point Likert scale. For skills in seven of the sixteen applications, the mean for of the teachers was numerically higher than for the students. When the applications were considered individually and the mean scores for the teachers and students compared, it could be seen that with the productive applications (i.e. Word-processing, LMS, Email and Computer File Management) teachers mostly had stronger skills when compared to the students. However, applications used for creativity or socialising resulted in stronger skills by the students. Good examples of these were the skills associated with Social Networking applications, which had the largest difference between students and teachers.

In general, it was clear that the *ICT Skills* scale was the most important of the three in determining *ICT Competence* and differences between the teacher and students for this scale were most likely to affect the level of *Meaningful Use of ICT* evident for the class. The results for the *Attitude* and *Application* scales seemed to have a marginal affect on the outcome of the *Digital Divide*. The *ICT Skills* scale, however, was varied, with five case studies with an effect size in favour of the students, and three classes with a majority large effect size in favour of the teacher. It was found that when the teachers' *ICT Skills* level was low the *Digital Divide* tended to be in favour of the student. A similar finding was found by Mumtaz (2000) who highlighted that the teachers' own beliefs about the use of ICT for teaching and learning are vital for integration. If a teachers' belief is not to use technology, then the skill level will most probably be low. If this was the case in 2000 it is more likely to be the case now with students having more access to ICT. However, if the *ICT Skills* level was high for the teacher then the divide tended to be in favour of the teacher. This was due to the fact that the average

scores for students in each class were very similar, so differences were determined by the teacher's score. This was evident for all of the eight classes.

As discussed previously, the main scale that tended to contribute mostly to the *ICT Competence* of the students and teachers was the *ICT Skills.* Consequently, the results from the *ICT Skills* scale demonstrated that on average across the skill areas 65% of the students had a *Competent* skill level compared to 62% of the teachers.

What *Meaningful Uses of ICT* are evident in the classroom?

This study determined from the case studies that *Meaningful Use of ICT* could be identified within a classroom. The *Meaningful Use of ICT* was more likely to occur when the teacher had ICT *Skills* levels higher than the mean for the students in his/her class. Research by Wastiau et al. (2013) had a similar finding, where increasing the use of well-designed ICT based lessons was the best way to improve the students' confidence in the use of ICT. In the case of the present study, well-designed ICT lessons would depend on the teachers' ICT skill level. It is likely that before a teacher can use technology in the classroom they must themselves be confident and competent in the use of that technology. This confident and competent in the use of technology was illustrated in the results from the case studies analysis, in that where the digital divide was in favour of the students there tended to be little noticeable *Meaningful Use of ICT* with the class. The divided being in favour of the students was demonstrated in the classes where the teacher's ICT skill level was higher than the students.

The teachers and students referred to certain types of ICT tools that were used consistently in the classroom. The main applications acknowledged by teachers and students, were eBooks, LMS, online information and interactive tutorials, presenting information and using applications for calculations. Each of these examples of *Meaningful Use of ICT* are now discussed separately.

Access to eBooks

The use of the eBook had established itself with the students in *Case Studies 2, 3* and *8* at the school. Students from these case studies pointed out how the eBook had allowed them to access information quickly and supplemented content through additional activities not normally found in a textbook. A student from *Case Study 2* stated that,

> I enjoy using the online textbooks because I don't have to carry my books around to every class, and you can access things quicker. Sometimes there are extra activities within the online textbook, which is fun and educational. I can access the book really quickly and I can access different activities within the online book.

The variety of the activities (sound/ video clips, quizzes, and extra links) within the eBook aided in the explanation of the content and helped to keep students engaged.

Access to the LMS

In all the case studies students and teachers frequently mentioned the LMS as an educational tool. At its simplest level, the LMS was used as an information delivery system with notes, assignments and additional information for the class to upload on to the class page. This was made available to students anytime in and outside of school. A student from *Case Study* 1 mentioned how supportive the school's LMS was, " because there is all our information from our class on there and it has many helpful links that we can click on to help and further our knowledge." Furthermore, the LMS allowed interactivity with quizzes, tests, blogs, wikis and online lessons. A teacher also from *Case Study 1* acknowledged that "The online lesson allowed the students to interact with the content and decide which path to take (for example had multiple learning paths for students to choose). The students were able to self-pace and had a choice in the learning." The LMS also allowed the uploading of video content from a science experiment in *Case Study 2* and the creation of an online test in *Case Study 3* where all students from five different classes sat the online test together.

Access to online information and Interactive tutorials

A common theme through all the case studies was that students liked the variety of information available online without the need to access a library. Furthermore, the information was available quickly and at any time. Online interactive websites were popular as an alternative method to extend the learning of the student or to clarify content taught in the classroom, in particular the creation of students' own video clips through learning websites such as, Educreation, and online mathematic websites that engaged students through interactive activities and quick tutorials. A similar finding was found by Wanago (2013), who highlighted the fact of using Web 2.0 technology to

encourage student interaction through collaborative and sharing sites rather than only to access information online.

Presenting Information

Students on numerous occasions stated that the mode of presenting information by the teacher affected the level of engagement in the learning of the content (Wanago, 2013). For example, a student from *Case Study 7* stated that "I enjoyed using this because the teacher made the PowerPoint very interesting while we were learning about a particular topic." The use of peripherals (i.e. Interactive Casio class pad) improved the learning experience of the student, as a student in *Case Study 6* stated,

> I enjoyed using it because it is good to visualise calculations whilst the teacher explains. I find it useful learning things by following along slowly, going step by step. What I did was learnt new skills, improved old methods of using my calculator, and became more efficient.

Using applications for calculating.

In *Case Study 6* mathematics students stated that spreadsheets allowed them to put mathematics into practice instead of being taught from a textbook. Students were able to manipulate the calculations, view the data as a graph, and observe the changes.

Summary of Chapter

The results demonstrate that a clear *Digital Divide* existed between the students and teacher in two-thirds of the classes. The scale that had the largest affect on *ICT Competence* was *ICT Skills*. Students and teachers were found to bring varying levels of *ICT Competence* to the classroom. However, out of the eight classes, the teachers' score was significantly higher than the mean for the students in three of the classes, and lower for the other five classes. It was found that when the *Digital Divide* was in favour of the students, no measurable level of *Meaningful Use of ICT* was apparent. However, when the *Digital Divide* was in favour of the teacher at least a *Developing* level of *Meaningful Use of ICT* was determined (Wastiau et al., 2013). As a result, this suggests that the *Digital Divide* is likely to have an affect on the *Meaningful Use of ICT* in the classroom. Teachers that develop lessons with best practice pedagogy (making sure they have component ICT skills) are likely to have more successful and meaningful lessons. Linton (2012) and Males (2014) had similar findings, where they found that teachers should develop their pedagogy to plan authentic learning experiences for their students

and their devices. Examples of *Meaningful Use of ICT* were suggested in the case studies by the responses of teachers and students.

The teachers and students identified five main applications that were likely to be *Meaningful Uses of ICT*: eBooks, LMS, online information/interactive tutorials, presenting information and using applications for calculations. The most mentioned application was the school's LMS. Examples of LMS use were online tests, uploaded content from the teacher for the students (worksheets, worked examples, video of experiments) and tailored learning pathways for students. The following chapter, Chapter 6, draws conclusions from the findings and discusses the limitations, implications for policy and practice and implications for future research.

CHAPTER 6
CONCLUSION

This chapter presents the results of the research as Summary of Findings, Limitations of Study, Implications for Policy and Practice and Implications for Research. Each will be discussed, and addressed in terms of the main research question.

Summary of Findings

The overarching research question for the study was found to be supported, where the *Digital Divide* is likely to affect the *Meaningful Use of ICT* in the classroom. Overall as two separate groups, the teachers and students were found to have a similar average level of competence in the use of ICT. However, in each of the case studies, a *Digital Divide* was measurable overall. The analysis of the *Digital Divide* established that out of the eight case studies four were in favour of the students. Of the four, two were large, and two were moderate. The case studies in favour of the students highlights the research of Vie (2008) who stated that the new *Digital Divide* is where students are more technologically advanced than their teachers. This research supports Vie with the *Digital Divide* for the majority of the case studies in favour of the students. In addition, Kale and Goh (2014) mentioned that if teachers lack the necessary *ICT Skills* and *Attitude* this would contribute to the *Digital Divide*. The teacher *ICT Competenc*e for this study was assessed through measuring three scales: *Application*, *Attitude* and *ICT Skills*. *Case Studies 2* and *4* had the largest *Digital Divide* in favour of the student. In these two case studies, the *Attitude* was in favour of the teacher, but the *Skill* was in favour of the student. The *Attitude* may contribute, however, the biggest factor that tended to affect the *Digital Divide* was the level *ICT Skills* of the teacher.

When the *ICT Competence* of the students and teachers was measured, the research found that both groups had varying levels of *ICT Skills* in the classroom. The difference in competence was only apparent when the ICT in the classroom was to be used meaningfully. Furthermore, when the *ICT Skills* scale of the *Digital Divid*e was analysed between the teachers and students, neither were more competent than the other overall. However, this research suggests that when the *Digital Divide* was in favour of the students there was limited evidence of *Meaningful Use of ICT*. When the divide was in favour of the teacher there was a noticeable level (at least a *Developing* across all

three LEA attributes) of *Meaningful Use of ICT*. Therefore, the *ICT Competence* of the teacher is important in instructing and guiding the students through activities that involve ICT. Pickett (2009) explained how improving the teachers' *ICT Skills* would most probably reinforce the integration of technology into the classroom. As the results from this study have demonstrated, the teachers with higher *ICT Skills* tended to have improved *Meaningful Use of ICT* in the classroom, which is supported by Pickett (2009). The results of this study have demonstrated that when the opportunity was provided with the students in the classroom *Meaningful use of ICT* can be observed.

The *ICT Skills* scale of the *Digital Divide* construct assessed sixteen applications. The student *ICT Skills* scale of the sixteen applications when ranked in order of mean student score (Table 14, p. 38) found that Social Networking and Internet had the highest skill factor. The high skill factor in the use of Social Networking and Internet supports Morgan's (2012) research who established that students possessed a high level in the use of Web 2.0 technology. Furthermore, this study confirms Sipilä (2014) and Hastings (2009) research that teachers mostly use ICT for productivity (Table 11, p. 33). The top three applications, when ranked in order of the teacher mean score, were Internet, Word-processing and Email. These applications would be applied for productivity tasks that a teacher would use as part of, "...everyday tasks for self-use." (Hastings, 2009, p. 124).

When the *Digital Divide* was in favour of the teacher and *Meaningful Use of ICT* was observed, the rating of the LEA tended only to achieve a *Developing* level. This emphasises that when a teacher demonstrates a *Digital Divide* in favour of him or herself it does not guarantee a high level (Routine or Comprehensive) of *Meaningful Use of ICT* in the classroom. Suggesting that teachers would still benefit from further professional development in using technology meaningfully. Mumtaz (2000) suggested that the ICT experience of the teacher could be a barrier against using ICT effectively. The question was would this still be the case. This study measured the ICT competence of the teacher and compared it with the average for their students, and found that teachers who were likely to be more competent tended to facilitate more Meaningful Use of ICT with their students than those who were less competent. That is, teachers who had an ICT competence lower than the student mean score of the class tended not to facilitate Meaningful Use of ICT.

Students and teachers gave examples of where *Meaningful Uses of ICT* were integrated or used in the classroom. These were eBooks, LMS, online information/interactive tutorials, presenting information and using applications for calculations.

Limitations of Study

When evaluating the effect of the *Digital Divide* between teachers and students on the *Meaningful Use of ICT* in the classroom there were some limitations. The research was limited to a single gender private secondary school, which could have been expanded to include other coeducational schools, primary and secondary to increase and vary the sample range. In certain case studies, the student participation in the survey was low, either due to the teacher not following through with permission forms, or not presenting the purpose of the study suitably with the students. The low student participation could be improved upon by the researcher scripting the communication between the teacher and students, or the researcher explaining the purpose of the study to the students themselves. Ensure consistency in the delivery, and follow-up of the information to the students. In the study, some students were sampled twice due to the selection of the classes by the teachers. Improved tracking of students in classes would resolve the doubling up of data from the students. However, this was not considered a serious limitation of the study as the quantitative analysis from the student survey focused on class means, not individual students.

Implications for Policy and Practice

The study has highlighted the significance that must be placed on teachers' *ICT Skills* to have *Meaningful Use of ICT* within schools. The results should interest all stakeholders of a school community: leadership groups, teachers, students and parents. Each of stakeholders must have an invested interest in how technology was implemented in the classroom. Schools devote large amounts of capital investment into technology, but not necessarily into the professional development of teachers (Johnson et al., 2013).

Time and resources have to be invested by schools into the purposeful professional development of teachers' *ICT Skills*. The investment cannot be a quick fix, but a long-term systematic school approach that initially assesses the *ICT Skills* of the students and the teachers of the school. Allowing schools to tailor specific professional development to the requirements of the individual teacher. This study was limited by the number of

participating teachers; however, the study did demonstrate the varied range in *ICT Skills* of the teacher.

Implications for Future Research

The study has suggested a link between teacher ICT Competence and *Meaningful Use of ICT* in the classroom. The research was limited to one private secondary school; therefore, further research could be instigated into widening the sample range to include coeducational schools, primary as well as other secondary schools. The larger sample range would improve the cross sectioning of the sample range, providing additional insight into the extent of the *Digital Divide* and meaningfulness in the uses of ICT across all sectors of schools.

The instruments used to gauge the teachers, and students' ICT Competence could be adapted specifically to a schools' future ICT plan. Further research could then be focused on using the data from the *ICT Skills* of the teacher and student to create explicit individual learning pathways for the teachers of the school. Once the staff member had completed the individual pathway, they would then re-analyse the data to observe if any difference had occurred with the *Digital Divide* and the *Meaningful Use of ICT* in the classroom. Comparison of these results would then be pre-required and a post study to detect if the personalised learning of the teacher had improved the *Meaningful Use of ICT* usage in the classroom.

