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What factors influence self-efficacy in teachers
using mobile digital technology within the
secondary school classroom?

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Abstract

As digital technologies develop and change so do the way these tools are integrated into classrooms. In particular as mobile digital technologies develop further, there is a need to investigate how teachers engage with these both personally and in the classroom. Research has consistently indicated that a key element regarding the use and integration of digital technologies in the classroom are teachers' underlying beliefs and attitudes, including self-efficacy theory.

In this study, changes in and factors influencing mobile digital technology self-efficacy are examined using a mixed methods research design. The study focused on the perspective of teachers in their first year of implementing a one-to-one iPad mini device programme within the context of an international school in Germany.

Over the course of the implementation, all teachers reported some increase in the use of the iPad mini in the classroom, regardless of their own personal self-efficacy concerning the device. Findings included self-efficacy influences such as enactive experiences, modeling and coaching, with enactive experience being a foremost contributor to the development of teacher mobile technology self-efficacy. A sense of classroom collective efficacy was also a key finding. This sense of collective efficacy demonstrates a shared confidence between teacher and students in the classroom context regarding the use of the iPad mini devices.

Device affordances in student organisation, differentiation (by difficulty and interest), and the encouragement of student agency were also evident as additional

findings in the data, and contributed to the teachers' perceived value of the iPad mini device.

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Chapter One: Introduction

The presence and importance of digital technologies and their integration into educational settings are continuing foci in education (Guerrero, 2005). Given the rapid growth of digital technologies in schools, the importance of teacher attitudes and beliefs when introducing new technologies mean this is an important area of research within education. With digital technologies reportedly providing high value for aspects of education such as personalised learning (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2011) as well as being linked to successful student outcomes (Ertmer & Ottenbreit-Leftwich, 2010), the relationship that teachers have with digital technologies warrants continued study. The impact of technology on the 21st century classroom, and particularly the potential changing roles of teachers (Wepner & Tao, 2002), and the benefits of e-learning to students (Wright, 2010), ensures this as a relevant area for continued study.

1.1 Rationale for the research project

Teacher beliefs and attitudes towards technology have been linked to their subsequent adoption of technology in teaching (Ertmer & Ottenbreit-Leftwich, 2010). A key element of these beliefs is self-efficacy wherein teacher beliefs about their competency are strongly connected to their use and integration of technology into the classroom (Watson, 2006).

Self-efficacy has been strongly linked to outcome and achievements of set skills or tasks (Pajares, 1996; Schunk & Pajares, 2001). The role of self-efficacy in digital technology uptake and continued use is increasingly of interest as technology use has become more prevalent in educational settings (Li, 2007). With the fast pace of development in digital technologies, continued research is needed to explore how self-efficacy influences the use of digital tools for teaching purposes. As many schools move toward one-to-one device programmes (where students are either provided with or bring their own device – typically mobile, such as a laptop or iPad), the introduction of multiple devices creates a new contextual environment in which to examine the role teacher technology self-efficacy plays in relation to technology usage in the classroom.

1.2 Purpose of the research project

This research project seeks to examine what factors influence teacher self-efficacy regarding digital mobile technology. Specifically, this study looks at how teacher digital technology self-efficacy changes, and potential influences in the formation of this technology self-efficacy. Exploring factors that influence self-efficacy can contribute towards knowledge of how to enhance and build these aspects to support teacher use and integration of digital technologies in the classroom.

1.3 Context of the study

The study was carried out in the context of a medium-sized English medium international school located in Germany. The research location was selected as it is at the beginning of a one-to-one iPad mini device implementation, and was

therefore able to provide an opportunity to observe influences and changes in teacher mobile technology self-efficacy over the course of the first year of device implementation.

1.4 Research questions

The central goal of this research is to explore in-depth teacher self-efficacy beliefs regarding the uptake and use of digital mobile technologies within the classroom.

The questions guiding this research are:

1. How does teacher digital mobile technology self-efficacy change over the first year of a one-to-one iPad mini implementation programme?
2. What are the influences on teacher digital mobile technology self-efficacy during the first year of a one-to-one iPad mini implementation programme?

1.5 Structure of the thesis

Chapter One outlines the structure for the thesis and provides a rationale for the research. Chapter Two reviews literature on self-efficacy formation and how this relates to both teaching and the uptake and use of digital technologies by teachers. Chapter Three outlines the methodology for the study, including the research tools used, and rationale behind the research method, as well as ethical considerations. Findings resulting from the research are presented in Chapter Four. Chapter Five discusses the data reported in Chapter Four in light of existing research and identifies connections with the literature presented in Chapter Two. Chapter Six presents the concluding thoughts and further implications arising out of the study, the role of the researcher and limitations of the study.

Chapter Two: Literature Review

This literature review seeks to outline what self-efficacy is, how it is formed, and explore how self-efficacy impacts teacher technology usage in 21st century classrooms.

The role of teacher attitudes and beliefs regarding digital technologies are central to understanding teacher behaviour regarding use and integration of these technologies into the classroom (Donnelly, McGarr, & O'Reilly, 2011). Key amongst these attitudes regarding the use and integration of technology in the classroom is a teacher's self-efficacy regarding the technology in question. Self-efficacy is strongly connected to beliefs regarding mastery, value and usability of devices, thus playing a role in their acceptance and uptake of technology in the classroom (Shea & Bidjerano, 2010). This importance of the link between teacher attitudes and integration of technology has been identified as a continued area for research focus (Abbit & Klett, 2007; Knezek & Christensen, 2007; Woodrow, 1992).

2.1 What is self-efficacy?

Self-efficacy can be broadly defined as an individual's personal beliefs regarding their own capabilities to influence or achieve certain outcomes (Bandura, 1994; Paraskeva, Bouta, & Papagianni, 2008; Shea & Bidjerano, 2010). It is considered central to an individual's ability to effect change, influencing choices individuals make regarding new situations or skills (Bandura, 2006).

This description of self-efficacy includes a sense of competency, as well as the notion of agency, indicating that it is not only what skills individuals actually possess, but also how they can mobilise their skills and resources to achieve particular goals (Bandura, 2007, as cited in Shea & Bidjerano, 2010). This implies that individuals are not passive in their interactions with their personal efficacy beliefs, but rather their choices regarding how they react to personal beliefs are central to the development and construction of self-efficacy (Bandura, 2006; Goddard, Hoy, & Hoy, 2000).

Connected to quality of life, Bandura (2006) suggests that self-efficacy beliefs govern both how an individual approaches new environments, tasks, and roles as well as how they are affected by emotional stressors. Rooted in Bandura's social cognitive theory, the concept of self-efficacy is not only important in terms of helping one understand how people are motivated, but also gives insight into how these motivations interact with various contexts, and their demands and impediments (Bandura, 2006).

Self-efficacy explores the complex interaction between cognitive beliefs, environment, skills, emotion and behaviour. Its relevance to achievement and behaviour is important as self-efficacy beliefs contribute to internalised rules affecting effort, persistence and perseverance in the face of new tasks or skills (Pajares, 1996).

Self-efficacy is strongly linked to success (Shea & Bidjerano, 2010). It has been positively linked to achievement outcomes, self-regulation, and cognitive learning

strategies (Schunk & Pajares, 2001) as well as greater persistence in tasks (Dweck & Leggett, 1988; Schunk & Meece, 2005). Self-efficacious individuals also possess a strong internal locus of control expressed as self-regulation that aids goal and outcome achievement (Shea & Bidjerano, 2010; Zimmerman & Cleary, 2006).

Self-efficacy is an important predictor of perseverance and persistence within a set task (Bandura, 1986, 1994). High self-efficacy is also linked with more risk-taking and a higher engagement with tasks in which sufficient challenge is perceived (Bandura, 1982). Higher self-efficacy has been linked to greater persistence when attempting new tasks, with specific relation to how an individual is motivated to master a new task (Overbaugh & Lu, 2008; Schunk & Meece, 2005; Schunk & Zimmerman, 1997; Zimmerman, 2000).

Self-efficacy is future focused (Shea & Bidjerano, 2010; Zimmerman, 2000; Zimmerman & Cleary, 2006). While this is true, it should be noted that the judgments individuals make regarding what is achievable in the future is founded on reflection upon prior experience, learned skills and achievements. This aspect specifically focuses the individual on what they may (or may not be able) to achieve when addressing a certain task in a specific context. Reflection upon past achievements enables future focussed judgments to be made regarding perceived ability. Therefore, while self-efficacy is future focused, prior experiences are key to providing information for self-efficacy judgments (Paraskeva et al., 2008).