Concluding Remarks

In conclusion, this study has demonstrated that the ICT competence of the teacher, when compared with the competence of his/ her students, is likely to have an effect on the *Meaningful Use of ICT* in the classroom. Higher levels of the *Meaningful Use of ICT* were apparent when the *Digital Divide* was in favour of the teacher. However, even when the *Digital Divide* was in favour of the teacher, the rating of the *Meaningful Use of ICT* was only at the *Developing* level. Emphasises that even when the *Digital Divide* is in favour of the teacher, it does not guarantee a high level of *Meaningful Use of ICT* in the classroom. Further research would benefit schools in understanding how to support teachers to improve the use of ICT in the classroom. The findings of this study would suggest that a first step in improving the use of ICT in classrooms would be to ensure teachers have a level of ICT competence at least commensurate with the average

student in their classes. To achieve this, ongoing professional learning and support for all teachers would be required.

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APPENDICES

Appendix 1

Modified Learning Environment Attributes Rubric

	Curriculum Framework	Developing	Routine	Comprehensive
Knowledge Building	Connection and Challenge Learning experiences should connect with students' existing knowledge, skills and values while extending and challenging their current ways of thinking and acting.	Activities support learners in demonstrating their understanding involving the coverage of information, which they are to remember which may take account of their prior knowledge.	Activities regularly support learners to integrate new ideas with prior knowledge and demonstrate their own understanding. While the aim is to develop deep understanding this may be uneven with some superficial approaches to knowledge.	Learning activities support learners to integrate new ideas with prior knowledge and to construct models to demonstrate the fullness and complexity of their understanding.
Active Learning	Action and Reflection Learning experiences should be meaningful and encourage both action and reflection on the part of the learner.	Some opportunities are provided for students to actively manipulate objects and tools but often students passively attend to the teachers and instructional materials.	Activities routinely support learners to actively manipulate objects and tools, to pose and investigate problems and recognise when they need more information.	Activities engage learners in actively manipulating objects and tools and reflecting on what they have done. They are involved in mindful processing of information to pose and investigate problems where they are responsible for the result.
Engagement, motivation and challenge	Motivation and Purpose Learning experiences should be motivating and their purpose clear to the students.	Many activities are designed around an understanding of the interests and motivations of the learners with some involving a degree of challenge.	Activities tend to be designed around an understanding of the interest and motivations of the learners but involve significant challenge and are suited to their needs.	Activities engage learners in actively and wilfully working towards achieving cognitive goals, which, they are able to articulate.

Appendix 2

Principal Consent Form

Mercedes College is being invited to partake in a study for a Masters in Education Thesis that is evaluating the Effect of the Digital Divide between Teachers and Students on the Meaningful Use of ICT in the classroom. The research study will be performed by Andrew Grigg, who is a Masters of Education student at Edith Cowan University.

The purpose of the research is to determine whether differences in Information and Communication Technology (ICT) skills between teachers and students affects the way in which computer technology is used within the classroom to support learning. The results will be used to recommend more effective strategies for teacher professional learning about using computers and developing student computer capability.

If the College agrees to participate in the research study, four learning areas (English, Mathematics, Science, Society and Environment) would be utilised. Two teachers and their classes from each learning area will form the data set of the study. Allocation of teachers will depend on willingness, experience, use of ICT and availability. This will involve a:

- *Teacher and Student paper-base questionnaire survey:* Teachers' survey will be conducted prior to the students' survey and will assess the teachers' ICT skills taking approximately 15 minutes. The student survey will be delivered to the class by the researcher and completed by the students without the presence of the class teacher. This can be undertaken prior to a lesson and will take about 25 minutes.
- *Teacher Interview:* This will consist of a 40 minute recorded and annotated structure interview, which will be performed after the teacher and student questionnaire. The time and place of the interview will be subject to the teacher's preferences.

This research has been approved by Edith Cowan University (ECU) Human Research Ethics Committee. Ensuring confidentiality and anonymity is part of the researcher's responsibility. All data provided will be used only in the aggregate without identifying any person or organisation at any time or place. Names of participants are not required for the research. Other than my university supervisors Associate Professor Paul Newhouse and Dr. Jeremy Pagram, no one will have any access to any data collected during this research. Participation is completely

voluntary; there is no advantage or disadvantage in the College participating and teacher or student can withdraw at anytime.

If you require any further information concerning this research, please contact:

Mr. Andrew Grigg (Associate Professor Paul Newhouse)

Contact address: Centre for School and Learning Technologies, Edith Cowan University

Email: atgrigg@our.ecu.edu.au

Tel: +61 9323 1323

If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact the:

Research Ethics Officer Edith Cowan University

100 Joondalup Drive, Joondalup Western Australia, 6027

Phone: (08) 6304 2170

Email: research.ethics@ecu.edu.au

Informed Consent Document

Evaluating the Digital Divide between teacher and student to establish the meaningful use of Information and Communication Technology (ICT) in the classroom.

I,_____the Principal, have read the information above and clearly understand the contents provided. I am also informed that I have the right to withdraw the College from this study at any time.

I willingly agree for the College to participate in this study.

Principals Signature: ……..... Date .....

Researchers Signature: ……..... Date .....

Appendix 3

Teachers Consent Letter

Dear Teacher,

Mercedes College is being invited to partake in a study for a Masters in Education Thesis which is Evaluating the Effect of the Digital Divide between Teachers and Students on the Meaningful Use of ICT in the Classroom. The research study will be performed by Andrew Grigg, who is a Masters of Education student at Edith Cowan University.

The purpose of the research is to determine whether differences in Information and Communication Technology (ICT) skills between teachers and students affects the way in which computer technology is used within the classroom to support learning. The results will be used to recommend more effective strategies for teacher professional learning about using computers and developing student computer capability.

The College has agreed to participate in the research study, and four learning areas (English, Mathematics, Science, Society and Environment) will be approached. Two teachers and their classes from each learning area will form the data set of the study. You are being approached to participate with one of your classes. This will involve the following:

- *Teacher and Student paper-base questionnaire survey:* Teachers' survey will be conducted before the students' survey and will assess the teachers' ICT skills taking about 15 minutes. The student survey will be delivered to the class by the researcher and completed by the students without the presence of the class teacher. This can occur before a lesson and will take about 25 minutes. A consent from will be distributed to the students before the questionnaire is distributed.

- *Teacher Interview:* This will consist of a forty minute recorded and annotated structure interview which will be performed after the teacher and student questionnaire. The time and place of the interview will be subject to the teacher's preferences.

Participation is completely voluntary; there is no advantage or disadvantage in participating and you can withdraw at any time.

This research has been approved by Edith Cowan University (ECU) Human Research Ethics Committee. Ensuring confidentiality and anonymity is part of the researcher's responsibility. All data provided will be used only in the aggregate without identifying any person or organisation at any time and any place. Names of participants are not required for the research. Other than my university supervisors Associate Professor Paul Newhouse and Dr. Jeremy Pagram, no one will have any access to any data collected during this research. Any participate of the study may withdraw at any time.

If you require any further information concerning this research, please contact:

Mail - Mr. Andrew Grigg (Associate Professor Paul Newhouse)
Centre for School and Learning Technologies
Edith Cowan University
2 Bradford Street
Mount Lawley WA 6050
Email - atgrigg@our.ecu.edu.au
Telephone - (08) 9323 1323

If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact the:

Research Ethics Officer
Edith Cowan University
100 Joondalup Drive, Joondalup Western
Australia, 6027
Phone: (08) 6304 2170
Email: research.ethics@ecu.edu.au

Informed Consent Document

Evaluating the Digital Divide between teacher and student to establish the meaningful use of Information and Communication Technology (ICT) in the classroom.

I,_____the teacher, have read the information and clearly understand the contents provided. I am also informed that I have the right to withdraw my class from this study at any time.

I willingly agree to be a participant in this study.

Teacher Signature: ..... Date .....

Researcher Signature:

Appendix 4

Parents (Student) Consent Letter

Dear Parent/ Guardian,

Mercedes College is being invited to partake in a study for a Masters in Education Thesis which is Evaluating the Effect of the Digital Divide between Teachers and Students on the Meaningful Use of ICT in the Classroom. The research study will be performed by Andrew Grigg, who is a Masters of Education student at Edith Cowan University. He is also employed by Mercedes College as the Learning Technologies Manager.

The purpose of the research is to determine whether differences in Information and Communication Technology (ICT) skills between teachers and students affects the way in which computer technology is used within the classroom to support learning. The results will be used to recommend more effective strategies for teacher professional learning about using computers and developing student computer capability.

The College and your daughter's teacher have agreed to participate in the research study. I am asking for your permission to allow your daughter to participate. If you agree your daughter will be requested to complete a paper-based questionnaire in class. The survey will be delivered to the class by the researcher and completed by the students without the presence of the class teacher. This will happen prior to the commencement of a lesson and will take about 25 minutes. The data collected is anonymous and NO NAMES of the students are collected. Participation is completely voluntary; there is no advantage or disadvantage in participating and you can withdraw your daughter at any time. Please keep in mind that if you do withdraw your daughter we will be unable to remove the completed survey due to it being anonymous.

This research has been approved by Edith Cowan University (ECU) Human Research Ethics Committee. Ensuring confidentiality and anonymity is part of the researcher's responsibility. All data provided will be used only in the aggregate without identifying any person or organisation at any time and any place. Names of participants are not required for the research. Other than my university supervisors Associate Professor Paul Newhouse and Dr. Jeremy Pagram, no one will have any access to any data collected during this research. Any participate of the study may withdraw at any time.

If you require any further information concerning this research, please contact:

Mail - Mr. Andrew Grigg (Associate Professor Paul Newhouse)
Centre for School and Learning Technologies
Edith Cowan University
2 Bradford Street
Mount Lawley WA 6050
Email - atgrigg@our.ecu.edu.au
Telephone - (08) 9323 1323

If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact the:

Research Ethics
Officer Edith Cowan
University
100 Joondalup Drive, Joondalup
Western Australia, 6027
Phone: (08) 6304 2170
Email: research.ethics@ecu.edu.au

Informed Consent Document

Evaluating the Digital Divide between teacher and student to establish the Meaningful Use of Information and Communication Technology (ICT) in the classroom.

I,_____the parent have agreed for my daughter _____to participate in the study. I have read the above information and clearly understand the contents provided. I am also informed that I have the right to withdraw my daughter from this study at any time.

I willingly agree for my daughter to be a participant in this study.

Parent Signature: ..... Date.....

Student Signature:..... Date.....

Researcher Signature:..... Date.....

Appendix 5

Teacher Survey

This is an anonymous questionnaire. By completing the questionnaire you are consenting to take part in this research. You should have read the letter that explains the intentions of this research.

Years of Teaching Experience: _____

Describe your current role(s) at the College:

_____

_____

_____

1. Estimate the amount of time in MINUTES you spent using computer devices (i.e. desktop, laptop, tablet) to do <u>WORK</u> at HOME last week.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
mins	mins	mins	mins	mins	mins	mins

2. For each of the statements TICK THE BOX that best fits your opinion on the importance of the issue.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I see a need to use computers					
Using computers takes away time.					
It is difficult to use technology					
Computers help me to learn					
I learn more quickly with computers					
I complete more work with a computer					
I enjoy learning with a computer					
By using computers I think in different and interesting ways					

3. Indicate how often this YEAR you have used computers for each of the following tasks by SELECTING ONE (1) BOX with a TICK.

Computers are used by me to ...	**Daily**	**Each Week**	**On Occasion**	**Never**
type work (e.g. word-processing, publisher)				
access information (e.g. internet search, CD's, blogs)				
analyse information (e.g. statistics, graphs)				
present information (e.g. PowerPoint, posters)				
store information (e.g. hard-disk drive, thumb-drive, CD)				
make a product (e.g. brochure, video, website)				
develop a skill (e.g. typing, tables)				
access the schools LMS (e.g. Moodle)				

4. Rate yourself on your skill level in using the following computer applications.
For each row CIRCLE THE CELL that best describes your skills.

Word processor (i.e. Word, Pages)	can't do much	can print a document, change fonts, spell check, insert footer and page numbers	can insert images, create tables, change Page Setup, change margins	can use columns and sections, set up styles, use mail merge
Spreadsheets (i.e. Excel, Numbers)	can't do much	can enter data and calculations, format cells, use Sort, insert and delete rows and columns, create and modify charts (graphs).	can use complex formulae, use absolute and relative cell references, use multiple worksheets.	can use filtering, can use conditional formatting, can import data.
Database (i.e.Access)	can't do much	can create simple tables, use simple queries to retrieve data, use wizards to create reports and forms	can use relational database, use wizards to create forms, sub-forms or portals, use more complex form design tools.	can create and use parameter queries, create summary reports, use complex functions in queries.
Slideshow software (i.e. Powerpoint, Keynote)	can't do much	can create a slide show, insert images, change font and layout.	can navigate during a presentation, add animation, transitions, and hyperlinks.	can create a master slide, include sound, print handouts, add navigation buttons.
Email	can't do much	can create, send and access emails, can add to and access Address book entries.	can store messages in folders, locate Sent and Deleted messages, add a Signature, can add attachments.	can create a mailing list, set up a discussion list.
Computer File Management	can't do much	can save files in a folder, create and name folders, can navigate between folders, copy, delete and rename files.	can recognise file types, navigate between drives, directories, and into a network, use Help files, install software.	can zip and unzip files, do complex searches for files, create short-cuts, use control panels to connect to networks.
The Internet	can't do much	can navigate to known websites, can create Favourites, do basic searches.	can use advanced searches, organise Favourites, alter browser preferences, save images and text.	can conduct complex searches, download and install software and plugins, use different browsers.
Web page authoring	can't do much	can create pages and links, insert and format text, insert images, use tables, create external links.	can create s site using naming conventions and folder structure, insert sound, upload files to web, use alt-text.	can build a complex site, insert components such as JavaScript.
Digital photography	can't do much	can take and delete pictures in-camera and transfer images to a computer.	can review images on camera, adjust camera, settings such as flash and close-up	can adjust camera menu options such as resolution and shutter speed.

Image editing	can't do much	can edit images including crop, scale, rotate and delete.	on computer can change file size, resolution and format (e.g. jpeg, png) as appropriate to purpose	can undertake complex image manipulation using special effects.
Video recording and editing	can't do much	can adjust camera settings (zoom and replay), transfer file to computer, assemble with minimal editing.	can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.	can use advance software to apply complex editing and special effects.
LMS (Moodle, Blackborad, Edmodo, etc)	can't do much	can login, change simple settings (i.e. password), view classes and read linked files.	can set up a course, add text, add images, add resources, add a choice and forum	can set up activities, add a choice, quiz, wiki, assignment
Social Networking (Blogs, Forums, Wikis, etc)	can't do much	can use and view a social networking site	can post a comment	can establish and maintain my own Blog
Video Sharing	can't do much	can search and view a video	can upload and delete a video	can share, edit a video
Podcasting	can't do much	can search and view a podcast	can upload and delete podcast	can share, edit a podcast
Content Hosting Services (Dropbox,etc)	can't do much	can access the service	can upload content to the service	can share and delete

5. Tick a box that best represents your response. Only one selection per statement.	Never	1 or 2 years	3 or 4 years	5 or more years
For how many years have you been REGULARLY using computers at school with students (averaging at least once a week)?				
For how many years have you been REGULARLY using computers for work-related tasks?				

6. Tick a box that best represents your response. Only one selection per statement.	Daily	Weekly	On Occasion	Never
How often did you facilitate the use of computers by your students last TERM/				
How often would you like to see students using computers in your classes?				

7. When students use computers in your class how often are the following outcomes evident.	Daily	Weekly	On Occasion	Never
Better understanding of curriculum content				
Students think in different and interesting ways				
Students learn more quickly				
students help each other				
The teacher's time is better used.				
Students complete more work.				
Students enjoy learning				

8. When responding to the following questions CIRCLE ONE (1) or MORE of the responses.

a) When computer applications (e.g. Internet, Blogs, Moodle, Applications (i.e. Word, Publisher, etc) are generally used in class do the :

none apply	students just use the skills you have taught	students use skills you have taught plus some of their own skills	students do not require to be taught and learn for themselves.

b) When learning in the classroom with computers do the students:

none apply	follow an instruction guide given by you	use the instruction guide supplied by you but find extra information when needed	require no guide and able to use the computer to produce (make) or find what is required

c) In the class when using ICT for activities do the students:

none apply	complete the activity as soon as possible without enjoying	find the activity interesting and have to work some problems out for yourself.	enjoy the activity but find it challenging to complete.

Appendix 6

Student Survey

This is an anonymous questionnaire. By completing the questionnaire you are consenting to take part in this research. You should have read the letter that explains the intentions of this research.

Year Level (Circle): 7 8 9 10 11 12

Lesson Subject (i.e. Maths): _____

1. Estimate the amount of time in **MINUTES** you spent using computer devices (i.e. desktop, laptop, tablet (iPad or Andriod)) to do **HOMEWORK ONLY** at **HOME l**ast week.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
mins	mins	mins	mins	mins	mins	mins

2. For each of the statements **TICK THE BOX** that best fits your opinion on the importance of the issue.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I see a need to use computers					
Using computers takes away time.					
It is difficult to use technology					
Computers help me to learn					
I learn more quickly with computers					
I complete more work with a computer					
I enjoy learning with a computer					
By using computers I think in different and interesting ways					

3. Indicate how often this **YEAR** you have used computers for each of the following tasks by **SELECTING ONE (1) BOX** with a **TICK.**

Computers are used by me to ...	**Daily**	**Each Week**	**On Occasion**	**Never**
type work (e.g. word-processing, publisher)				
access information (e.g. internet search, CD's, blogs)				
analyse information (e.g. statistics, graphs)				
present information (e.g. PowerPoint, posters)				
store information (e.g. hard-disk drive, thumb-drive, CD)				
make a product (e.g. brochure, video, website)				
develop a skill (e.g. typing, tables)				
access the schools LMS (e.g. Moodle)				

4. Rate yourself on your skill level in using the following computer applications.
For each row **CIRCLE THE CELL** that best describes your skills**.**

Word processor (i.e. Word, Pages)	can't do much	can print a document, change fonts, spell check, insert footer and page numbers	can insert images, create tables, change Page Setup, change margins	can use columns and sections, set up styles, use mail merge
Spreadsheets (i.e. Excel, Numbers)	can't do much	can enter data and calculations, format cells, use Sort, insert and delete rows and columns, create and modify charts (graphs).	can use complex formulae, use absolute and relative cell references, use multiple worksheets.	can use filtering, can use conditional formatting, can import data.
Database (i.e.Access)	can't do much	can create simple tables, use simple queries to retrieve data, use wizards to create reports and forms	can use relational database, use wizards to create forms, sub-forms or portals, use more complex form design tools.	can create and use parameter queries, create summary reports, use complex functions in queries.
Slideshow software (i.e. Powerpoint, Keynote)	can't do much	can create a slide show, insert images, change font and layout.	can navigate during a presentation, add animation, transitions, and hyperlinks.	can create a master slide, include sound, print handouts, add navigation buttons.
Email	can't do much	can create, send and access emails, can add to and access Address book entries.	can store messages in folders, locate Sent and Deleted messages, add a Signature, can add attachments.	can create a mailing list, set up a discussion list.
Computer File Management	can't do much	can save files in a folder, create and name folders, can navigate between folders, copy, delete and rename files.	can recognise file types, navigate between drives, directories, and into a network, use Help files, install software.	can zip and unzip files, do complex searches for files, create short-cuts, use control panels to connect to networks.
The Internet	can't do much	can navigate to known websites, can create Favourites, do basic searches.	can use advanced searches, organise Favourites, alter browser preferences, save images and text.	can conduct complex searches, download and install software and plugins, use different browsers.
Web page authoring	can't do much	can create pages and links, insert and format text, insert images, use tables, create external links.	can create s site using naming conventions and folder structure, insert sound, upload files to web, use alt-text.	can build a complex site, insert components such as JavaScript.
Digital photography	can't do much	can take and delete pictures in-camera and transfer images to a computer.	can review images on camera, adjust camera, settings such as flash and close-up	can adjust camera menu options such as resolution and shutter speed.

Image editing	can't do much	can edit images including crop, scale, rotate and delete.	on computer can change file size, resolution and format (e.g. jpeg, png) as appropriate to purpose	can undertake complex image manipulation using special effects.
Video recording and editing	can't do much	can adjust camera settings (zoom and replay), transfer file to computer, assemble with minimal editing.	can use basic software to introduce transitions, import and edit sound track, add titles and subtitles.	can use advance software to apply complex editing and special effects.
LMS (Moodle, Edmodo, etc)	can't do much	can login, change simple settings (i.e. password), view classes and read linked files.	can set up a course, add text, add images, add resources, add a choice and forum	can set up activities, add a choice, quiz, wiki, assignment
Social Networking (Blogs, Forums, Wikis, etc)	can't do much	can use and view a social networking site	can post a comment	can establish and maintain my own Blog
Video Sharing	can't do much	can search and view a video	can upload and delete a video	can share, edit a video
Podcasting	can't do much	can search and view a podcast	can upload and delete podcast	can share, edit a podcast
Content Hosting Services (Dropbox,etc)	can't do much	can access the service	can upload content to the service	can share and delete

FOR QUESTION 5 only circle one (1) response.

5. When you use computer applications (e.g. Internet, Blogs, Moodle, Word, Publisher, etc) in the lesson do you:

struggle	use own knowledge and skills	get shown how to use them by the teacher	ask a friend for help to use them

FOR the following question provide a **BRIEF** written response (note form is fine)

6. Answer the following questions by giving one (1) example where you have enjoyed using computers (e.g. Internet, Blogs, Moodle, Word, Publisher, etc) as part of a lesson.

a) Name of example (e.g. Internet, Blogs, PowerPoint, etc): _____

b) Why I enjoyed using it: _____

_____

_____

_____

_____

c) What I did with it: _____

_____

_____

_____

_____

d) How long did this take? _____

_____

_____

Appendix 7

Teacher Interview Questions

Class _____

No.	Question (s)	Cat.	Level	Response
1	**How would you describe your students?**	Student Attitude		
	level of engagement			
	involvement			
	attendance			
	behaviour			
	How would you rate the ICT knowledge and skills of your students generally?			
	Upon what do you base this judgement?			
2	**What is the main purpose in using ICT in your classroom?**	Knowledge Building		

	How often do your students use ICT in activities?			
	Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?			
	Do students normally have the ICT skills to do the activities without you teaching them?			
	How do you extend the students ICT skills in an activity?			
	In what ways do you connect what the students do with ICT to society?			
	To extend students how do you challenge then when using ICT? **1 to 3 How challenged do you think your students are in using ICT?**			
3	**Number of computers available in your normal teaching room?** **Number of students in the class?**	Engagement, Motivation and Challenge		
	How do you engage (motivate) the students in the use of ICT in the lesson? **Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?** **How do you know they are engaged?** **Do you set goals for what they need to achieve?**			

	Do you discuss the goals prior/ post to the ICT activity? **1 to 5 how engaged are students in using ICT?**			
	What potential do you see for ICT to support learning in your classes?			
	Have you incorporated ICT into your courses? **No -Are you making any changes or steps to incorporate ICT into your subjects?**			
	What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows) **What did the students do and what did you do? (e.g. find information, class discussion using projector)** **How did you decide on what ICT applications to use with the students?**			
4	**When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)**	Active Learning		
	When you instruct do the students ask further questions?			
	Do ICT activities allow the students to use (search)/ and or produce (make)?			
	Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)			

	How do you deal with a question from a student that you don't know how to do on the computer?			
	Do you allow students to decide which applications are best for the task at hand?			
	Do students document how they find information on the computer?			
	Do students reflect on how ICT was used in an activity and how they could have done better?			
5	**Can you give an example where you have used ICT in an activity with success? (i.e. students very motivated)?**			
	What application?			
	What did it achieve?			
	How was it successful?			

Appendix 8

LEA Rubric

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have a better understanding of curriculum content?	• Weekly - Better Understanding of the curriculum content • Daily - Students learn more quickly				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e Word, Publisher, etc) are generally used in class the:	• students use skills the teacher has taught plus some of their own skills				
	Teacher Survey Q8b When learning in the classroom with computers do the students:	• use the instruction guide supplied by you but find extra information when needed				
	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?					
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?					
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?					
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?					

	Source	Evidence	NU	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the					

	application? (i.e. booklet, demonstrate, leave to learn for self)					
	Teacher Interview Q4b When you instruct do the students ask further questions?					
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?					
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)					
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?					
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?					
	Teacher Interview Q4g Do students document how they find information on the computer?					
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?					

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the following outcomes evident: • How often do they think in different and interesting ways • How often do they help each other? • How often do they complete more work? How often do they enjoy learning?	The teacher had a choice of Daily, Weekly, On Occasion and Never. For the two outcomes the teacher selected that these activities are evident on a weekly basis.				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)					
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.					
	Teacher Survey Q8c In the class when using ICT for activities do the students:	The teacher had the option of 4 choices and could select more than 1: • complete the activity as soon as possible without enjoying • find the activity interesting and have to work some problems out for yourself • enjoy the activity but find it challenging to complete • none apply The 2nd				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?					
	Teacher Interview Q2b How often do your students use ICT in activities?					
	Teacher Interview Q2g					

	To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?					
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?					
	Teacher Interview Q3bii How do you know they are engaged?					
	Teacher Interview Q3biii Do you set goals for what they need to achieve?					
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?					
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?					
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?					
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?					
	Teacher Interview Q3e					

	What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)					
	Teacher Interview Q3eii How did you decide on what ICT applications to use with the students?					
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?					

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 9

LEA Rubric Case Study 1

Background of Class 1	• Learning Area of Class 1 is Science • Class is held in a typical Science laboratory • The teacher has 19 years of teaching experience • Last week the teacher estimated 660 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 5 years or more. • The teacher has been using computers on a regular basis for work related tasks for 5 years or more. • The students in the classroom have a reasonably high level of engagement, are willing and have very good behaviour. • The technology accessible in the classroom was 1 laptop POD (16 laptops) and another laptop POD could be book for the class. • The teacher has access to a laptop/ iPad that is networked to a digital projector. • The laboratory has Wi-Fi access to the school network, Internet and the schools Learning Management System. • There are 33 students in the classroom, 10 of whom bring iPads to the classroom.