Self-efficacy is characteristically task or context specific (Bandura, 1994; Paraskeva et al., 2008; Schunk & Meece, 2005; Schunk & Pajares, 2001; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Zimmerman, 2000). This means that although self-efficacy affects a wide range of areas in people's lives, it is limited to particular skills, tasks or contexts. While an individual may feel efficacious and competent in playing one sport, they may not carry across this confidence in their knowledge and coordination to other physical activities. Within the context of education, this may be seen through a student having a high sense of self-efficacy when it comes to mathematics, but low self-efficacy when it comes to reading. There is some evidence in literature to suggest a general sense of self-efficacy exists, which could be seen to traverse multiple operational domains (Luszczynska, Gutiérrez-Doña, & Schwarzer, 2005).

Self-efficacy and self-esteem are terms that are often interchanged. While self-esteem indicates an emotional connection to circumstances, self-efficacy is concerned solely with cognitive assumptions about ability, and how this connects to outcomes (Zimmerman & Cleary, 2006). Self-efficacy's domain-specific nature also differentiates it from the more generic self-esteem.

Research has shown that high levels of self-efficacy are associated with positive self-concept, use of high level learning strategies (S. Wang & Wu, 2008), expectations of success (Abbit & Klett, 2007), and perseverance in an activity (Puzziferro, 2008). Additionally, low levels of self-efficacy are associated with negative self-concept, anticipation of failure, and reluctance to attempt tasks (Hsieh, Cho, Liu, & Schallert,

2008). Self-efficacy has also been linked to proximal goal setting (Zimmerman, 2000).

Individuals with a well-formed sense of self-efficacy tend to be more motivated and invest more effort into new challenges and tasks, particularly if they perceive a successful outcome is possible (Schunk & Meece, 2005). This element of sufficient challenge in a task is also important - if an individual has a very high level of self-efficacy, they may not perceive any challenge or need for effort to be exerted to master new tasks, limiting their ability to extend skills (Bandura, 1982). Efficacious learners also display resilience. Resilience is an individual's likelihood to continue with a task even with setbacks, or to not internalise one failure as indicative of their whole ability. Once it is achieved, well developed self-efficacy tends to be resilient (Schunk & Meece, 2005).

Forethought, proactivity, and reflection are evident in a developed sense of self-efficacy (Zimmerman, 2000). The development of self-efficacy is a process in which the reflection on experiences is a key step to revising and individual's self-efficacy (Bandura, 2006). The individual's summation of an experience (against their own internal criteria) will determine whether their self-efficacy is enhanced or reduced regarding a certain domain.

2.2 How is self-efficacy formed?

Self-efficacy theory suggests that its formation is a cyclical process, requiring reflection upon successes and failures, rather than a linear, sequential approach

(Bandura, 2006). The inherent individuality of self-efficacy also means that what may positively affect self-efficacy for one student may lower self-efficacy for another, depending on what the individual perceives as success.

Self-efficacy is influenced (both positively and negatively) through four main sources of information on which judgments are made: Mastery (or enactive experiences), modelling, coaching (or exhortation/verbal persuasion) and physiological reactions (Bandura, 1977; Hinton, Simpson, & Smith, 2008; Margolis & McCabe, 2006; Schunk & Pajares, 2001). Margolis and McCabe however, suggest only three of these four sources of self-efficacy information are key, focusing on enactive mastery, modelling, and coaching (Margolis & McCabe, 2003). Each of these modes has a varying ability to affect self-efficacy, with research suggesting that enactive mastery is the most influential of the four key sources (Joët, Usher, & Bressoux, 2011).

Enactive or mastery experience is the most influential source of information that contributes towards self-efficacy, providing individuals with clear evidence that they are able to master a particular task (Bandura, 1982; Schunk & Meece, 2005). If an individual is not able to master (or feel successful) in a particular task, they then may then perceive a lower sense of self-efficacy through this experience. Bandura also suggests that notable increases in self-efficacy can be found when specific experiences contradict an individual's held belief (Bandura, 1982), where an unexpected successful experience may positively affect a person's self-efficacy in a particular domain.

Observation of similarly skilled individuals in similar contexts can encourage others to attempt tasks, as they perceive through the observation of the success of others that their success in similar circumstances is also possible (Schunk & Pajares, 2001). This source of information for self-efficacy is called modelling. However, if the model is unsuccessful in the task, the self-efficacy of the observer is negatively impacted (Schunk & Pajares, 2001). The extent to which the model is influential is directly related to the similarity of the model to the observer as perceived by the observer (Bandura, 1994).

Coaching or verbal persuasion can be given by either peers or teachers and has some impact on motivation to try new/challenging tasks that could lead to higher self-efficacy. Research also indicates this form of influence can be fleeting, especially if the individual is not successful in the attempted task (Schunk & Meece, 2005).

Physiological responses refer to the body's natural physical responses (positive and negative) in a given situation. In a case of arousal that results in fear or anxiety, this can then translate into avoidance behaviours which can lower efficacy (Bandura, 1986) and is called the 'intrusive affective arousal' (Bandura, 1989, p. 730). Conversely, if individuals believe they have the capacity to master risks in particular situations, they are less likely to fear the context in which they carry out the task (Bandura, 1983).

Intrusive affective arousal can cause avoidance of certain tasks and therefore prevent mastery (Bandura, 1982). While this may influence an individual's attempt at new skills, it is usually not the only reason that avoidance of tasks may be displayed (Bandura, 1983, 1986). In situations in which fear arousal is present, low self-efficacy is often observed (Bandura, 1982, 1994; Schunk, 1991; Zimmerman & Cleary, 2006).

In terms of the connection between self-efficacy and changed attitudes or achievement in particular domains, Bandura (1982) suggests that this change is not necessarily immediate and that there may be a delay as to how quickly new mastery experiences translate into growth in interest or efficacy towards previously inefficacious or disliked tasks or skill areas. Reflection on past achievement, comparison with others and social persuasion are all sources of information used to make judgments about self-efficacy (Shea & Bidjerano, 2010).

2.4 Teaching and self-efficacy

Teacher self-efficacy relates to the perceived capabilities that teachers possess in regards to their presence in the classroom, ability to effect change in student learning, and their ability to participate in the collegial environment. It is identified as a key factor in influencing student achievement (Ashton, 1984; Henson, 2001), and is a long established field of study (Protheroe, 2008).

Teachers with a high sense of self-efficacy believe that they are influential in students' successes, and conversely take responsibility for student failures (Ashton,

1984). They are apt to examine their own practice and approach to the classroom as a source for change rather than solely placing the responsibility for non-success on the shoulders of the students (Protheroe, 2008). Equally, teachers with low self-efficacy are more likely to have low expectations of students, coupled with expectation of student failure. High efficacy teachers also perceive their work to be meaningful and of importance. Their relationships with students are characterised as being positive and accepting (Ashton, 1984).

Teachers with a high sense of self-efficacy tend to perceive intelligence as a malleable and fluid entity, rather than a fixed construct (Dweck & Leggett, 1988). They believe they are able to effect change in student achievement, and possess positive teaching behaviours (Henson, 2001). A teacher's self-efficacy level has also been linked to their creation of classroom activities for students (Abbit & Klett, 2007; Bandura, 2006).

Teachers with lower self-efficacy tend to place responsibility for failure on the personal contexts of the students (such as family or socio-economic factors), or fixed ability/intelligence. They perceive that they are not able to effect change because of fixed environmental factors and feel a low sense of agency, and subsequently hold low outcome expectations for students. Low efficacy teachers are also quicker to refer students to learning support systems such as special education (Protheroe, 2008; Tschannen-Moran et al., 1998).

2.5 Collective efficacy

Efficacy formation can also be more than an individual affair. Similar to personal self-efficacy, collective efficacy refers to the collective beliefs of a group to achieve specific outcomes (Bandura, 1982, 1998, 2006). Bandura explains the potential power of this efficacy by elaborating that collective efficacy forms a synergistic approach to problem solving (Bandura, 2006). Personal efficacy is strongly connected to collective efficacy, as people do not live in isolation, participating rather as organisms in a larger social system (Bandura, 1998). Research on collective efficacy has been supported by other researchers, indicating a potentially reciprocal influence between collective and personal self-efficacy (Klassen, Usher, & Bong, 2010).

Teacher collective efficacy is a recognised domain of self-efficacy and has been directly related to student achievement (Goddard et al., 2000; Klassen et al., 2010). Research also suggests that collective teacher efficacy centres on the perceived ability of the entire group's collective skills and resources (Goddard et al., 2000; Klassen et al., 2010; Pajares, 1996). Of interest is the potential for collective efficacy to influence the success or failure of particular initiatives. Kopcha supports this notion by suggesting that there is a "community of practice" that can be inherent in group environments which can influence how new initiatives are received and subscribed to (2012, p. 1110).

2.6 Self-efficacy and technology

The continued implementation of and pervasiveness of technology in educational contexts mean that the study of self-efficacy and technology continues to be a relevant area of study. Given the key link between self-efficacy and mastery, it is clear that examination of self-efficacy within the domain of digital technologies is important, as this continues to be an area of growth in educational arenas. There is some indication in literature that the influence of self-efficacy may be more important than an individual's actual technology skill set, suggesting that while these skills are important, they are not as valuable as knowing how to use the technology in a meaningful way in a classroom context (Ertmer & Ottenbreit-Leftwich, 2010). For the purpose of this study, digital technologies are defined as "the use of digital resources to effectively find, analyse, create, communicate, and use information in a digital context" (Unknown, 2014). This definition encompasses both e-learning and mobile learning (m-learning), the use of digital devices, as well as software and apps used.

The Technology Acceptance Model (TAM) was a model developed by Fred Davis to ascertain the level to which an individual uses technology (Chuttur, 2009). This model suggests that self-efficacy is an important indicator of acceptance and use of technology, indicating that the easier a user perceives technology to be, the higher the self-efficacy associated with this technology use will be (Davis, Bagozzi, & Warshaw, 1989). This model suggests two main constructs through which we can examine to what extent technology is accepted by users.

Perceived ease of use and perceived usefulness form major factorial aspects when considering how technology is adopted in a given situation (Chuttur, 2009). Familiarity with a particular device or tool is also considered a key element to building comfort and ultimately use of digital technology (Mueller, Wood, Willoughby, Specht, & Deyoung, 2005).

Similar to other forms of self-efficacy, technology self-efficacy can be divided into separate domains, including online (or internet) self-efficacy, specific device efficacy (such as laptop vs. smartphone) or classroom integration efficacy. Enactive mastery is the most powerful form of influence on self-efficacy constructs (Ertmer & Ottenbreit-Leftwich, 2010). Allowing teachers time to explore technology and empowerment of “small successes” are key elements to building technology efficacy (Ertmer & Ottenbreit-Leftwich, 2010).

2.6.1 Technology and teaching self-efficacy

There is considerable agreement amongst researchers that technology self-efficacy is a key component to be considered when addressing technology integration in the classroom (Abbit & Klett, 2007; Celik & Yesilyurt, 2013; Mueller, Wood, Willoughby, Ross, & Specht, 2008; Soa, Choi, Lim, & Xiong, 2012). As discussed earlier, self-efficacy is a task or domain specific entity (Luszczynska et al., 2005) and as such individual teacher efficacy and teacher technology self-efficacy when using digital technologies in the classroom can be considered to be two different domains (Shinas, Yilmaz-Ozden, Mouza, Karchmer-Klein, & Glutting, 2013).

Several researchers suggest that the use of ICT technology is essential to successful teaching outcomes, indicating the importance of technology integration in current educational contexts (Ertmer & Ottenbreit-Leftwich, 2010; Overbaugh & Lu, 2008; Rau, Gao, & Wu, 2008). Computers have been recognised for the potential to “provide an open, creative learning environment in which students can think and create knowledge at higher levels” (Overbaugh & Lu, 2008, p. 43). In addition, they identify that in order for teachers to embrace and engage with technology in the classroom, they must first have an underlying positive efficacy when using technology and also possess an underlying belief in the meaningful employment of technology within the teaching context (Mueller et al., 2008; Uslu & Bümen, 2012).

Pedagogical beliefs about the value and use of technology can also heavily influence whether a teacher will engage on a curriculum level with technology integration (Lai & Pratt, 2008). While the integration of technology in the classroom may not create a high level of personal anxiety for the teacher, doubt about the value of the use of the device in the classroom may influence the extent to which one perseveres in the implementation of technology for curriculum development purposes.

Teacher attitudes towards technology are indicated as potential barriers by several authors (Abbit & Klett, 2007; Diem, 2000; Ertmer, 1999; Kopcha, 2012). In order to address these underlying attitudes a certain degree of self-awareness is necessary in order to address beliefs that may hinder technology integration. Mueller (2008) suggests that as physical barriers to technology integration lessen, teacher perception and attitudes becomes increasingly important. Not only is the

study of self-efficacy relevant in regards to technology use, the intention of the teacher in terms of use of the technology is also inherently important. Teacher perception of the value and use of the device can play a key role in adoption of technology in the classroom (Donnelly et al., 2011). Added value that the use of technology brings to the classroom includes engagement which is also strongly linked with success (Oblinger, 2014).

There is some suggestion that when the introduction of technology is systemic or mandated, then teacher attitudes or beliefs towards technology (including self-efficacy) may be minimised regarding technology uptake, as individuals are more focused on extrinsic motivation such as succeeding in their employment position (Brown, Massey, Montoya-Weiss, & Burkman, 2002).

While a teacher may have a high personal level of comfort with technology, this does not automatically equate to their feeling confident about introducing it into the curriculum (Lai & Pratt, 2008). This is an important distinction and may go some way to explaining possible barriers to teacher self-efficacy and subsequent technology integration.

Paraskeva et al. (2008) suggest that teachers who possess higher technology self-efficacy also are “more open to new ideas and they are more willing to experiment with new methods” that can benefit students (p. 1084). They also suggest that a teacher’s perception of their ability with the intended technology is of prime importance for successful integration. Hesitation toward computers can be an

indicator of computer anxiety, which may mask low technology self-efficacy (Celik & Yesilyurt, 2013). It is also suggested that prior attitudes, knowledge and experience towards technology significantly and positively affect perceived computer self-efficacy (Celik & Yesilyurt, 2013). Abbit and Klett (2007) refute this, stating that their research found no clear link between perceived usefulness of technology and technology integration self-efficacy.

There is some suggestion in existing research that the factors influencing technology use and technology integration are complex and as such worthy of separate study (Soa et al., 2012). This distinction of a separate self-efficacy domain encompasses the idea that while a teacher may be individually confident regarding technology, this confidence may not carry over into classroom integration of technology (Abbit & Klett, 2007).

Ertmer (1999) suggests that technology integration can (at times) appear to directly challenge traditional teaching styles. Should the introduction of new digital technologies also effect teaching style/role change, these new experiences may affect teacher-efficacy in regards to the use of the device in the classroom (Paraskeva et al., 2008).

As the emergence of mobile technology usage in the classroom is relatively recent, there is not a large body of established research as yet available for consideration (Abbit & Klett, 2007). Integration of mobile technology is a multi-faceted matter, where self-efficacy plays a significant part. While it is not the only contributing

factor, its contribution towards perceived ability warrants further study into its contribution to technology uptake and integration in our schools.

Chapter Three - Methodology

This chapter outlines the philosophical underpinnings for the chosen methodological approach to research, including which approaches to research are appropriate to both the research context and research questions. Research methods such as the selection of participants, data collection methods and ethical considerations are also outlined in this chapter.

3.1 Purpose of the research project

As the use of mobile technologies such as tablets and smartphones becomes more prevalent in classrooms, knowledge surrounding how teachers interact with these technologies is increasingly relevant. The goal of this research is to identify what factors may influence teacher self-efficacy when using mobile technologies in the classroom. The study looks at various teachers' experiences in the chosen international school context and seeks to contribute to the growing body of research concerning teacher self-efficacy in relation to technology usage in the classroom.

3.2 Research Questions

The central goal of this research is an in-depth exploration of teacher self-efficacy beliefs regarding the uptake and use of mobile technologies within the classroom.

The guiding research questions are:

1. How does teacher mobile technology self-efficacy change over the first year of a one-to-one iPad mini implementation programme?

2. What are the influences on teacher mobile technology self-efficacy during the first year of a one-to-one iPad mini implementation programme?

3.3 Research design

Mixed methods research allows a researcher to gather multiple sources of data through various means in order to gain a wider picture of a particular area of study. Blending both hard and descriptive data, mixed methods research designs also allow the researcher to overcome any limitations of a single particular design. This ability of one method to complement another is a key reason to explore a mixed methods approach the research study as it provides opportunities for triangulation, clarification and development of data (Burke Johnson, Onwuegbuzie, & Turner, 2007).

A key element of self-efficacy is that it is inherently subjective and relies heavily on the perception of subjective competency beliefs of individuals (Bandura, 1977). This particular research project is therefore intentionally founded within a subjective perspective (Creswell, 2003). The belief that individuals carry their own tacit knowledge of self-efficacy is a foundational knowledge claim in this study. As such, a predominantly qualitative approach, where both a depth and richness of personal perspective is found, is suitable for this study (Yin, 2003).

To summarise the key knowledge claims underpinning this study:

1. Self-efficacy is an inherently personal and individual construct, based in a subjective perspective category, best suited to a (mostly) qualitative approach.
2. An individual's personal narrative is rich with information, nuances and perspective relevant to a study on self-efficacy.

The methodology adopted for this inquiry is a fixed sequential mixed methods approach (Creswell, 2003), with data being both quantitatively and qualitatively sought, allowing one form of data collection to inform and confirm the other. This method of research is appropriate given the flexibility to present opportunities for various types of data (Yin, 2003). This is relevant as the research conducted seeks to confirm connection to existing self-efficacy concepts as well as gather new information regarding factors influencing self-efficacy in the use of mobile technologies in the classroom.