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have a better understanding of curriculum content?	• Weekly - Better Understanding of the curriculum content • Daily - Students learn more quickly			■	
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class .	• students use skills you have taught plus some of their own skills •		■		
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed		■		
	Teacher Interview Q2b How often do your students use ICT in activities?	• 2/3 times a week over 5 teaching periods • No pattern in when I use ICT. More on a ad-hoc basis when needed		■		
	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• Only if they are having trouble early on	■			
	Teacher Interview Q2d	• Some of the students do in the class but no all		■		

	Do students normally have the ICT skills to do the activities without you teaching them?					
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• Students extend themselves. Sometimes I put harder questions				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• Using realistic examples on the Internet i.e. interactive BBC				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Created an online lesson for the students to follow using the schools LMS • Skills were taught on how to use the LMS and navigate through the webpage				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• PowerPoint because it's fun to add animations a special effects this also helps me with my studies				
		• Create a postcard, I enjoyed it because we got to make and edit our own photos, we also got to create the postcard however I wanted to				
		• PowerPoint because I learnt new things and my friends helped me learn how to do new things				
		• Publisher because its fun to create your own things and print them off. I also liked looking at the pictures				

	Source	Evidence	NU	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• A mixture of all • I mainly facilitate and guide. I wonder around the class to see how the students are going. Never stay at the front of the class. • Applications we have used are Word, PowerPoint, Google Drive, Edmodo and Moodle				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• Yes, but sometimes the students help each other				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Find information using the Internet. Assignment work like postcard research				
	Teacher Interview Q4d	• Only really when students are doing assignments				

	Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)					
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Ask the class or find out for later				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Not in class but maybe with assignments				
	Teacher Interview Q4g Do students document how they find information on the computer?	• Little				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• No				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Created an online lesson for the students to follow using the schools LMS. The online lesson allowed the students to interact with the content and decide which path to take (i.e. had multiple learning paths for students to choose). The students were able to self-pace and had a choice in the learning.				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the mentioned outcomes evident?	• Weekly – they think in different and interesting ways • Daily – they often help each other • Weekly – they complete more work • Daily – they enjoy learning				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• Have been using computers at school regularly (i.e. once a week) for 5 years or more				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• Facilitated the use of computers weekly over the term				
	Teacher Survey Q8c	• find the activity interesting and have to work some problems out for				

	In the class when using ICT for activities do the students:	yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• Using ICT it appeals to different learners/ visual • variety in use i.e. IWB and websites • different way of learning for students • can circumvent literacy and spelling for some students				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• 2				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• No				
	Teacher Interview Q3bii How do you know they are engaged?	• Observation and quality of the work they produce • Their engagement is reasonably high/ enthusiastic				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• Yes, but this is on a needs basis.				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Only sometimes with the students				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• From 1 to 5 how engaged are the students - 4				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Using online resources/ show content in different ways for the students • Reinforcement for students, especially learning in a different way • I see a lot of potential which is very frustrating when we cannot do much.				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• Just happens, no incorporation into the curriculum of the subject •				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei	• Some planning of work on Moodle for students i.e. interactive webpage and homework				

	What did the students do and what did you do? (e.g. find information, class discussion using projector)	• Find information using the Internet and class discussion • Assignment work e.g. creating postcards involving aspects of science • Interactive Websites for the students to use to help explain concepts. Also a different way for students to learn.				
	Teacher Interview Q3eii How did you decide on what ICT applications to use with the students?	• When teaching a topic in Science and I see a suitable ICT application that can be used with students, then I incorporate the application i.e. online.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Created an online lesson using Moodle (accessed externally) • Did take a long while to set up. • Application used is Moodle which is an LMS • Girls could self-pace and they had a choice in the learning (i.e. 2 choices) • Students enjoyed being able to choose which path to take. Friends doing same online course but took a different path.				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Using blogs because it helps me socialise more with people I wouldn't always talk to.				
		• Moodle because we can access it easily and can look at all the extra content that we don't open in class with the teacher but can go through it ourselves, it gives me a sense of independence.				
		• Internet because I enjoy the internet and can find a lot of information and different ways you can study information.				
		• Creating blogs because I loved creating my own blog as I did it with a friend and I could insert all kinds of different images and write great comments and information				
		• Moodle because I enjoyed using it if I did not hear what the teacher had said I could look back on the information in class.				
		• Internet because I enjoy using it has nearly all the information I need and has a lot of things that I can explore.				
		• PowerPoint because it's like a little movie				
		• Internet because teachers sometimes show us videos and give us extra information				
		• Moodle because there are stuff that teachers put up for different subjects that I need to know, find out and it's a good resource to go to when I need to study.				
		• Publisher because I enjoy that you can do so much work on it and it is mainly for assessment and you can do so many tricks.				

		• Moodle because there is all our information from our class on their and it has many helpful links that we can click on to help and further our knowledge			■	
		• Word because I enjoy using it and it helps me effectively finish my school work so that then I don't have to do it at home.		■		
		• PowerPoint because it is really easy to insert pictures make text boxes change spelling or font. It is fun for all the different animations.	■			
		• Skype because I can talk to friends.	■			
		• Blogs because I get to see interesting stuff.		■		
		• PowerPoint because it is much easier to look up things on the Internet instead of a book and you can show the PowerPoint clear.	■			
		• Word because it is easy and convenient. Also you can add pictures and make a project look appealing.		■		

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 10

Descriptive Statistics for the Normality Assumption

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Q2_Student_Mean	154	99.4%	1	0.6%	155	100.0%
Q3_Student_Mean	154	99.4%	1	0.6%	155	100.0%
Q4_Student_Mean	154	99.4%	1	0.6%	155	100.0%

Descriptives

			Statistic	Std. Error
Q2_Student_Mean	Mean		3.53815	.045447
	95% Confidence Interval for Mean	Lower Bound	3.44836	
		Upper Bound	3.62793	
	5% Trimmed Mean		3.55474	
	Median		3.62500	
	Variance		.318	
	Std. Deviation		.563987	
	Minimum		1.875	
	Maximum		4.875	
	Range		3.000	
	Interquartile Range		.625	
	Skewness		-.513	.195
	Kurtosis		.572	.389
Q3_Student_Mean	Mean		2.72727	.032603
	95% Confidence Interval for Mean	Lower Bound	2.66286	
		Upper Bound	2.79168	
	5% Trimmed Mean		2.72835	
	Median		2.75000	
	Variance		.164	
	Std. Deviation		.404593	
	Minimum		1.500	
	Maximum		4.125	
	Range		2.625	
	Interquartile Range		.500	
	Skewness		.059	.195
	Kurtosis		1.146	.389
Q4_Student_Mean	Mean		2.608766	.0356071
		Lower Bound	2.538421	

	95% Confidence Interval for Mean	Upper Bound	2.679111	
	5% Trimmed Mean		2.610119	
	Median		2.625000	
	Variance		.195	
	Std. Deviation		.4418727	
	Minimum		1.5000	
	Maximum		3.9375	
	Range		2.4375	
	Interquartile Range		.6250	
	Skewness		-.084	.195
	Kurtosis		.034	.389

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.103	154	.000	.972	154	.004
Q3_Student_Mean	.094	154	.002	.978	154	.016
Q4_Student_Mean	.067	154	.086	.993	154	.671

a. Lilliefors Significance Correction

Test Results on Teacher Means

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Q2_Student_Mean_T	8	5.2%	147	94.8%	155	100.0%
Q3_Student_Mean_T	8	5.2%	147	94.8%	155	100.0%
Q4_Student_Mean_T	8	5.2%	147	94.8%	155	100.0%

Descriptives

			Statistic	Std. Error
Q2_Student_Mean_T	Mean		4.07813	.108092
	95% Confidence Interval for Mean	Lower Bound	3.82253	
		Upper Bound	4.33372	
	5% Trimmed Mean		4.07986	
	Median		4.12500	
	Variance		.093	
	Std. Deviation		.305730	
	Minimum		3.500	
	Maximum		4.625	
	Range		1.125	
	Interquartile Range		.125	
	Skewness		-.201	.752
	Kurtosis		2.997	1.481
Q3_Student_Mean_T	Mean		3.10938	.188150
	95% Confidence Interval for Mean	Lower Bound	2.66447	
		Upper Bound	3.55428	
	5% Trimmed Mean		3.12847	
	Median		3.18750	
	Variance		.283	
	Std. Deviation		.532168	
	Minimum		2.125	
	Maximum		3.750	
	Range		1.625	
	Interquartile Range		.844	
	Skewness		-.818	.752
	Kurtosis		.395	1.481
Q4_Student_Mean_T	Mean		2.617188	.2550925
	95% Confidence Interval for Mean	Lower Bound	2.013990	
		Upper Bound	3.220385	
	5% Trimmed Mean		2.605903	
	Median		2.531250	
	Variance		.521	
	Std. Deviation		.7215106	
	Minimum		1.6875	
	Maximum		3.7500	
	Range		2.0625	
	Interquartile Range		1.3594	
	Skewness		.339	.752
	Kurtosis		-.751	1.481

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean_T	.314	8	.020	.842	8	.078
Q3_Student_Mean_T	.169	8	.200*	.950	8	.710
Q4_Student_Mean_T	.155	8	.200*	.953	8	.746

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Factor List Added

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Q02e	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	1.0	.297	8	.037	.864	8	.131
	2.0	.128	34	.176	.975	34	.610
	3.0	.144	56	.005	.932	56	.004
	4.0	.143	40	.040	.962	40	.196
	5.0	.147	16	.200*	.940	16	.346

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class by Class - Student Question2

Class 1

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.198	23	.020	.935	23	.140
Q3_Student_Mean	.195	23	.024	.919	23	.063
Q4_Student_Mean	.160	23	.131	.937	23	.156

a. Lilliefors Significance Correction

Class 2

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.120	18	.200*	.969	18	.781
Q3_Student_Mean	.113	18	.200*	.945	18	.357
Q4_Student_Mean	.107	18	.200*	.987	18	.994

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 3

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.095	14	.200*	.977	14	.957
Q3_Student_Mean	.167	14	.200*	.912	14	.168
Q4_Student_Mean	.206	14	.111	.885	14	.069

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 4

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.135	14	.200*	.963	14	.779
Q3_Student_Mean	.171	14	.200*	.943	14	.455
Q4_Student_Mean	.179	14	.200*	.879	14	.056

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 5

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.182	8	.200*	.951	8	.721
Q3_Student_Mean	.167	8	.200*	.938	8	.594
Q4_Student_Mean	.182	8	.200*	.949	8	.705

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 6

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.134	26	.200*	.964	26	.480
Q3_Student_Mean	.173	26	.043	.930	26	.079
Q4_Student_Mean	.181	26	.028	.887	26	.008

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 7

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.154	25	.128	.958	25	.367
Q3_Student_Mean	.166	25	.072	.896	25	.015
Q4_Student_Mean	.100	25	.200*	.961	25	.431

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Class 8

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Q2_Student_Mean	.154	25	.128	.958	25	.367
Q3_Student_Mean	.166	25	.072	.896	25	.015
Q4_Student_Mean	.100	25	.200*	.961	25	.431

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Appendix 11

LEA Rubric Case Study 2

Background of Class 2	• Learning Area of Class 2 is Science • Class is held in a typical Science laboratory • The teacher has 27 years of teaching experience • Last week the teacher estimated 540 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 1 or 2 years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more • The students in the classroom have a very high level of engagement (small group not highly engaged), small number involved and have pretty good behaviour • Rates the ICT knowledge and skills of the class as broad range • The technology accessible in the classroom is 1 laptop POD (16 laptops) and another laptop POD bookable for the class • The teacher has access to a laptop/ iPad that could be networked to a digital projector • The laboratory has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS) • There were 31 students in the classroom, 16 of whom brought iPads to the classroom

	Source	Evidence	N	D	R	C
Knowledge Building	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes :	• Better understanding of the curriculum content - Weekly • Students learn more quickly - Weekly				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed				
	Teacher Interview Q2b How often do your students use ICT in activities?	• Use the text book which is online in the lesson i.e. via iPad or laptop would use every day • Number of kids with iPads (1/2) in the class. Students who do not have an iPad would share with the student • Laptops are available but tend not to use them in the class				

	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• No				
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Yes, students do have the skills				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• No they usually help me. I have learnt a few tricks myself from the students. • Discussed how good the student's skills were i.e. taking a video clip and editing for the class • I am not teaching them anything				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• No connection, only if the photos can be used as examples with other classes, but that is within the school				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Filming the introduction to the brain dissect and that then lead to .... • Students used the iPad to create a movie clip of the dissection and upload onto the LMS for the class • Students posted a video of a dissection on the LMS. The students selected the best application on the iPad to film the clip and upload onto the LMS. • The students extend their own skills to post the clip				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• PowerPoint – my teacher year 6 teacher taught me a lot about PowerPoint and I use what I have learnt from him. It's also easy to use and can be lots of fun. I make PowerPoint's for fun and school				
		• PowerPoint – It has lots of options. Have lots of knowledge on it. Can work well with it. Fun to create presentations. Helpful and simple to use. Add pictures to illustrate, type up all needed info, change fonts and add different styles to make it pretty and attractive.				