Qualitative data collection is also most appropriate for researchers who are seeking to examine a subject's personal perception and understanding of themselves and the world around them (Berg, 2009; Creswell, 2003; Yin, 2003). Self-efficacy is, by its very nature, a subjective perception and as such, an approach to research of this construct must also both consider and embrace the unquantifiable nature of the selfhood held at the core of self-efficacy.

A sequential mixed method approach is considered appropriate (Creswell, 2003) combining an initial anonymous online survey followed by a series of three

interviews with a small subset of teacher participants, who demonstrated a range of self-efficacy beliefs. Creswell suggests that this approach is useful as it allows the researcher to use a quantitative data collection process to set starting points, or provide information for finding appropriate participants for more in depth qualitative data collection (2003). This is particularly appropriate with the chosen site where a larger number of teachers could potentially participate in qualitative research. It was initially intended that a wider spread of teacher technology self-efficacy beliefs would be sought for this study, however due to the number of respondents, the spread of self-efficacy beliefs was somewhat narrower than anticipated, although some variation of teacher technology self-efficacy beliefs were still evident in the teacher participants.

a) Survey

An initial intention of the research was to establish what range of self-efficacy beliefs existed in the research context of the research site: a medium sized international school located in Germany. In addition, the survey was intended to identify potential participants for Phase Two of the study. A survey is an appropriate method in this study as it allows a larger random number of participants to indicate their responses to a formulated set of self-efficacy questions.

The researcher developed the questions posed in the online survey (Appendix E). Wang's Computer Technology Integration Survey was consulted (L. Wang, Ertmer, & Newby, 2004), however the researcher sought to make the survey tool specifically

applicable to the contextual implementation of mobile technology. Therefore, a simplified contextualised set of questions was designed. When participants completed the Survey, the researcher was able to directly access results through the SurveyMonkey website (www.surveymonkey.com).

b) Longitudinal semi-structured interviews

Interviews form a rich qualitative data source reinforcing their value in this study. The language choices that participants make when expressing their answers to questions are also rich in data which is particularly relevant when researching personal self-efficacy constructs (Dweck & Leggett, 1988).

A series of interviews is appropriate for this study due to their personal and in-depth qualitative nature. This method allows for the researcher to focus on what can be learned from a specific case then studied to form general conclusions from a particular situation (Denzin & Lincoln, 2003; Yin, 2003). Specifically, a long term or longitudinal approach is relevant, as this study seeks to examine the self-efficacy of individual teachers over an extended period of time, in relation to in mobile technology use in the classroom. In the context of this study, the individual teachers will be initially considered individually, and then a thematic analysis will be carried out to determine common themes that arise from the teachers as a whole.

3.4 Selection of research site

The specific research location was chosen because it is in a unique position of being at the beginning of a one-to-one iPad mini device implementation, where all

students and staff were issued with iPad minis for use in the classroom and for mobile learning, beginning in the 2013-2014 school year.

The school is an English-speaking international school based in Germany, following a northern hemisphere school year, beginning in August and finishing in June. The school issued teachers of the relevant grades (Grades 6-8, 12-14 year olds) with the devices prior to the end of the 2012-2013 school year (June 2012). Teachers were also provided with a range of professional development options prior to students receiving the devices. Students in the specified grades received their devices in September/October of the 2013-2014 school year.

This iPad mini implementation provided a strong research opportunity to explore teacher self-efficacy beliefs regarding the uptake and use of mobile technologies within the classroom. The school caters for approximately 800 students, and provides education from early childhood to high school years, using the International Baccalaureate curriculum ("IBO Website," 2014). All three programmes available from the International Baccalaureate Organisation are offered at Deutsche International School, including the Primary Years Programme, the Middle Years Programme and the Diploma Programme.

Approximately 60 full time teachers are employed across the whole school and come from a variety of cultural and educational backgrounds, as do the students. The school website outlines key features of the school culture, including embracing internationalism, promoting inquiry in learning, and respect for others.

The high school has four terms, each approximately nine weeks long. As the medium of instruction is English, all teachers are highly proficient in English. All teachers teaching grades 6-8 were provided with an iPad mini for their own usage in the classroom. All classrooms have either a SMART Board or projector, as well as access to digital cameras, printers and bookable computers (laptops and desktops).

Professional development training for iPad mini usage was provided in an on-going manner in frequently training sessions where teachers were invited to sign up and attend any number of repeated sessions. Either the school's Educational Technology Coordinator or iPad technician provided these sessions. The iPad technician and Educational Technology coordinator were also available to work with teachers on a one to one, "drop in" or appointment basis.

3.5 Selection of teacher participants

While the school provides education from students from ages 3 to 19 years, teachers working in the Middle Years Programme were the focus for this research. Teachers of these grade levels were the first recipients of an iPad mini device for both individual learning and integration into the classroom and the first teachers fully immersed in the one-to-one programme at the school.

In addition to gaining initial self-efficacy information from those participating in the iPad mini implementation, the online survey also sought to In order to access a

range of self-efficacy beliefs, the invitation to participate in the online Survey was issued to all 48 teachers involved in the first stage of the iPad implementation.

Teachers were invited to participate in the anonymous online Survey via email from the school's Educational Technology coordinator, sent on behalf of the researcher (Appendix C). Criteria for participants included those participating in the Grade 6-8 iPad mini rollout, in a classroom teaching capacity, and would be working in the school in this capacity for the 2013-2014 school year.

Questions within the Survey were designed to establish how efficacious participants felt in relation to technology; specifically mobile technology. The survey was issued at the beginning of the implementation. Several Survey respondents with a range of efficacy beliefs indicated a willingness to participate. Of the seven respondents who indicated a willingness to participate in Phase Two of the research, only five were suitable for Phase Two of the study. One staff member was leaving, and another was not a classroom teacher.

Five participants was an acceptable number for this study as it enabled the researcher to explore a range of efficacy perspectives (should a range of participants agree to participate in the study) in a range of different subject areas, allowing for some connection between participants' self-efficacy experiences where possible.

Of the five teachers who elected to participate in Phase Two of the project, there was a range of gender, subject areas taught and self-efficacy beliefs including those who were highly efficacious to those who were less so. Participants were given pseudonyms to protect their identity throughout the course of the study and in the data analysis.

3.6 Credibility

Throughout the investigation, credibility of data was pursued through the use of a sequential mixed method approach, allowing for both confirmation of common themes and differences in participant data. Comparison of themes revealed by collected data with existing literature also offered analytical triangulation with existing themes in literature and research.

In order to further ensure trustworthiness of the data, a multiple approach to data collection was employed (Yin, 2003). Through the primarily quantitative initial teacher survey, to a multiple interview approach, data about the individuals and their perspectives on self-efficacy was collected through the series of in depth, semi-structured interviews.

In order to increase reliability of the study, the semi-structured interviews followed a similar line of questioning throughout each individual interview. While some questions were accompanied by follow up questions, key questions were asked of all participants. This allows for reliability in analysing across teacher data sets, as well as the verbatim use of teacher responses. The research supervisors prior to

commencement of the study reviewed questions for the online survey and longitudinal interviews.

Interviewees were provided with transcripts of the interviews for inspection to ensure the transcript was an accurate representation of their responses. Combining both the initial online survey and subsequent semi-structured interviews provides a depth of data, enabling rich information for the ‘thick description’ necessary for validating qualitative research (Cohen, Manion, & Morrison, 2011).

Transparency with methodological approaches also seeks to reinforce confirmability (Shenton, 2004). Through clear and in-depth discussion of the research context and resultant data, readers can assess for themselves the transferability of the study (Cohen et al., 2011).

3.7 Methods of Data Collection:

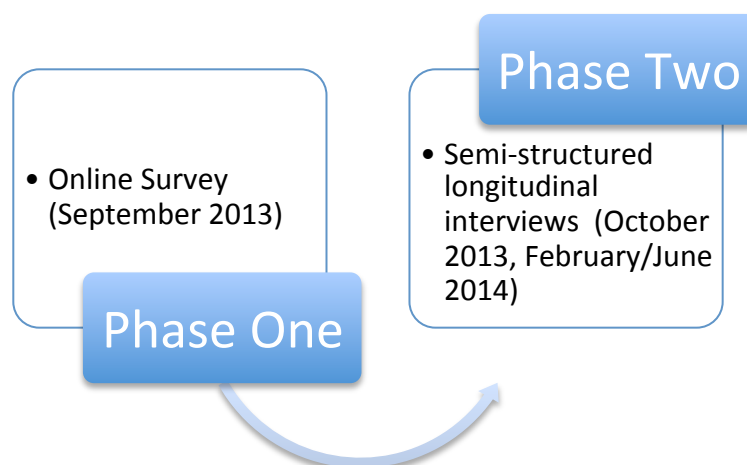


Figure 3-1: Overview of methods of data collection

Two main methods of data collection were used to gather data for the study. Data collection began in October 2013 (at the beginning of term two of the school year), and concluded at the end of June 2014 (term four of the school year).

a) Phase One of research – Anonymous online survey:

An initial approach to prospective participants was made via email on behalf of the researcher by the school's Educational Technology Coordinator, which included a short introduction, participant information sheet and a link to the anonymous online survey (Appendix C). This survey was undertaken at the commencement of the implementation, and was administered using the Survey Monkey website (www.surveymonkey.com).