	Source	Evidence	N	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• I don't know if i have done anything that has been a first time for them. • They certainly can use applications to do homework, class activities but it is not me instructing them • I use the prior knowledge of the student for the application				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• I am occasionally asked the odd question. If I cannot answer I put it out to the class to see if it can be answered • If not than usually it is an suggestion to ask IT or go home and ask your parents				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Yes, they can do all of that.				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• Not used directly but used more as a tool • If students have that extensive knowledge they will go that next step, because that is there level of ability				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Occasionally the odd question • Put it out to the class to see if it can be answered • Otherwise ask at home or ICT support				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Yes				
	Teacher Interview Q4g Do students document how they find information on the computer?	• Not often. No.				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• No				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very	• Filming the introduction to the brain dissect and that then lead to .... • Students decided which was the best app to film the clip on the iPad • Teacher uploaded the video to the LMS page				

	motivated)? What application? What did it achieve? How was it successful?	• No reflection				
	Source	**Evidence**	**N**	**D**	**R**	**C**
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident?	• Weekly - they think in different and interesting ways. • Weekly - they help each other. • Weekly - they complete more work • Weekly - they enjoy learning.				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• I have been using computers for 1 to 2 years				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• I facilitated the use of computers with the students on a weekly basis				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• Filmed brain dissection (by student) performed by the teacher to upload onto the LMS of the school for students to view at a later stage. • Every experiment done I take photos of lab work and excursions like the yr 11's next week. I show photos from previous excursions for • text book online for students to read which has interactive activities that the students can do but not many students do them • imparting information to students via projector				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• No comment				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?	• Technology available to the students is 1 Laptop POD (16 laptops), can book another POD, has 32 students in the class and ½ of them have iPads				
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• No				
	Teacher Interview Q3bii					

	How do you know they are engaged? **Teacher Interview Q3biii** Do you set goals for what they need to achieve? **Teacher Interview Q3biv** Do you discuss the goals prior/ post to the ICT activity?					
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• Used the online text as an example, plain text book when compared to interactive text book which would be more engaging. Teacher stated that it works both ways depending on the type of students. Students who have the iPad are inclined that way and more likely than the online text. • Both ways for different kids – middle 3				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Yes I could but still in that learning curve. So yes I do think so Couple with change at the minute will move slowly to how we can do more Generally can see a use				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• More teachers specific. • If a teacher does come across a good link or interactive that will be written into the course.				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei and eii What did the students do and what did you do? (e.g. find information, class discussion using projector) **Teacher Interview Q3eii** How did you decide on what ICT applications to use with the students?	• All happens at various times and lessons • No the teacher doesn't decide on what applications to use with the students.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Filming the introduction to the brain dissect and that then lead to .... • Application used was iPad and camera (maybe iMovie) • It achieved a level of excitement with what they were doing and then being able to use it the next day. Be able to show to the whole class especially absent students. • Yes it was successful.				
	Student Survey Q6	• Internet because we could find the answer that we were looking for a lot faster than if we had to find it in a book. I looked up information for a				

	Give one example where you have enjoyed using computers as part of a lesson.	report that was for school so the internet helped me find it quicker and easier. The report took me around 1 hour to find all the information and another 30 minutes to type it on Word.				
		• Online Text books – I enjoy using the online text books because I don't have to carry my books around to every class, and you can access things quicker. Sometimes there are extra activities within the online text book which is fun and educational. I can access the book really quickly and I can access different activities within the online book. These activities are fun and educational to use.				
		• Moodle – Easy to use and find links. Helps me keep up to date on missed items. Can ask questions. Easy to change profile settings. What I did with it was access work/ assignments/ homework, checked safety stuff in my personal settings and easy to find the file.				
		• Video Clip from Text book – Why I enjoyed using it was I found it interesting and helped me to learn. Full of useful information and good video clarity. What I did with it was listened and watched, remembering parts of its content.				
		• Internet – I enjoyed using it because it was fast to search a question, variety of answers and some websites were interactive. What I did with it was use information to answer questions on a worksheet. Able to copy labelled and clear diagrams.				
		• Internet – Why I enjoyed using it was it was interesting, finds out new information and great learning resource. I used the internet to help me find relevant information for projects and assignments.				
		• PowerPoint – helps me present my work clearly and easy to use. I use it to present my assignments and assessments.				
		• Internet – I enjoyed using it because I can easily (sometimes) find an answer to any Science question. It is easy to access and quick to get information. What I did was go into Google and I usually type what I'm looking for in the search box.				
		• Don't really use it in this class				
		• Pages (iPad) – I enjoy using Pages because when I make study pages I can copy pictures I need from my textbook and can use tables and layout so I can understand. What I did was make study notes and homework questions.				

		• Internet – I enjoyed using it when we had to search up different subjects for study, assignments or for terminology. Searched up the information read it and took notes.				
		• Microsoft Word – I enjoy using it because it's easy to use and nearly always needed for the task I'm doing. What I did was make a mini poster using pictures, text boxes, text and titles.				
		• Microsoft Word – I enjoyed using it because you can create your own page. Use different fonts and decorate the page. It has lots of variety to design the page. What I did was create posters, do assignments and create small animations.				
		• Publisher – I enjoyed using it because you can move stuff easily and stuff rarely disarranges itself and you are in complete control of it. What I did with it was make posters and many others brochures as well.				
		• Microsoft Word – I enjoyed using it for making my fonts big and crazy. Adding pictures and text boxes. Quick and easy to use. What I did was make a report for my Science class.				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 12

LEA Rubric Case Study 3

Background of Class 3	• Learning Area of Class 3 is Society and Environment • Class is held in a typical classroom layout. Whiteboard and desks for up to 30 students • The teacher has 19 years of teaching experience • Last week the teacher estimated 660 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 5 or more years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more • The students in the classroom have a variable level of engagement (depends on the lesson and students), there is chattiness, noisy students can get distracted and there is a minority that are very distractive. Behaviour is good apart from the chattiness and directed students (minority). • Rates the ICT knowledge and skills of the class as fairly good for basic tasks i.e. internet search and word-processing. The students do help each other. • The technology accessible in the classroom is 1 laptop POD (16 laptops) another POD is bookable and an Interactive Whiteboard (IWB) • The teacher has access to a desktop computer/ laptop and iPad which can be networked to the IWB • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS) • There are 21 students in the classroom

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have a better understanding of the opposite outcomes?	• On occasion – Better Understanding of the curriculum content • On occasion - Students learn more quickly				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills • students do not require to be taught and learn for themselves				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed • require no guide and able to use the computer to produce (make) or find what is required				
	Teacher Interview Q2b How often do your students use ICT in activities?	• basically every lesson • There would be an minority of lessons where I say don't get a laptop • Laptops have been generally pretty good				

	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• at the start of the semester I did ask a few questions to gauge where students were at • (Did you incorporate this into an activity) in terms of the main idea that I am doing which is as that production tool it didn't have a huge effect, operate at a pretty basic skill level, it wasn't a big issue it was to gauge where they were at, it gave me a couple of pointers to some students that needed help. (Did you give them more help?) I try to, there were a couple of students there. • Do not teach new applications; however there have been a few moments where I have taught new uses in an application, for instance Adobe reader highlight function. Highlighting the eBook.				
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Yes pretty much so				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• Exception would be when extending in an application i.e. wiki's in Moodle. I have really had to push them into getting in there and playing to work on it. So once again I have to say, come on look at this.				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• In the current context we have been looking at the election campaign and the use of social media. They certainly have been suggesting that there are some things they could be looking at.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Taught the students to use Wiki's for the electoral investigation process on the LMS. Each student had to produce their own wiki. • The class were taught how to access the wiki, create a wiki and how to continually update the wiki.				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• PowerPoint – I enjoyed using it because it is easy to display information and edit the way it looks. What I did was create slides, add title, add images, add backgrounds and add transitions.				

	Source	Evidence	NU	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• It would usually be, most of the time a demonstration using the projector/ IWB. I don't usually use the documentation because based on my estimation where the students are, it has been shown to them once or twice and they should be able to do it.				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• Sometimes yeah.				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Yes – note taking.				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• Not really, no. No.				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Doesn't happen a lot due that's due to their engagement level, but when it does, my usual response is that I will get back to you. • If it is my gut feeling that it will be something quick, I will do a quick search to see if I can find the answer and deal with it				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Sometimes depends it depends on what we are doing. If it is simply responding the eBook. They don't actually get a choice there i.e. Adobe reader. • When I ask them and it doesn't happen a lot presentation to the class. I don't require formats. • Did stipulate using Moodle wiki but some students did not like and asked to use another application. Which I did i.e. word, scrap booking online. I let them choose but they need to keep me updated. One student is using word-processing, the other student is actually using a scrap booking website. So there is some choice there. • Where possible there is some choice there.				
	Teacher Interview Q4g Do students document how they find information on the computer?	• With what I am doing it is pretty much straight to the point, there is not much documentation process with this class.				
	Teacher Interview Q4h	• We do have informal discussions				

	Do students reflect on how ICT was used in an activity and how they could have done better?	• As time gone by those quizzes we did, after this election process we did, we have a reflect on the wiki exercise we did.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Students who were not familiar with wiki's were taught how to use. Content copied directly into the wiki. I gauged their engagement by simply seeing if they were doing it by visiting the wiki. That was my measure of success this year.				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident.	• Weekly – students think in different and interesting ways. • Daily – students help each other. • Weekly – students complete more work. • Weekly – students enjoy learning.				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• have been using computers at school with the students for 5 or more years				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• I facilitate the use of computers on a daily basis with the students in the last term				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself • enjoy the activity but find it challenging to complete				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• main purpose with that class for this semester is note taking • answering of questions (online) • All students have access to a laptop every lesson to use • eBook usage in class everyday but mainly used as a production tool				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• At the moment just extending their abilities in an application they already know i.e. Adobe reader.				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi	• I haven't really played to their strengths.				

	Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?					
	Teacher Interview Q3bii How do you know they are engaged?	• Observation, there level of engagement is variable. Depends on lesson and student.				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• N/A				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Yes simple discussion prior and post				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• At the start of the semester I established a protocol where I said if you have got an IT device in front of you, here is what it can be used for – fact checking as I am talking, that's okay, obviously the word-processing, the eBook, and responses that's fine. I said anything else is with permission with the teacher. • Most of the class respect that agreed protocol but some don't. I would say some are slow to work, like I said easily distracted – I would give them a 5 because they are doing the work but distracted. The others do the work but I wouldn't say they are totally engaged.				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• N/A				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• Within the eBook that the students use like some of the activities it is pre-written into them i.e. conduct an Internet search, use an Internet dictionary to define				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)	• Work on that eBook, the day to day responding, and Moodle the Wiki's, Quizzes with Moodle, just in terms of informative assessment. There are a core of 5/6 students who do the quizzes and others that don't.				
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)	• eBook – day to day • Moodle wikis • Moodle quizzes • Formative assessment				
	Teacher Interview Q3eii	• Stay with what I know				

	How did you decide on what ICT applications to use with the students?			■		
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• We have done a lot of little things nothing has been a failure i.e. I suppose it would be the electoral investigation process, i.e. the Wiki/ other, Some students are progressing further than other, students are compiling information. • Students maintained their own wiki's • (Are the students engaged) – Very simple are they doing it! That is my measure of success this year.			■	
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• PowerPoint – I enjoyed using it because it was an enjoyable group task which allowed me to put lots of information into my PowerPoint and it saved lots of time. What I did was make a PowerPoint about politics in Australia and put effect, sounds and links.		■		
		• Internet – I enjoyed using it because it was easy to use and gives me the information I need. What I did was search what I needed for assignments/ helps with tests.	■			
		• Internet – I enjoyed using it because reading on the text book on the computer I like how we can type up our notes at the same time as well as look up answers to questions		■		
		• Internet- I enjoyed using it because I find new information and search things that are interesting. I can know things in seconds. I can go on social networks. What I did was search interesting things and go on social networks.	■			
		• Internet – I enjoy using it because if you need to search something you are unsure of the internet is right there to help you. It extends your learning abilities. What I did was research information for study notes, to answer questions for school and homework.		■		
		• Moodle – I enjoyed using it because we got to make our own scrapbook (wiki scrapbook). It was fun to post pictures and write what you want. Make your own personal scrapbook online with your things in it. What I did was post images and notes on the 2013 election.			■	
		• PowerPoint – I enjoyed using it because it is creative and simple to use. What I did was create a PowerPoint on the election.		■		

		• Internet – I enjoyed using it because I was able to find interesting new information that I don't find in the school library books. What I did was use it to find information for biology assignment.				
		• Moodle – I enjoyed using it because it is easy to get work/ tasks. Find out calendar. What I did was find out tasks and worked on wiki.				
		• Moodle – I enjoyed using it because it is convenient and easy to use. The wiki it is like a scrapbook and looks cool. What I did was my wiki page; I upload pictures, videos and create linked pages.				
		• Moodle – I enjoyed using it because I got to create our own digital scrapbook (wiki) which was a change from a normal assignment. What I did was create a scrapbook on the 2013 federal election.				
		• PowerPoint – I enjoyed using it because it's a great way to display information and present it to the class. You can add sound effects and style to it. What I did was I changed the style of it, the font and made multiple slides with information on it.				
		• PowerPoint – I enjoyed using it because I find it interesting making slides. What I did was make a PowerPoint of the election for politics and law.				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 13

LEA Rubric Case Study 4

Background of Class 4	• Learning Area of Class 4 is Society and Environment • Class is held in a typical classroom layout. Whiteboard and desks for up to 32 students. • The teacher has 40+ years of teaching experience • Last week the teacher estimated 45 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 5 or more years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more. • The students in the classroom has a very high level of engagement, strong students with a very few that are weak. • They are very motivated, push each other and have excellent behaviour. • Rates the ICT knowledge and skills of the class as very high. • The technology accessible in the classroom was 1 laptop POD (16 laptops) with another POD bookable for the class. • Six students bring iPads to class. • The teacher has access to a laptop/ iPad both can be networked to a digital projector. • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS). • There were 32 students in the classroom, ten of whom brought iPads to the classroom.

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have:	• better Understanding of the curriculum content - On occasion • students learn more quickly - On occasion				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills • .				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• require no guide and able to use the computer to produce (make) or find what is required				
	Teacher Interview Q2b	• More, more and more.				

	How often do your students use ICT in activities?	• On average about twice a week • 2 periods out of 4				
	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• No, I just assume that they will be able to do it. • If they can't have to find out how to do it				
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Yes they do				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• I don't think I really do. I just assume they will be able to do it and up to now they always have. For example they had no problem doing that Moodle test with them in class. No problem. A breeze. Some did and some didn't like the Moodle Quiz online in class, but they scored high in it. It might have been that some of the questions weren't hard. It was good they did well because the instant return (result) was there.				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• Not that I can think of. Nothing obvious comes to mind in the general sense. The more and more it becomes computerised, electronic and communications, as we know in schools increasingly email based, rather than face to face, so in that sense they are reflecting, what is happening in society wise.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Yes, Educreations (video clips). Video sharing website. Teacher uses but not the students. • No ICT knowledge building of the students				

	Source	Evidence	NU	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• When using Tagxedo for the first time I had written down the various steps required for the students to produce whatever they wanted. Didn't show but read out aloud to students in the library				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• No – go on and do it.				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Yes				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• • Normally find they can do it and their skills are better than mine. A student showed how a teacher to do something the other day.				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• If I am up in the library I ask a librarian they are pretty cluey • If in class get some cluey kid that is bound to know the answer.				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• I normally give them a variety, as long as they can present something. It's up to them.				
	Teacher Interview Q4g Do students document how they find information on the computer?	• They have to do a detailed bibliography, and put down every website they use.				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• Yes, we have just done an assessment with a sheet incorporating reflecting questions, how they worked, of course that involved ICT and habit of minds and which ones they use.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Yes, Educreations (video clips). I just love it. Especially with Geography to point out places • Students do not use or reflect on application. • Used for learning content.				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the following outcomes evident:	• How often do they think in different and interesting ways? - On Occasion • How often do they help each other? - Daily • How often do they complete more work? – On occasion • How often do they enjoy learning? - Daily				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• Have been using computers on a regular basis for 5 years or more with the students at school				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• Students used the computers in the last term on a daily basis				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• First of all for me it is variety, varied teacher method compared with my traditional stand and deliver. Which I am very good at and I still like doing. • Have coming to the terms of the availability of knowledge is so great. The only problem is the ability to select, there is so much there, it is a selection issue but the girls are very good at sifting through stuff especially this class in particular.				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• N/A				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• What we have been doing recently is to get them to do little brainstorms involving those cloud website, where you type in a series of words you get a shape, the best one I come across is Tagxedo and they can type in, its having a bit of fun with the brainstorm type of thing.				

	Teacher Interview Q3bii How do you know they are engaged?	• Walk around and keep eye on them, especially with the iPads. They are bound by their commitment but they are tempted to flick to something else easily.				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• Yes finish product, expect a very high quality. They are very quick do a quick research a nice little word document put it up on the noticeboard. It is normally good quality stuff.				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Yes explain what the activity will involve, the timeframe, how long they have to do it, what is expected by the end of the period. I normally expect too much, and take longer than I figured it, but I think that we will only get it done in 1 period, we do go over time. That tends to what happens.				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• Very much so I hope so in that class, a definite 4.				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Yes, go up more and it is up to me to be able to monitor it. Sometimes it gets a bit frustrating for me because I know that I can do something on the board in 10 minutes. Where as if I get them to do it using ICT they are going to take a lot longer, to put it all together. Whereas I have already packaged it for them and whacked it on the board, so they are not going to be as quick as I am get the information out. I just have to bite the bullet, not so much at this level but in yr 12 and 11 it is. Especially in yr 12 with that time pressure.				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• The whole yr 10 Geography course is on Moodle. • In this course, any research activity is automatically going to involve ICT.				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)	• Well there is, it is classed as 2 big research investigations using ICT over the year. • As well as lot of smaller ones. • They get to use PowerPoint and Publisher (brochures) and Moodle				
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)	• lots of smaller ones • Use PowerPoint, Publisher (brochures) and Moodle Quiz (interactive)				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very	• Yes, Educreations (video clips). I just love it. Especially with Geography to point out places				

	motivated)? What application? What did it achieve? How was it successful?	• Very engaged, I think that they were surprised that I could do it. • It was successful				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Moodle Test – I enjoy using it as a quick and easy way to do the test with fast results.				
		• Nothing				
		• Nothing				
		• Moodle – I enjoyed using it because it was easy to find what worksheet we were doing and notes for revision. So I knew what we were asking.				
		• Moodle – I enjoyed using Moodle because it is an easy way to ask teachers about homework and we can have a class chat so you can ask questions.				
		• Microsoft Word – I enjoyed using it because I know how to use it, and it was easy to learn from. I had to create a poster for my class. I changed how it looked, added photos and put on a border.				
		• Publisher – I enjoyed using Publisher because it has so many layouts and designs. It was easy to manage and I had plenty of time to use it. I created a small book – let on medieval knights. Inserting pictures, captions and titles.				
		• PowerPoint – because it is an easy format, so I can understand how to use it. You can also add cool effects. I made a slideshow presentation with images, transitions effects, sounds and animation.				
		• Publisher – I enjoyed using it because all the different fonts and layouts help with making your work neat. I made a cover page for my report.				
		• PowerPoint – I enjoyed using it because it is easy to use and upload images and sounds. I wrote notes on given tops like the festivals in Japan.				
		• PowerPoint – I enjoyed using PowerPoint because I could present it in a professional matter and it will look good. I can add animations and translations. I made a PowerPoint on Japan and its culture. The topic was on Buddhism and I was able to fit my research in a neat format.				

		• PowerPoint – I like making PowerPoint presentations and styling them and add effects. It is a good way to present information. I presented information.				
		• Publisher – I enjoyed using it because I got to be creative and do what I wanted with the program. I enjoyed choosing colours, text and images for example. We had to create a booklet on knights and I used publisher to present the booklet which was interesting.				
		• Publisher – I enjoyed using publisher as I am able to insert and delete photo's, play around with the many settings and effects it offers are enjoy how efficient and easy it is, yet is a good product. I created a publisher on knights.				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 14

LEA Rubric Case Study 5

Background of Class 5	• Learning Area of Class 5 is English • Class is held in a typical classroom layout. Whiteboard and desks for up to 32 students. • The teacher has 8.5 years of teaching experience • Last week the teacher estimated 510 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 5 or more years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more. • The students in the classroom have a high level of engagement and involvement is varied • Their behaviour is generally good but casually talk too much. • Rates the ICT knowledge and skills of the class as very varied some have a great deal and others can't do basic skills, some are advanced. • The technology accessible in the classroom is 1 laptop POD (16 laptops) with another POD bookable for the class. • Six/seven students bring iPads to class. • The teacher has access to a laptop/ iPad and both can be networked to a digital projector. • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS). • There were 32 students in the classroom

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have:	• Better Understanding of the curriculum content - Weekly • Students learn more quickly - Daily				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed				
	Teacher Interview Q2b How often do your students use ICT in activities?	• The ones with the iPad we will use every lesson • Otherwise once a week				

	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• Usual not. In terms of the activity I will plan to a basic level, than I will go around for1:1 extension if students requires. Not all require extension				
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Normally to basic level, yes • Just to that basic level and I try to build on things				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• Go around and extend students 1:1. Not all students need				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• I guess in terms what I talk about we are doing a science fiction unit we used the example for instance, previously the Biro was technology and very advanced and now of course we have the iPad. In the 1960's a computer was the size of this room and now it is this tiny, tiny thing. I held up my phone and said this is now advanced than the computers that used to be the size of this room. And so that sort of thing and looking at the future				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• They had to choose a theme, I had written a document up that I had previously that I put on Moodle. So I said right here are the instructions and I verbalised the instruction and put that sheet on the board as well. So you need to choose a theme, you need to answer these questions which were in another booklet that I had already given them. Based on the theme you need to go and create a presentation that you will be presenting to the class about this theme and how it is revealed in the film and you must show and have at least 2 images from the film where that theme is present and analyse those images. Like on the slide, they all used PowerPoint because it was just easier • Students built on prior knowledge to build the PowerPoint				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Adobe Photoshop – I enjoyed using this because our teacher made a fun way for us to learn how to use most of the tools and effects. We are making a digital photo of ourselves. We took a photo of ourselves and used Photoshop to make it look like a line drawing, we then uploaded it on illustrator to add colour. Our finished product will look like an abstract version of us.				
	Source	**Evidence**	**NU**	**D**	**R**	**C**

Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• Usually just on the board (teachers computer projected on the board), you open it up here, this is what it looks like, you go to this screen, you physically show them how to do it and maybe posing for a while to let some kids catch up • No booklets, but I did with Moodle, at the beginning of the year. Some kids said I already got that in S&E, so that was the only thing				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• Yes.				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Yes, both				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• Yes, but probably not enough really thinking about it. I could go further, that is something I really need to explore				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Ask another student or I will try and find out • Or why don't you Google that and find a forum with some experts. There are a lot of those and you can usually find the answer. I have emailed support before.				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Mostly, pretty much always				
	Teacher Interview Q4g Do students document how they find information on the computer?	• Yea, sometimes we do, do that. Depends on activity. They have to research certain things and ask certain questions. Then yes I do get them to do that.				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• Sometimes, I have done that occasionally				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• They had to choose a theme, I had written a document up that I had previously that I put on Moodle. So I said right here are the instructions and I verbalised the instruction and put that sheet on the board as well. So you need to choose a theme, you need to answer these questions which were in another booklet that I had already given them. Based on the theme you need to go and create a presentation that you will be presenting to the class about this				

		theme and how it is revealed in the film and you must show and have at least 2 images from the film where that theme is present and analyse those images. Like on the slide, they all used PowerPoint because it was just easier. • No evidence (process and reflection) was submitted in regards to the use of ICT				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident:	• How often do they think in different and interesting ways? - Daily • How often do they help each other? - Daily • How often do they complete more work? - Weekly • How often do they enjoy learning? - Daily				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• For 5 or more years have been regularly using computers at school with the students				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• I facilitated the use of computers by the students on a weekly basis				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• Guess it is to help the students learn in a different way to try and tackle in particular kids that learn differently, to really try and engage them and to try and ensure that they can build on their skills as well. And also to present their ideas because it is much easier to present ideas using ICT to the class or small group then it was previously just using paper • You can share ideas more effectively, much more quickly				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• I guess I try and leave it open for them and I say find different ways to do this and feel free, and I tend to give examples like PowerPoint. Why not try and use Prezzie and some of these other things and play with the apps. I do tend to keep it a bit rigid and until we get a stable system				
	Teacher Interview Q3b					

	How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• Yes				
	Teacher Interview Q3bii How do you know they are engaged?	• They are interested; they are actually talking about the activity, doing the activity. There discussing the activity or how to change it with people next to them. They are excited, happy buzz in the room				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• Basic goals in terms of a basic presentation standard it has to be able to show it to me or the class and this information must be present. So kind of a basic level				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Yes				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• Always higher engagement				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Heaps. I was experimenting with TED, a flip lesson with my Philosophy, the problem with that is that they do not have individual access to YouTube at school. So we played that clip through the teacher's computer and they did some of the questions on the TED Ed website which is really cool. They can do that at home so they increasingly, it's a customisable lesson and I just looking at that a little bit more. You can quite easily do that with any YouTube clip and use it on TED Ed and do a flip lesson and say students here is your lesson. Which is something I really want to look at, it's now possible because nearly every kid has a computer with decent speed internet.				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• We have, but I know that some teachers are not following it and that's in every course.				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)	• We haven't had any formal assessment is that an ICT assessment. We have focused on more the in class assessment and plagiarism is still an issue. In the year 8 course we did a pamphlet by publisher and so many were plagiarising to a crazy extent and we found that it just was not worth doing it. So we deleted that task so really it is				
	Teacher Interview Q3ei					

	What did the students do and what did you do? (e.g. find information, class discussion using projector) **Teacher Interview Q3eii** How did you decide on what ICT applications to use with the students?	the activities in the class, which becomes a really individual teacher thing				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Well I guess it was at the end of last term. We were doing theme in the film and I broke them up into groups of about 3 or 4. They had to choose a theme, I had written a document up that I had previously that I put on Moodle. So I said right here are the instructions and I verbalised the instruction and put that sheet on the board as well. So you need to choose a theme, you need to answer these questions which were in another booklet that I had already given them. Based on the theme you need to go and create a presentation that you will be presenting to the class about this theme and how it is revealed in the film and you must show and have at least 2 images from the film where that theme is present and analyse those images. Like on the slide, they all used PowerPoint because it was just easier • What did it achieve? Well they got to first of all analyse the theme in more depth and how it was used in the film. They got to actively use viewing conventions in a still image from the film. So they choose it first and analyse it and they had to present that to the class. Which means the class got to learn a little more about that theme and the use of viewing conventions? It was reasonably good. It was pretty good and could have been better, to have a bit more diversity and gone into it a little bit more depth				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• PowerPoint – I enjoyed using it because it saved me time instead of having to write all of the information out, I could type it. I wrote a speech on it for an English oral then printed out the slides in handouts so they we already the size of palm cards				
		• Publisher – I enjoyed using it to create/ design what you want on it. Can add pictures, change font and change style/ layout. What I did was create a booklet about Rust in Science. I was able to create what I wanted and what I wanted it to look like				
		• PowerPoint – I enjoyed using it because in class when we have assignments, the format is easy to understand, and to make				

		documents/ slide shows. Easy to present information. What I did was add information and pictures related to the topic				
		• PowerPoint – I enjoyed using it because I liked the design choices and the effects. I also like how it is easy to move photos around without changing 'the wrap text'. What I did was create a PowerPoint with many pictures, effects and writing involved				
		• Moodle – I enjoyed using it because it was interesting and was not that hard to use and find things. What I did was print off study sheets for tests coming up and had a look at all my subjects				
		• Adobe Photoshop – I enjoyed using it because it allows me to create and manipulate photos. I am able to create and edit texts and create an animation. What I did was edit and manipulate my photos so it looked like I had been to places I haven't been to				
		• PowerPoint – I enjoyed using it because I love the slides interesting and using layout, colour and font options to do so. What I did was make school presentations on it				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 15

LEA Rubric Case Study 6

Background of Class 6	• Learning Area of Class 6 is Mathematics • Class is held in a typical classroom layout. Whiteboard and desks for up to 32 students. • The teacher has 35 years of teaching experience • Last week the teacher estimated 140 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 3 or 4 years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more • Some students in the classroom are engagement but some are not. Same with involvement • Their behaviour is generally good • Rates the ICT knowledge and skills of the class as pretty good and very good for some • The technology accessible in the classroom is 1 laptop POD (16 laptops) with another POD bookable for the class • Five students bring iPads to class • The teacher has access to a laptop/ iPad both can be networked to a digital projector • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS) • There were 28 students in the classroom