This initial survey incorporated Likert-type questions (using five descriptors including Seldom, Sometimes, Usually, Mostly and Consistently) where participants were asked to rank their responses to questions regarding both general and mobile technology and the use of such in the classroom. The online survey also provided for open-ended responses for all questions, allowing participants to indicate if they were open to being invited to participate in Phase Two of the research project.

b) Phase Two of research – semi-structured Interviews:

A semi-structured interview approach was adopted for Phase Two, where a total of 15 semi-structured interviews (three per research participant) took place within the first year of the iPad mini one-to-one device implementation at approximately four-monthly intervals. Questions developed by the researcher, based on key self-

efficacy themes from the technology self-efficacy literature, were also used in the semi-structured interviews (Appendix I).

Each interview was a maximum of 30 minutes long, and was focused on the individual teachers' experiences of the implementation of the iPad mini device within the classroom. Interviews were spread over the course of the year, so as to observe potential changes in self-efficacy evenly over the first year of implementation. The ability to carry out audio recordings of the interviews, and subsequent transcription of the data allows for deep analysis of the data to inform the findings for the study. Each interview was transcribed, using a transcriber who signed a confidentiality agreement prior to commencing (Appendix L).

c) Data collection overview:

Table 3.1 below indicates an overview of the data collection process at a glance.

Table 3.1: Data collection overview

Data Collection Method	Date	Structure	Purpose
Online Survey	October 2013 (beginning of the implementation)	18 questions, focusing on technology self-efficacy using a Likert scale for responses.	Gain foundational data for self-efficacy Provides data for beginning of the implementation and for invitation to Phase Two of research
Semi structured Interview – Interview One	November 2013 (2 months into implementation)	<ul style="list-style-type: none"> • Approx 30 min interview with each teacher • Semi structured interview questions • Audio recorded • Interviews were transcribed 	Gather rich data about each teacher's self-efficacy towards the beginning of the first year of the one-to-one iPad implementation.

Semi structured Interview – Interview Two	February/February 2014 (5-6 months into implementation)	<ul style="list-style-type: none"> • Approx 30 min interview with each teacher • Semi structured interview questions (same questions as Interview one) • Audio recorded • Interviews were transcribed 	Gather meaningful data about each teacher’s self-efficacy mid way through the first year of the one-to-one iPad implementation. Focus on changes and experiences between the first interview and second interview to ascertain if any change in self-efficacy had occurred.
Semi structured Interview – Interview Three	June 2014 (end of the first year of implementation)	<ul style="list-style-type: none"> • Max 30 min interview with each teacher • Semi structured interview questions (similar and additional questions to interview one and two) • Audio recorded • Interviews were transcribed 	Gather meaningful data about each teacher’s self-efficacy towards the close of the first year of the one-to-one iPad implementation. Focus on changes and experiences between the second and third interview and to ascertain if any change in self-efficacy had occurred.

3.8 Data analysis – quantitative and qualitative analysis

Berg (2009) suggests that content or data analysis is “a passport to listening to the words of the text and understanding better the perspectives of the producer of these words” (Berg, p. 343). As self-efficacy is inherently personal and subjective, the verbatim use of participant voice aids in providing the perspectives of the participants.

Each individual teacher’s collected data was analysed, then cross analysis across all teacher respondents was carried out. This approach allows for common themes and findings to be firstly discovered within individual teacher experiences, then analysed across the participant cohort. Strauss suggests (as cited in Berg, 2009), a four-step approach including analysis through a consistent set of questions, minute

analysis, theoretical notation, and open-mindedness in regard to contextual variables such as gender, culture, background etc.

An open coding analysis of the information gathered is an appropriate approach to considering the data (Strauss & Corbin, 1996), allowing themes to arise through analysis. Identifying common elements in both individual teacher cases and across the sample of data (Gudmundsdottir, 1996) would indicate common understandings of how self-efficacy is affected by various factors therefore forming a response to the posed research question(s).

A key action in order to carry out this thematic analysis and coding will be to transcribe recorded interviews so that they can be closely analysed for repeated themes in order to construct meaning from the basic concepts evident in the interviewee's responses. According to Berg (2009), this falls into the interpretative approach. In order to carry out the interpretive inquiry required of open coding, the researcher must approach the information gathered from the five participants with a considered and systematic approach.

3.9 Potential for bias

Potential for personal bias must also be addressed in order to minimise its effect on the research process and findings. Just as the language-rich aspect of this form of data collection provides a relevant perspective, the interpretation of such a form of data can be heavily reliant on how the researcher interprets this language. Developing clear and consistent coding themes, consistently applied allows the

audience for this study to interpret with full contextual understanding. The researcher regularly consulted with supervisors to ensure that both data collections/instruments used and analysis of data was carried out with an awareness of the potential for bias.

Using both a set online survey and semi-structured interview questions also aids to reduce bias, as all participants are presented with some replicated elements, as well as individualised questions. Findings from the ten online survey respondents will be analysed using descriptive statistics as well as thematic analysis of open-ended responses given by respondents. The collection of the data over an extended period of time also seeks to reduce bias, as repeated themes over a longer period of time show consistency in data (Rajendran, 2001).

3.10 Ethical considerations

Ethical approval was sought and gained from the Massey University Human Ethics Council (Appendix A). Participant anonymity and confidentiality was maintained, and informed consent from all participants was gained. Permission was gained from the school's governing body to carry out the research and seek participants from those directly participating in the iPad mini implementation.

Phase Two participants were provided with the opportunity to review the transcripts from their individual interviews in order to ascertain that it is an accurate representation of what was said. Participants were also provided with a summary of

the findings. As per ethical principles, participants were informed of their right to withdraw from the research at any time (Phases One & Two), and the right to review transcripts after each interview for accuracy (Phase Two). Principles of informed and voluntary consent were employed with participants being informed of the procedures involved, and their right to review the data for accuracy. The researcher also sought to minimise any conflict of interest by ensuring no technology leadership roles were continued during the course of the research study. Transparency, confidentiality and privacy were principles also upheld by the researcher, including anonymity and protection of participant identities, and no deception (MasseyUniversity, 2013).

3.11 Conclusion

This chapter has sought to outline and explain the underlying principles and approaches to the research design for this study. This explanation seeks to outline in a transparent way the steps taken throughout the research process to ensure the process was ethical and credible. The next chapter presents findings on teacher self-efficacy influences and changes in self-efficacy throughout the first year of the iPad mini device implementation.

Chapter Four – Findings

This chapter seeks to outline the study's findings on teacher self-efficacy influences in the context of a one-to-one iPad mini device implementation programme. This study is based in the context of an English-speaking international school, where students in Grades 6-8 were provided with an iPad mini device for school use. Teachers of these students were provided with their own devices prior to the beginning of the 2013-2014 school year. Changes in and influences on self-efficacy for five teacher participants in the first year of the implementation are also examined and presented.

Findings are presented in response to the research questions:

1. How does teacher mobile technology self-efficacy change over the first year of a one-to-one iPad mini implementation programme?
2. What are the influences on teacher mobile technology self-efficacy during the first year of a one-to-one iPad mini implementation programme?

This chapter presents the results from the initial Survey (carried out in phase 1 of research) as well as the reported self-efficacy of the five teachers interviewed (carried out in Phase Two of the research).

Initially, the results from the online survey are presented, both general findings with those of particular interest also highlighted. Following on from this, qualitative findings are presented. The findings from individual teachers are presented in order to be able to examine if changes to self-efficacy were evident. For research question

two, findings were holistically analysed in order to establish what common aspects, if any, were seen to be influences on teacher mobile technology self-efficacy. Findings will be presented according to the most salient, followed by an additional findings section.

4.1 Online Survey findings

The purpose of the online Survey was in response to research question one, enabling the researcher to gain insight into the general attitudes towards technology as well as provide a general idea of the individual teacher’s perceived self-efficacy at the beginning of the implementation.

Ten teachers took part in the online Survey from a pool of approximately 48 potential participants, equating to a 16% response rate. The response rate to questions was 100%, with the exception of the question relating to participation in Phase Two of the research. While the resultant data set is relatively small, it provides information as a general starting point for self-efficacy viewpoints for both those who responded to the survey and the subsequent participants in Phase Two of the research. It also includes open-ended responses from teacher participants, contributing towards qualitative data for the study.