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they :	• Better Understanding of the curriculum content - weekly • Students learn more quickly - weekly				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc.) are generally used in class do the:	• students use skills you have taught plus some of their own skills				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed				
	Teacher Interview Q2b How often do your students use ICT in activities?	• Use the classpad every day. Overhead projector 4/5 days minimum. Do not use whole lesson.				
	Teacher Interview Q2c	• No - Students have word solutions on Moodle. Mymaths (paid site)				

	Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?					
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• For the applications I use I mainly show them • show students how to use the graphics calc • show them how to use Moodle				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• Don't				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• Don't				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Using the projector app for the Casio graphics calculator • Casio applets financial (rather than Excel) • Helped to demonstrate the concept to the students • Showed them the skills to use the Casio graphics calculator • Students learnt pretty good				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Interactive Casio classpad – I enjoyed using it because it is good to visualise calculations whilst the teacher explains. I find it useful learning things by following along slowly, going step by step. What I did was learnt new skills, improved old methods of using my calculator, and became more efficient.				
		• Classpad – I enjoyed using it because it helped me learn how to use my own classpad better and I was able to follow along while the teacher had the program up on the projector. What I did with it was that I was shown how to use my own classpad. It allowed me to see how to use my classpad effectively and what menus to access and how.				
		• Casio Classpad – I enjoyed using it because it was a blown up version of the calculator so it was easy to see what the teacher was doing to solve an equation. What I did with it was able to transfer the information to my calculator so I could do it at the same time with the teacher.				
		• Classpad – I enjoyed it because it helped show me what to do on my own classpad. It is helpful so I know what to do later on				

		without help. What I did with it was I followed along with the teacher on the screen setting up/ performing steps on my classpad.				
		• Classpad – I enjoyed using it because the skill can be seen by everyone, slowly and with understanding. What I did was find shortcuts to equations to solve it quicker				
		• Classpad – I enjoyed using it because it is easier to understand and apply what we are supposed to be doing or what applications we need to be using. What I did with it was to use the classpad to plot functions, graphs, do algebraic equations, sequences, tables.				
		• Classpad – I enjoyed using it because we can actually see what we need to do and how its suppose to look like on our classpad. What I did was watched it, remembered it, and applied it when I needed to do that certain thing on the calculator.				
		• Classpad – I enjoyed using it because it allowed me to understand using the calculator as we went through it slowly and could see it clearly. The whole class could view it together. What I did with it was to see how to use the calculator and learn its different functions.				
		• Classpad – I was able to follow along and understand the various steps that I need to take. What I did with it was to solve mathematical equations.				
		• Classpad – I enjoyed using it because I could be shown on a bigger screen how to properly use the classpad and all its functions which I previously did not know. What I did with it was to use what I have been shown on the screen on my calculator.				
		• Classpad – I enjoyed using it because it was fun when using it, interactive and helps everyone learn how to use classpad. What I did was sit at computer and did the steps. Showed the class how to do it and followed teacher's instructions.				
		• Classpad – I enjoyed using it because it got me involved, interactively helping me understand how to use the calculator better and more efficiently. What I did with it was I sat in class on my classpad and worked interactively following the teacher on the screen learning functions of the calculator.				
		• Classpad – I enjoyed using it because it was a good way to learn, demonstrated so it's easier when doing it and interactive. What I				

		did with it was learn how to do different things using the classpad and developed my skills.				
		• Classpad – I enjoyed using it because the classpad software shown on the big screen was easy to follow and helped me follow the questions. It was very helpful and interactive. What I did with it was watch on the screen as the teacher/ student worked the question through on the calculator, and repeated the process on my own classpad.				
		• Classpad – I enjoyed using it because it was very useful to be shown different steps and are able to work through problems as a class. What I did with it was I went through calculator skills necessary for certain questions.				
		• Class Pad – I enjoyed using it because it was easy to understand, informative, shows you how to use the calculator properly. What I did with it was graph functions, use main setting, use table and sequence and many more.				
		• Classpad – I enjoyed using it because I was able to see how to use my own classpad as I just mirror what is done on the screen to my classpad. What I did with it was learn how to effectively use my calculator.				
		• Classpad – I enjoyed using it because it gave me better insight to how to use my classpad. I enjoyed being shown what to put into my calculator instead of being told. What I did with it was I could easily follow what the teacher was telling me to do. I learnt how to input calculations into my Casio calculator.				
		• Classpad – I enjoyed using it because it helps you better understand how to use your calculator. I used it to complete work.				
		• Classpad – I enjoyed using it because it helps me to understand how to use certain apps in my calculator. I learnt how to input certain values and numbers into my classpad.				
		• Classpad - I enjoyed using it because it has helped me to learn how to do certain things on the classpad that I did not know how to do. The teacher displayed a classpad on the projector and taught us how to do certain things.				
		• Classpad – I enjoyed using it because visuals help and handouts were given with graphics at class pad to refer back to. What I did				

		was regurgitate and imitated what she did on the board with my own classpad.				
	Source	**Evidence**	**NU**	**D**	**R**	**C**
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• Demonstrate • Support with notes • General instructions				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• Do ask questions				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Limited make				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• No - Students tend to help each other in extension				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Check out to find answer for student				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Yes. Solving equations there are different apps to use.				
	Teacher Interview Q4g Do students document how they find information on the computer?	• No				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• Do as a class. Reflect on activity				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Using the projector app for the Casio graphics calculator • Casio applets financial (rather than Excel) • Helped to demonstrate the concept to the students • Showed them the skills to use the Casio graphics calculator • Students learnt pretty good • No evidence of Active Learning				

		• Students didn't extend themselves				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident:	• How often do they think in different and interesting ways? - Weekly • How often do they help each other? - Weekly • How often do they complete more work? - Weekly • How often do they enjoy learning? - Weekly				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• Have been using computers with students regularly over the last 5 years				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• On occasion I facilitated the use of computers by the students				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• Classpad – views graphics calc on screen for students to see. Can show them and scan in worksheets and do on board. Project on board • Though the ICT knowledge of the students is pretty good. Very good for some. This can be seen by what they say and how the interact • Word solutions on Moodle (LMS)				
	Teacher Interview Q2g	• Don't				

	To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?					
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• No				
	Teacher Interview Q3bii How do you know they are engaged?	• Students come up and I show them how to use Calc • Majority are some and not				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• No				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Sometimes				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• Majority are engaged but some are not. The same with getting involved. • Behaviour is good in t he class				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• There is more potential to engage students				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• Not stipulated in course. About to use calcs				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)	• MyMaths extra resources • Moodle – resources page • Graphing package to show students				
	Teacher Interview Q3eii How did you decide on what ICT applications to use with the students?	• Already decided by leader				
	Teacher Interview Q5	• Using the projector app for the Casio graphics calculator • Casio applets financial (rather than Excel)				

	Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Helped to demonstrate the concept to the students • Showed them the skills to use the Casio graphics calculator • Students learnt and was meaningful to the students				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Internet – I enjoyed it because it is very informative, quick to access information, easy to find information, effortless and versatile. What I did was Google answers to questions I am not sure about or look up definitions to words I don't know.				
		• Moodle – I enjoyed using it because the working out and solutions of exercises are posted on there so I can check my work and see how to do a question without the teachers help or when she is busy. I use it to check working out and solution, the Moodle maths page also has many practice questions and solutions that I can use for assessment preparation.				
		• Moodle – i enjoyed using it because it allowed me to access exercise answers and working out. So that I could work at my own pace and I could also access it at home and it saved me printing out lots of answers. What I did was download the answers for our maths exercise and saved it to my hard drive so that I could easily access it later.				
		• Moodle – I enjoyed using it because it was convenient, simplistic format, easier to use, more compact, easier access and less materials used. What I did with it was to view working solutions and sample answers to class questions/ assignments/ homework.				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 16

LEA Rubric Case Study 7

Background of Class 7	• Learning Area of Class 7 is English • Class is held in a typical classroom layout. Whiteboard and desks for up to 34 students • The teacher has 20 years of teaching experience • Last week the teacher estimated 240 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 5 or more years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more • Students in the classroom are quite good at being engaged but there are a few that are easily distracted • Student's involvement is very good • Their behaviour is generally good • Rates the ICT knowledge and skills of the class as above average, some familiar with computers • The technology accessible in the classroom is 1 laptop POD (16 laptops) with another POD bookable for the class • Six students bring iPads to class • The teacher has access to a laptop/ iPad both can be networked to a digital projector • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS) • There were 33 students in the classroom

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have a:	• Better Understanding of the curriculum content - Weekly • Students learn more quickly - Weekly				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills				
	Teacher Survey Q8b When learning in the classroom with computers the students:	• use the instruction guide supplied by you but find extra information when needed				
	Teacher Interview Q2b How often do your students use ICT in activities?	• In my subject area (in that class we surveyed) probably once a week • We get onto Moodle because I put things onto Moodle •				

	Teacher Interview Q2c Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?	• No, not really •				
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Yes				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• I do tend to do that and allow them to go away and learn extension by themselves • Simply because they are confident with the computer				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• I think it is a skill that is so common now and expected to know how to use technology because this going to be their future and to go into jobs that require for them to research or to be able to use the computer proficiently. To be able to research analyse, read.				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Used the schools LMS - Moodle • It was an assessment posted on Moodle and the students had to create a picture book and design a Storyboard • Goals were discussed with the class. • Extra resources were add to Moodle for the students to use • They had 24/7 access to the assessment • Students were shown were to access the assessment and allowed to use an application to produce the picture book. • No extra skills were demonstrated to the students				

	Source	**Evidence**	**NU**	**D**	**R**	**C**
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• Own knowledge •				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• No				
	Teacher Interview Q4c	• Yes both •				

	Do ICT activities allow the students to use (search)/ and or produce (make)?					
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• Yes •				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• Can anybody else help • I say get back to them •				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• Yes				
	Teacher Interview Q4g Do students document how they find information on the computer?	• They do plan				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• No. Not always				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Used the schools LMS - Moodle • It was an assessment posted on Moodle and the students had to create a picture book and design a Storyboard • Goals were discussed with the class. • Extra resources were add to Moodle for the students to use • They had 24/7 access to the assessment • Students were shown were to access the assessment and allowed to use an application to produce the picture book. • The students discussed the process and research of the picture book but no evidence was documented for the ICT process.				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident:	• How often do they think in different and interesting ways? - Weekly • How often do they help each other? - Weekly • How often do they complete more work? - Weekly • How often do they enjoy learning? - Weekly				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• I have been using computers regularly for the last 5 years				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• In the last term I have facilitated computers with the students on a weekly basis				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• I think for me the main purpose is in order to replay information at a faster rate • Giving and showing them examples • keeping them interested as well as enabling them to access things outside school that I put on the Moodle so they can further their knowledge and keep up to date				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• By research, finding out, predominately investigation research, finding articles, looking up articles.				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi	• sometimes, have to build the activity around the learning process				

	Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?					
	Teacher Interview Q3bii How do you know they are engaged?	• when they don't ask questions/when all concentrating and they are on task				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• Yes, whether they achieve them or not is another question but there are goals				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• I do at times sometimes it is a carry over and they should know but it is sort of addressed in the communication • Sometimes I do discuss it after the activity, most time. Not always we do run out of time I do try				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• 4 or 5				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Well I think it is valuable for supporting learning, just wish I knew how to do more things but it is time, more things with them. • I do use YouTube with clips, films and I do show PowerPoint's				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• Yes, sometimes there will be a suggestion of showing what we have on our departmental drive. Sometimes there will be in the resources to assist the teacher, there are suggestions. Only in the resources column of the course outline. • There is also film, picture books includes PowerPoint's. Sometimes a PowerPoint can assist them in an assessment (i.e. oral) • In the outline it might say visuals (tend to use ICT)				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)	• Use of Moodle (LMS) internal and external to the class. We access Moodle for sheets to work on, activity sheets, extra reading, mainly a resource. • Also I get them to email me, I sometimes get them to write out an introduction in groups, they email it to me and I edit it for them and I put it on Moodle. In groups, so I might get 6 emails to edit them. • Videos • Write up in Word				
	Teacher Interview Q3eii How did you decide on what ICT applications to use with the students?	• No response				

	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Used the schools LMS - Moodle • It was an assessment posted on Moodle and the students had to create a picture book and design a Storyboard • Goals were discussed with the class. • Extra resources were add to Moodle for the students to use • They had 24/7 access to the assessment • Students were shown were to access the assessment and allowed to use an application to produce the picture book. • More confident • 7's were disorganised with the assessment				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Moodle – I enjoyed using Moodle when we do worksheets and assignments at school and at home. On Moodle you can find valuable information created by your teacher. I used the information to complete worksheets and assignments				
		• PowerPoint – I enjoyed using it because it was very easy and simple.				
		• Moodle – I enjoyed using it because you can see/ make notes of PowerPoint's and word documents you may use in/ during classes. What I did with it was watch PowerPoint's.				
		• Moodle – I enjoyed using it because it is all already there and I don't have to go searching for it and if I lose something it will probably be on Moodle. What I did with it was to view thing that teachers put upon it.				
		• PowerPoint – I enjoyed using this because the teacher made the PowerPoint very interesting while we were learning about 'fairy tales'. The whole class watched the PowerPoint slides.				
		• Internet – I enjoyed using the internet because it was quick and easy to find information. We researched Doctors Without Borders with a partner.				
		• Internet – I enjoyed it because it does help the lesson go by very fast. I liked it because it is way easier to search something up rather than looking in books. We search up what does the MSF do an mean.				
		• Internet – I enjoy using it because its fun and I can do anything on it. I searched on it for school work				

		• Moodle – I enjoy using Moodle because it is a simple way to collect work, contact teachers and other things. It is practically the only website we go on during class. I can easily open documents posted on the website, create my own profile, contact teachers and online users, access the courses and navigate the website.				
		• Moodle – I enjoy it because we work on the computers/ iPads, easier to do assessments.				
		• Internet – I enjoy using it because when I had to research on the Greek goddess Athena. I looked at the information and made a word pg about her.				
		• Nothing				
		• Moodle – I have enjoyed it because, if I'm at home and I have forgotten my homework or need help with something from my teacher, I can go into my courses or go on a chat. I will always figure out what to do. I normally go onto my courses and look up what I need for my work or sometimes I see what events are happening that week or who ahead in house points are.				
		• Microsoft Word – I enjoy using it because it was easier to complete online or school assignments. It has made my work a lot neater and easy to read. I have used 'Word' for almost all of my assignments.				
		• Moodle – I enjoy using Moodle it gives you worksheets when you have misplaced them, it also helps you through assignments/ assessments. I do work with it and enter forums and questions of the week.				
		• Nothing				
		• Moodle – It is quick, easy thing set up that can give us help and revision for upcoming tests. If we forget about something we can always access Moodle just in case. What I did with it had to view a theme and essay structures on it.				
		• Nothing				
		• Nothing				
		• Nothing				
		• Moodle – I enjoyed using it because it helps me with understanding things and helps me with work/ assignment. In English we looked				

		at things on Moodle like Word documents and how to write an essay. Also about the book against the odds.				
		• Moodle – I enjoyed using Moodle during English when we were learning about picture books and Mrs McNamee showed us different books on Moodle. We accessed Moodle and learnt about picture books.				
		• Nothing				
		• Moodle – That my teacher puts a lot of things on Moodle and I love having Moodle. If I forget homework at school I can go on Moodle and see if it is on there. What I did with it was get stuff for my class from there or sometimes in a class we have to go onto Moodle and do a lesson on Moodle.				
		• Nothing				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				

Appendix 17

LEA Rubric Case Study 8

Background of Class 8	• Learning Area of Class 8 is Mathematics • Class is held in a typical classroom layout. Whiteboard and desks for up to 28 students • The teacher has 13 years of teaching experience • Last week the teacher estimated 540 minutes of time spent using computers at home • The teacher has regularly been using computers at school with the students (averaging at least once a week) for 3 or 4 years • The teacher has been using computers on a regular basis for work related tasks for 5 years or more • Students in the classroom are pretty good at being engaged • The student's are a pretty motivated group and get involvement • Their behaviour is generally good but can be chatty • Rates the ICT knowledge and skills of the class as unknown, assumption – medium to medium high • The technology accessible in the classroom was 1 laptop POD (16 laptops) with another POD bookable for the class • Two students bring iPads to class • The teacher has access to a desktop computer/ laptop/ iPad, both can be networked the Interactive Whiteboard (IWB) • The classroom has Wi-Fi access to the school network, Internet and the schools Learning Management System (LMS) • There were 18 students in the classroom

	Source	Evidence	NU	D	R	C
Knowledge Building	**Teacher Survey Q7a** When students use computers in your class how often do they have:	• Better Understanding of the curriculum content - Weekly • Students learn more quickly – On occasion				
	Teacher Survey Q8a When computer applications (e.g.) Internet, Blogs, Moodle, Application (i.e. Word, Publisher, etc) are generally used in class do the:	• students use skills you have taught plus some of their own skills • students do not require to be taught and learn for themselves				
	Teacher Survey Q8b When learning in the classroom with computers do the students:	• None apply.				
	Teacher Interview Q2b How often do your students use ICT in activities?	• Rarely. Might use on occasions throughout the year. • Mainly used for demonstration, instruction.				
	Teacher Interview Q2c	• No				

	Do you assess the student's prior ICT knowledge prior to an activity? If so, do you then incorporate this into the activity?					
	Teacher Interview Q2d Do students normally have the ICT skills to do the activities without you teaching them?	• Sometimes not as in if I am going to use it ie lets open up Excel, lets create a spreadsheet, lets create a compound interest formula. • I will actually survey them and do a quick who has used Excel before to get a range of hands but generally its a 1/3 or less and even then I don't think the knowledge is very high, so no. That's normally where I fire it up on the board, large screen, and demonstrate how to use Excel				
	Teacher Interview Q2e How do you extend the students ICT skills in an activity?	• If I am doing Excel I am doing it for a specific skill. We are generating and modelling this sort of thing for instance and there might be a few questions and that is it				
	Teacher Interview Q2f In what ways do you connect what the students do with ICT to society?	• No				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Spread sheeting in terms of financial stuff • It was successful in that it exposed students to spreadsheets and into how spreadsheets work i.e. creation of formulas. So it was successful in that instance. • Secondly it was successful in that it gave students slightly different view of the concept doing manually i.e. with the calculation, table. It just gave them a different perspective and that there are some quicker ways and more than one way to do a problem • Students shown basic skills of Excel				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Casio Calculator – we are shown how to use our calculator to the best of our abilities. I am able to apply it to all my math work and use the knowledge in exams and test.				
		• Microsoft Excel – allowing to see mathematics put into practice using a computer, and instead of being taught from a text book. I was able to use the application to find out about maths ideas electronically and manipulate the ideas.				
		• Classpad – it helps me to conduct my work faster and efficiently.				
		• Casio Classpad – It is convenient when doing homework, looking at instructions on the board. Used it on occasion at home.				

		• Casio Classpad – my teacher shows us how to use the calculator by displaying an interactive calculator on the board. I am able to learn effectively, and fast. It is also easier to take for help.				
		• Casio Classpad – It makes finding answers to hard questions easier and quicker. It makes everything more efficient and easier to understand. Found questions for maths.				
		• Casio Classpad – It is informative as it teaches us quick and easy way to perform calculations on the calculator. Used it occasionally at home.				
		• Interactive Classpad – I enjoyed using it because I learn from it, can follow instructions/ steps on my own classpad. It was on the board so I mainly just learnt from what was being shown to us.				
		• Casio Classpad – I can see how to maximise efficiency as the teacher is doing it on the projector screen. View what the teacher is doing and copy that on my own device.				
		• Classpad – because when I forget to bring mine in I can look at the board and see what he is doing and usually follow it. Answer questions and learn new classpad techniques.				
		• Casio Classpad – because it helped me to know about its different capabilities and its various functions. I used those skills in the classroom to solve problems quickly.				
		• Classpad – Help us to learn more and easier because we can see what he's calculating and at the same time teach us how to calculate it. Calculations that is taught by the teacher and use it in the test and/or class.				
		• Casio classpad – it shows us fast and easy ways to solve problems on the calculator. It helps our skills when using the calculator. Don't use the app, the teacher shows us.				

	Source	Evidence	NU	D	R	C
Active Learning	**Teacher Interview Q4a** When using applications with the students for the first time how do you instruct in the use of the application? (i.e. booklet, demonstrate, leave to learn for self)	• Demo on PowerPoint • No booklets				
	Teacher Interview Q4b When you instruct do the students ask further questions?	• Yes				
	Teacher Interview Q4c Do ICT activities allow the students to use (search)/ and or produce (make)?	• Yes, producing and making a spreadsheet which is modelling a particular financial				
	Teacher Interview Q4d Do you give opportunity for the students to extend themselves with the application? (i.e. go further than what you taught)	• No				
	Teacher Interview Q4e How do you deal with a question from a student that you don't know how to do on the computer?	• In this particular class I haven't had a question but in another class I have had little things. • A few ways I would email to support is one way I have done it and emailed off to the Head of ICT. • If a kid would ask me I would say no I don't know but I will try and find out				
	Teacher Interview Q4f Do you allow students to decide which applications are best for the task at hand?	• No, with this class they were told specifically that they were going to use Excel				
	Teacher Interview Q4g Do students document how they find information on the computer?	• No				
	Teacher Interview Q4h Do students reflect on how ICT was used in an activity and how they could have done better?	• No				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Spread sheeting in terms of financial stuff • It was successful in that it exposed students to spreadsheets and into how spreadsheets work i.e. creation of formulas. So it was successful in that instance.				

		• Secondly it was successful in that it gave students slightly different view of the concept doing manually i.e. with the calculation, table. It just gave them a different perspective and that there are some quicker ways and more than one way to do a problem				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Word – puts on big screen and does worksheets with us, interactive learning. Able to see working out and actively learn.				

	Source	Evidence	NU	D	R	C
Engagement, motivation and challenge	**Teacher Survey Q7** When students use computers in your class how often are the opposite outcomes evident:	• How often do they think in different and interesting ways? - Daily • How often do they help each other? - Daily • How often do they complete more work? - Weekly • How often do they enjoy learning? - Daily				
	Teacher Survey Q5i For how many years have you been regularly using computers at school with students(Averaging at least once a week)	• Have been using computers regularly with the students for the last 3 to 4 years				
	Teacher Survey Q6 How often did you facilitate the use of computers by your students last TERM.	• I have facilitated the use of computers with the students on occasion this term				
	Teacher Survey Q8c In the class when using ICT for activities do the students:	• find the activity interesting and have to work some problems out for yourself • enjoy the activity but find it challenging to complete				
	Teacher Interview Q2a What is the main purpose in using ICT in your classroom?	• A few areas, my primary one would be in terms of instructions bring up sheets they are working on, working with them on the whiteboard whilst working with that and at the same time I will bring up the Casio Calc up onto the screen at the same time, just in case we need to some calculations they know which buttons I am pressing because it is a relatively complex device much easier that they can see. That would be my main one from an instruction point of view, there will be times where I will bring up Excel spreadsheets to demonstrate things like gradient of a curve, various content that I have developed for normal distribution curves • I use ICT for attendance and eMaze				

		• mainly now and again I might use for a PowerPoint, but I don't use them that often				
	Teacher Interview Q2g To extend students how do you challenge then when using ICT? 1 to 3 How challenged do you think your students are in using ICT?	• No				
	Teacher Interview Q3b How do you engage (motivate) the students in the use of ICT in the lesson?					
	Teacher Interview Q3bi Do you take their interests into account? If so, how (i.e. develop ICT activity around the interest)?	• No				
	Teacher Interview Q3bii How do you know they are engaged?	• Basically if they are plugging or if there are their talking to a friend saying how do I do this next bit, if I can see it later on in the task then I will take that as being engaged • Otherwise the other ones that are turning around and chin wagging they are not engaged.				
	Teacher Interview Q3biii Do you set goals for what they need to achieve?	• No, the goals would have been we are going to in this spreadsheet activity we are going to model these particular questions				
	Teacher Interview Q3biv Do you discuss the goals prior/ post to the ICT activity?	• Yeah				
	Teacher Interview Q3bv 1 to 5 how engaged are students in using ICT?	• Look I would say about a 4 with this particular activity				
	Teacher Interview Q3c What potential do you see for ICT to support learning in your classes?	• Probably lots but the same time I haven't delved too much into the possibilities yet but I do see a huge potential for it • Examples are like the Calculator and eBooks instead of text books				
	Teacher Interview Q3d Have you incorporated ICT into your courses? No -Are you making any changes or steps to incorporate ICT into your subjects?	• Only in that if it appears in the syllabus it that particular course i.e. we are modelling spreadsheets. No we have not done additional on top of that.				
	Teacher Interview Q3e What activities or projects have been supported by ICT use over the last term? (e.g. project work, maths skill practice, science, slideshows)					
	Teacher Interview Q3ei What did the students do and what did you do? (e.g. find information, class discussion using projector)	• No haven't got them onto a laptop this term				

		• might use Moodle for solution i.e. if I am in the class I would say to the students that I am putting the solutions up there, discussing with the kids and getting them to download the solutions for themselves				
	Teacher Interview Q3eii How did you decide on what ICT applications to use with the students?	• Moodle for copy of test/ marking keys				
	Teacher Interview Q5 Can you give an example where you have used ICT in an activity with success? (I.e. students very motivated)? What application? What did it achieve? How was it successful?	• Spread sheeting in terms of financial stuff • It was successful in that it exposed students to spreadsheets and into how spreadsheets work i.e. creation of formulas. So it was successful in that instance. • Secondly it was successful in that it gave students slightly different view of the concept doing manually i.e. with the calculation, table. It just gave them a different perspective and that there are some quicker ways and more than one way to do a problem				
	Student Survey Q6 Give one example where you have enjoyed using computers as part of a lesson.	• Nothing				
		• Moodle – I enjoy using it because it's easy to access, neat set up/ layout. What I did with it was access previous exam papers for study.				
		• Maths Online – enjoyed it because of its interactive activities and quick tutorials to help understand the idea. What I did with it was use it to practice questions and chapters studied before.				
		• Excel- Interactive and teacher show us graphs and how different values change them.				
		• Word – It makes it easier to do maths problems as a class because the word page is projected on the whiteboard and the teacher goes through the equation with the class. The whole class works through the maths problem.				
		• Excel – it allowed me to quickly get the answer without resorting to much more complex methods. It was set up as a graphing tool and allowed me to quickly see points on a graph as given by an equation.				
		• Moodle – gives me access to the answers of revision booklets and to obtain more worksheets to prepare me for tests and exams. It is also very easy to use. I checked my answers and printed out post exam papers for practise.				

		• Excel – I enjoyed using it because I am able to view how the graph has been changed and transformed. I used it once at home to complete my homework.				
		• Excel – its good way of explaining. I watched as the teacher used it to talk.				
		• Word – puts on projector and its more interactive and easier to see. Copied notes off it.				
		• Excel – it shows a clear example in bold of what we are doing in class. It enables us to see how our teacher graphs and how the shapes of graphs change with changing numbers. I enjoyed it because it is interactive and more interesting to watch than reading about it, in a text book.				
		• Excel – visual learning is easier learning, easier to understand the changes in parabolas when the equation is slightly altered. Watched my teacher show it on the projector screen.				

Summary

	No Use	Developing	Routine	Comprehensive
Knowledge Building				
Active learning				
Engagement, Motivation and Challenge				