Table 4.2: Online Survey questions

	Question	Mean	Standard Deviation (N)
1	I like using technology in several areas of my life.	4.1	1.1
2	I am encouraged to try new technology when I hear about what others are doing.	3.5	0.85

3	Watching other people use technology makes me feel like I can try new things.	3.5	0.97
4	If people around me feel confident with technology, I am more likely to try too.	3.9	0.99
5	I feel confident about using technology in my classroom regularly.	3.5	0.97
6	I believe I can master new technology skills in general.	3.7	1.06
7	I like to have a lot of support when learning about new technology.	3.6	0.97
8	When I have a problem with technology I keep trying until I fix the problem	3.4	1.07
9	I like taking risks and trying new things when using technology.	3.3	1.34
10	I think it is important to be able to play and explore with new technology.	4.1	0.99
11	I have had many positive experiences using technology in my teaching.	3.6	0.70
12	I feel technology can help improve my classroom teaching.	3.9	0.88
13	I think previous technology training will help me in developing new skills, even if it is for something different.	3.6	0.96
14*	If technology doesn't work once, I would be unlikely to try again.	1.6	0.52
15	I am looking forward to the implementation of the iPads	3.6	0.96
16*	I feel nervous about the iPad implementation.	2.1	0.88
17	I believe I can master new skills specifically when using the iPad mini.	3.6	1.07
18*	I feel I can only be successful with the iPad mini if I have lots of support.	2.8	1.03

* Reverse order question

Fifteen of the 18 questions are positively phrased, where a higher numerical response indicates a higher self-efficacy response. Questions 14, 16 and 18 (marked by an asterisk) are reverse order questions, in which a lower number indicates a higher sense of self-efficacy. A summary of participant responses can be found in Appendix F.

Questions 2-8, 11-13, and 17 all resulted in a similar range of generally positive responses, although some variation was present ($M = 3.4-3.9$, $SD = 0.70-1.07$). These results indicate that participants were generally confident with learning technology (questions 5, 6, 9 and 17) and felt somewhat resilient when facing technology failure (question 8).

Teachers also reported that modelling was valued (questions 2-4) as well as reporting perceived value/positive experiences in using the technology in their classroom (questions 11, 12). Questions 9, 10 and 13 referred to experimentation and prior knowledge when learning new skills in technology, and these results ($M = 3.3-4.1$, $SD = 0.99-1.34$), while showing some variation in teacher respondents, also indicate a generally positive attitude towards both experimentation and value of prior learning.

Results of note in the survey were those with highest mean or greatest variation in results. Questions one and ten revealed the highest means in the Survey ($M=4.1$, $SD= 1.1$ and $M=4.1$, $SD=0.99$ respectively). Question one was related to participant enjoyment of technology (I like using technology in several areas of my life), and with the highest mean suggests that participants use technology in several areas of their lives and have a high level of enjoyment in using this technology. Question ten relates to perceived importance of exploring new technology, in which respondents

clearly indicated that the ability to explore technology is an important aspect of learning with new technology.

Question nine results were also of interest as it had the widest spread of responses indicating a wider range of attitudes towards risk-taking with technology. Question 14 also indicated the smallest spread ($M = 1.6, SD = 0.52$), indicating participant responses that were more homogenous. This question also indicates that all participants show perseverance when faced with difficulties in using technology. While this does not specifically relate to the iPad mini implementation, it does indicate some resilience towards failure within the wider respondent group as a whole.

Several respondents took the opportunity to further explain their answers, taking advantage of the open answer section for each question. This Survey indicates some variety of efficacy beliefs regarding the use and implementation of iPads in the school. A range of efficacy beliefs were demonstrated, including those who felt highly efficacious regarding the device, to those who exhibited clear apprehension towards the use of the device. For example:

“I feel confident that I can learn anything I put my mind to irrespective of what others are doing.” (Respondent 7, Survey, October 2014)

“Sometimes I feel overwhelmed and think I could never be as adept as they are” (Respondent 4, Question 4, Survey, October 2014)

Some elements of the open-ended responses are also reflected also in subsequent interviews with teachers, for example:

“I love the moments when the students come up with solutions, which no doubt will be happening increasingly now with the iPads. It has already begun to happen” (Respondent 4, Survey, October 2014)

This aspect of confidence in student ability arose as a strong theme in the subsequent interview data, and findings to support this are discussed later in the chapter. Barriers to device use were also foreshadowed theme in the open-ended Survey responses, in which teachers mentioned various technical issues that affected device usage:

“Slow programs, broken computers, slow internet, etc. can bring a lesson to a grinding halt and is very frustrating.” (Respondent 9, Survey, October 2013)

Time needed to learn new skills, implement new ideas and facilitate learning, were also mentioned as potential barriers. When considering modelling (or vicarious learning), comment was made that this can make one feel overwhelmed and unable to reach the same level as those who show mastery:

“Sometimes I feel overwhelmed and think I could never be as adept as they [colleagues] are.” (Respondent 4, Survey, October 2013).

The same respondent also makes the distinction between feeling confidence in the use of technology for personal reasons (such as Skype and Facebook) and using technology in the classroom:

I find challenged by it at work (but can see the potential, it is mainly a confidence issue as I know we will be increasingly obliged to incorporate it into our programs), on a personal level I use it a lot to stay in touch with family and friends overseas e.g. Facebook and Skype. So, my feelings about it are mixed. (Respondent 4, Survey, October 2013)

While the data from the online Survey was from a small sample, it is interesting to note that the results of the analysis do highlight a range of efficacy beliefs, as well

as foreshadowing some of the themes that emerged in the interview data (such as student efficacy and technical challenges). These and other identified themes are considered in the following section.

4.2 Interviews

Five participants took part in Phase Two of the research, which consisted of three semi-structured interviews approximately four months apart. For research question one, teachers are individually reported on, with a summary of common themes following. Research question two is presented collectively, as several emergent themes were present across the participants.

4.3 Research question one: how did teacher mobile technology self-efficacy change over the course of the first year of implementation?

In order to discuss how self-efficacy changed throughout the year, it is first important to understand each teacher's general approach to the iPad as well as their iPad self-efficacy at the beginning of the implementation.

The teachers involved in this study demonstrated a range of technology self-efficacy levels at the commencement of the iPad mini implementation. From those who described themselves as technology 'virgins' such as Leslie to those who clearly indicated high self-confidence from the outset (Rita and Jim), some range in efficacy beliefs was evident from the outset. Table 4.4 below indicates these starting points (taken either from the first interview, or participants reflecting upon the beginning of the implementation):

Table 4.4: Technology self-efficacy starting points – all teachers

Participant	Evidence
Leslie	"Maybe I was a bit nervous, yes, because I talked about the generational thing – I was nervous about the expectations about how much I would have to use it" (Interview 3, June 2014)
Arthur	"I'd say I'm comfortable, sometimes I curse it because it doesn't work" (Interview 1, November 2013)
Jim	"I was pretty confident using the devices from the beginning on" (Interview 3, June 2014)
Annette	"I could say that I can usually figure out most things" (Interview 1, November 2013)
Rita	I'm not sure if I feel any different to then, because by then I think I felt relatively confident about the use of them (Interview 3, June 2014)

4.3.1 Teacher One: Leslie

a) The beginning of the implementation:

Leslie is an experienced teacher, with many years of experience in various teaching fields. She is experienced in teaching within both an Intermediate and Secondary school environment, and has taught various Humanities based subjects. Leslie currently teaches in the Language department.

Leslie has used a variety of technology in her past professional roles. She also uses a variety of technology in her personal life such as Skype, Facebook, Smartphone (Leslie, Interview1, November 2013). Leslie has used a MacIntosh laptop in the workplace consistently for the last five years and indicates more confidence regarding the use of this:

"I feel more confident using this [touching laptop]" (Leslie, Interview 1, November 2014)

At the beginning of the implementation, Leslie indicated that she had some nervousness regarding the iPad implementation – primarily centered around the amount of learning required and the time allowed for becoming familiar with the devices and how to use them in the classroom:

“I have to remind myself sometimes it’s that beaming thing too, when I’m in a, I forget what to do and you know it’s on my Ipad and then it’s just navigating around the Ipad to find out the page where I made the notes to tell me how to do the beamer you know, that all takes time ‘cause it’s not automatic” (Leslie, Interview 1, November 2013)

b) Use of the iPad

Throughout the course of the first year of implementation, Leslie reported using the iPad in a variety of ways in the classroom, as indicated in Table 4.5 below:

Table 4.5: Leslie's iPad use in the classroom

Ipap Use	Evidence
Researching subject relevant apps (student use)	“I was very proudly, I researched for the EAL department two apps” (Leslie, Interview 1, November 2013)
Presenting on iPad use in the classroom in a conference (teacher use)	“I know that I’m in no way an expert but at least the name of the presentation was Integrating iPads” (Leslie, Interview 2, February 2014)
Using the IPad to create vocabulary lists (student use)	“....they’re using a variety of apps to present their vocabulary which I’m really enjoying”
Research	“I was working with one group of language learners, referring to something, and boom, they could look it up and there was the visuals straight away” (Leslie, Interview 3, June 2014)
Personalised learning (student choice, task difficulty)	“...some of them come up with beautiful charts and they might put pictures” (Leslie, Interview 1, November 2014)

In contrast to reported classroom use, Leslie reported limited personal use of the iPad throughout the year and indicated that this was due to her sense of feeling overwhelmed when the implementation first commenced:

“I’m not using it that much. I’m not using it very much at all” (Leslie, Interview 2, February 2014)

“I haven’t changed at all; I’m not using it. It’s staying in my cupboard that hasn’t changed” (Leslie, Interview 3, June 2014)

This was re-iterated in her final interview, indicating a clear use by the students, but restricted use by herself, as the following quotes indicate:

“I’ve successfully managed to avoid that by not using them myself, but using it as a tool and a portal – the kids using it as a tool and a portal in my room” (Leslie, Interview 3, June 2014)

“I’m really confident with the kids using it, but I don’t use it much myself” (Leslie, Interview 3, June 2014)

This strong confidence in regards to using the iPad as a tool in the classroom is re-iterated three times in Leslie’s third interview, indicating her clear confidence in using the iPad with the students, versus using the iPad herself. This avoidance of personal use may also infer a coping strategy, when viewed in connection with Leslie’s earlier indications of a sense of being overwhelmed by the demands of the implementation. As we can see from the following quote, while Leslie did not increase her own use of the device over the course of the year, she places a clear value on the device:

“I’m very positive for it. I’m sold on it” (Leslie, Interview 3, June 2014)

c) Anxiety responses

Leslie also reported a sense of the potential for being overwhelmed by the time and knowledge required to master the device:

My self-talk to myself is 'I can only do what I can do' given the time, the time in the day and the teaching, the support that I can have so I have to draw a line around it otherwise I'd go mental (Leslie, Interview 2, Oct, 2013)

Leslie is aware of this aspect and as the following quote shows, she develops a coping mechanism in which she approaches the implementation in stages, when she feels she is able to engage further:

"I just need to focus because otherwise I'm getting overwhelmed, you know, just do some then when, when I'm ready, take on some more" (Leslie, Interview 2, February 2014)

d) Sources for self-efficacy judgments

Coaching emerged as a repeated theme in Leslie's responses indicating a desire to be coached or have coaching on a one-to-one basis or in small groups. This was a repeated idea when discussing her experience in the first year of implementation (mentioned six times in her second interview):

"Someone presented it, but that's not enough. I'd like some designated time to be able to do it for my subject and have someone help me when I have questions" (Leslie, Interview 2, December 2014)

Influence from peers through modelling (specifically department colleagues) was also indicated both in a manner of helping through coaching and through modelling of technology inclusive behaviour. Referring both to personal projects (such as an online CV) to technical issues while presenting with the iPad, expert knowledge shared from colleagues has also helped increase problem solving when using the iPad as indicated by the quote below:

“A colleague has introduced me to a site to do CV’s called Wix or something and you make tabs and this colleague has also you know inspired me” (Leslie, Interview 2, February 2014)

Closely connected to this, a recurring sub-theme regarding comparison to colleagues was present. This seemed to have both an encouraging and deterrent effect on Leslie’s self-efficacy with the device. On some occasions, this shared knowledge by colleagues was encouraging, propelling Leslie to try new techniques and skills on the device:

“I’d like to workshop it, sit down and turn it into something, for example a colleague introduced Quizlet or whatever – I want to sit and get tutored through how to do that” (Leslie, Interview 2, February 2014)

At other times, observed expertise of colleagues lead to anxiety, where in comparison, Leslie felt she would not be able to reach those standards. This expert knowledge by other staff also led to a reduction in anxiety at times, when assistance was provided to solve imminent technology issues particularly with presentation using the iPad. This sense of comparison causing anxiety was indicated in the initial two interviews, however was not present in the third interview:

“Really feel insecure with that because I have a colleague who’s so fantastic at that and I just watch that and think “Woah I’d love to be able to do that!” but it’s just a time thing” (Leslie, Interview 1, November 2013)

“Because you look around at what’s touted by other people and what other people are doing and you think well I’ve got to keep up with the game” (Leslie, Interview 2, February 2014)

How did Leslie's iPad mini self-efficacy change over the year?

Table 4.6: Leslie's changes in self-efficacy over the investigation

<i>Interview One</i>	<i>Interview Two</i>	<i>Interview Three</i>
"I'm in a continual state of apprehension"	"Why do I feel more confident? Well because it's been a success, because they like it."	"I do feel more confident, and yeah, so that's good".

Throughout the first year of implementation, Leslie's self-efficacy showed noticeable changes. Initially, Leslie indicated anxiety and apprehension in terms of employing the iPad in her class and with students. She indicated that she felt she was a technology 'virgin' (Leslie, Interview 1, November 2013), and that it is sometimes difficult to retain information:

"...then I forget so I have to run to somebody to tell me again, it doesn't stay in" (Leslie, Interview 1, November 2013)

Confidence in the ability of students to problem solve amongst themselves was indicated. This was clearly indicated in the contrast between Leslie's comments regarding her feeling about personal use of the iPad, and the comments focused on the confidence felt in student usage a tool in the classroom, as we can see from the following comments:

"I'm really confident with the kids using it, but I don't use it much myself" (Leslie, Interview 3, June 2014)

"...because 9 times out of ten, if there's a problem, then there will be a solution. Mostly I won't know it, but someone will know it" (Leslie, Interview 3, June 2014)

In comparison to peers, Leslie reported some anxiety about being left behind, and that perhaps lack of confidence was related to age, feeling not as 'whizzy' as others

(Leslie, Interview 1, November 2013), indicating she also felt somewhat insecure in comparison to other teachers. Using words such as 'nervous and anxious' (Leslie, Interview 1, November 2014), Leslie indicated apprehension when asked how she felt about the iPad implementation.

Leslie also indicated that technical issues regarding the use of the iPad were evident:

"And then there are catastrophes, you know..... wrong, and the thing doesn't work and it doesn't download... I can't think of a precise one but I've had numerous ones of those" (Leslie, Interview 1, November 2013).

As we can see in Table 4.6 above, Leslie indicates some increase in confidence; which also included strong value placed on the device:

"I'm very positive for it. I'm sold on it" (Leslie, Interview 3, June 2014)

Growth in Leslie's own use of the device seemed somewhat static as Leslie indicated on multiple occasions that she herself is not using the device within the classroom:

"I'm not using it that much. I'm not using it very much at all." (Leslie, Interview 2, February 2014)

"Any changes you feel about using it? I haven't changed at all, I'm not using it. It's staying in my cupboard that hasn't changed" (Leslie, Interview 3, June 2014)

Growth was reported in other areas of efficacy, such as collective problem solving between students and teacher, and using the iPad as a student content synthesis tool, as well as efficacy related to particular apps related to the subject area taught:

“It makes me confident with the kids using it, because I can see progress. (Leslie, Interview 3, June 2014)”

“My confidence in the students’ ability has really grown” (Leslie, Interview 3, June 2014)

4.3.2 Teacher Two: Arthur

a) The beginning of the implementation:

Arthur is an experienced Science teacher who has taught general Science, Biology and Chemistry. He has used a number of different forms of technology in his professional role ranging from Script duplicators, Banda machines, overhead projectors to SMART boards, laptops and now, iPads. Arthur has used a Mac laptop as part of his job for at least the last six years.

As a science teacher, Arthur says that the use of technology is commonplace in the Science classroom due to the nature of the subject. Microscopes, data recording devices and sensors are all forms of technology that Arthur identifies with that are regularly used in Science. Arthur indicates a reliance on digital technologies in his class, saying that he uses these heavily to communicate content.

At the beginning of the implementation, Arthur describes himself as somewhat comfortable with technology:

“I’d say I’m comfortable, sometimes I curse it because it doesn’t work and I would say that I probably couldn’t teach effectively without it the way I want to. I would say that I have some knowledge of it” (Arthur, Interview 1, November 2013)

In the initial online Survey, Arthur indicated a higher level of self-efficacy due to his consistently positive responses (ranging between 'Usually' and 'Mostly' in positively phrased questions), however he did indicate some nervousness regarding the iPad implementation, revealing that the implementation made him nervous (responding with a 'usually' response).

b) Use of the iPad

Arthur uses the iPad in the classroom in a variety of ways. A common use that is employed in the classroom is using the device to process data, including the use of spreadsheets and also essay writing. Using the device to view content (including websites, videos) is also a common usage mentioned.

In Arthur's classroom, the focus is on student usage, and less on the teacher's personal usage of the device:

"I must admit that when I'm in the classroom and the kids have their iPads, I'm not using it that much" (Arthur, Interview 2, February 2014)

This level of iPad use as reported by Arthur did not change over the course of the year:

"to be honest with you, I don't use the iPad myself much, so a lot of the material there is not used really" (Arthur, Interview 3, June 2014)

Although a significant level of confidence exists in the students' ability to use the device is indicated:

"I would say that the students have become much more familiar with what it can do than I have" (Arthur, Interview 2, February 2014)

Table 4.7: Arthur's use of the iPad mini

Ipap Use	Evidence
Researching subject relevant apps	".....and we've been working on IBooks Author" (Interview 2, February, 2014)
Subject related use (student use)	"At the moment that appeals to me most is well two things, first of all Explain Everything (yeah) I like it, and the other one is IBooks Author" (Interview 1, November 2013)
Using the IPad to access teacher resources (student use)	"...it'd be Word format that they download onto their IPads and open as Pages documents" (Interview 2, February, 2014)
Using the device as a tool (Student use)	"The students themselves have learned to use cameras, videos far more. They're more familiar with using say stop clocks that they've got on their IPads" (Interview 2, February 2014)
Research (student use)	"So they searched Youtube, which was fantastic, they air played it, by reflector onto the screen, the smartboard. And we sang along, that was a great experience, everybody enjoyed it." (Interview 3, June 2014)

c) Sources for self-efficacy judgments

In terms of learning new skills and extending existing skills, Arthur showed a range of learning strategies (as we can see from the above quote), also citing curiosity as a key factor propelling him to learn about the iPad:

"I think just sharing of knowledge and just curiosity myself about how it works" (Arthur, Interview 2, February 2014)

Arthur also participated in training sessions offered by the school, stating that he found these inspirational, encouraging him to learn more about what the iPad mini can do:

They've been very inspirational. Our iPad technician shows me clearly all the potential that is there and he's very enthusiastic about it and he gets me really wanting to make, I mean I've been trying this book for the Science course, make it into an IBook, and he makes me very enthusiastic about it (Arthur, Interview 2, February 2014)

How did Arthur's iPad mini self-efficacy change over the year?

a) Device self efficacy

Table 4.8: Arthur's changes in self-efficacy over the investigation

<i>Interview One</i>	<i>Interview Two</i>	<i>Interview Three</i>
"How would I describe myself? I'd say I'm comfortable."	"I have these doubts – is this really what we should be doing?"	"Since the beginning of the year, perhaps a bit more confident."

As we can see in Table 4.8, while comfortable, Arthur indicated some hesitation towards the value of the iPad in the classroom, unsure of how it would be effective, although he also conversely indicated the effective nature of the device:

"I would say that I probably couldn't teach effectively without it" (Arthur, Interview 1, November 2013)

Throughout the course of the three interviews, Arthur's attitude towards the iPad was distinctly positive and clear value regarding the device was indicated:

"it gives them more access to the resources, it gives a more uniform environment for us to work in, and it gives, using apps, it gives us a lot more tools that we can use as well" (Arthur, Interview 1, November 2013)

Arthur indicated that some infrastructure issues (both with limitations of the device and functionality of the Internet in the school context) had an effect on his confidence

"Affected my confidence... Yes I could say, yes it has affected my confidence" (Arthur, Interview 2, February 2014)

Growth in self-efficacy was evident within particular applications such as Pages, Numbers, and iBooks (Arthur, Interview 2, February 2014), rather than an overall

growth in iPad efficacy. Focus on particular apps and their use in the classroom was indicated through the interview data collected:

“So I’m more, certainly more familiar with how Pages works on the iPad, how Number works on the iPad and in that respect I feel more confident” (Arthur, Interview 2, February 2014)

Similar to other teachers, a clear confidence in the student use of the device was demonstrated:

“Um, I think they’ve become second nature. They’ve become integrated into students’ days, into their routine, and I think that’s good” (Arthur, Interview 3, June 2014)

In contrast to this general sense of efficacy reported by other teachers, Arthur’s own confidence in use of the iPad mini was more focused on particular apps:

Interviewer: how confident do you feel about being able to resolve a problem or find a solution when you strike a problem?

Arthur: Depends on the on the application, depends on the situation. As I said if it’s something like Pages then I’m relatively confident about them or any of the iWork suite (Arthur, Interview 2, February 2014)

4.3.3 Teacher Three: Jim

Jim is an Arts teacher who has had a wide range of experiences using technology. He has been teaching for 5 years in both the Middle Years Programme and Diploma Programme. Jim regularly uses a range of Apple technologies both at home and at work, including:

“SmartBoard technologies to varying degrees, Apple products mostly so the MacBook and all of the programmes connected with that, in particular Garage band, Sibelius, those type of music sculpting programmes” (Jim, Interview 1, November 2013)

Jim teaches a range of students, including grades 6-8 on which the iPad first year of implementation is focused, as well Diploma classes. While Jim says his knowledge is not overly extensive, he feels generally comfortable around technology, and has an attitude of being comfortable figuring things out and exploring technology:

"I was never you know particularly computer-savvy but I always felt comfortable with computers. Sort of 'I don't know what I'm doing but I'm sure I can figure it out' " (Jim, Interview 1, November 2013)

From the beginning of the implementation, Jim evidenced a strong sense of self-efficacy, with the initial online Survey responses all indicating confidence with technology use due to his consistently positive responses (ranging between 'Consistently' and 'Mostly' in positively phrased questions). Consistent with other teachers (as identified in the analysis of the Survey results), Jim did feel that support was necessary to success with the implementation of the iPad mini device, as seen by his response to question 18, where he answered usually to the question "I feel I can only be successful with the iPad mini if I have lots of support".

a) Use of the iPad

"It's the biggest Swiss army knife that anyone's ever invented." (Jim, Interview 3, June 2014)

Jim reports that he uses the iPad mini in a range of ways in the classroom, mostly as a tool with the students (as we can see from the quote above). Documenting student instrument practice times, internet use, presentation of acquired knowledge and research are the primary uses indicated, as outlined in Table 4.9 below:

Table 4.9: Jim's use of the iPad

Ipap Use	Evidence
Classroom use (student use)	<p>"One application that we absolutely love is Explain Everything" (Interview 1, November 2013)</p> <p>"We've taken them all back to Book Creator" (Interview 1, November 2013)</p>
Presenting on iPad use in staff workshops (teacher use)	"I chose to teach workshops at that time on things that I had done instead of attending workshops" (Interview 1, November 2013)
Personal use of the iPad (teacher)	"...at the end of the school year we got them three months the year before, the kids were being released, I really tried my hardest to use it every day in my lessons" (Interview 1, November 2013)
Subject specific apps (teacher and student use)	"in particular Garage band, Sibelius, those type of music sculpting programmes" (Interview 1, November 2013)
Student use	"We've used it as a resource for projects that are initiated in school, so in school workshops on apps and applications on the iPad" (Interview 1, November 2013)

From the beginning of the implementation, Jim indicated a high sense of value for the device, indicating a clearly positive attitude to the use of the device in the classroom:

"Big picture, I see all of the technology in the classroom as beautiful because it's just making, if it's done right, it's making our teaching more engaging, more interesting, you know, more active for the students too" (Jim, Interview 1, November 2013)

Connected to this expression of value, Jim also indicated the felt value in the device in its capacity to improve student work:

"You give them that freedom and all of a sudden everyone's going four steps beyond what they've been able to do in the classroom in the past, and I think that that is just the most telling bit about the whole thing" (Jim, Interview 3, June 2014)

b) Sources for self-efficacy judgments

Jim indicates that he is an independent learner, stating that he prefers to learn through experimentation and independently sought information:

“Trial by fire is my general – um – I usually trial something a little bit on my own and then it’s just sort of dig in” (Jim, Interview 1, November 2013)

Online sources such as YouTube and company websites are indicated as key sources for this independent learning:

“I find generally that workshops tend to be a little bit slow, below my level, and it’s a lot more of people that aren’t tech savvy learning the most basic things that I’ve already picked up, so I mostly stick to YouTube tutorial type things (ok) or I go to the company’s website and look at their tutorials” (Jim, Interview 1, November 2014)

Jim also engaged in experimentation with the device, intentionally used the iPad mini over the summer prior to implementation, substituting his laptop and immersing himself in the use of the device so that he would force himself to be familiar with the device:

“I really tried my hardest to use it every day in my lessons, I took it home instead of my MacBook so that I really forced myself into using it. I used it the entire summer” (Jim, Interview 2, October, 2014)

Jim also mentioned in his third interview that this approach enabled him to feel he has explored all the ‘nooks and crannies’ of the device, showing a clear level of comfort with the device:

“And so there was so much experimentation going on at the beginning but I feel now – I mean at least with the - we have a wide variety of apps here, it’s not like a shortage of apps – but I feel like I’ve explored all the nooks and crannies” (Jim, Interview 3, June 2014).

How did Jim’s iPad mini self-efficacy change over the year?

Table 4.10: Jim’s efficacy change over the course of the investigation

<i>Interview One</i>	<i>Interview Two</i>	<i>Interview Three</i>
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“Have an attitude that yeah I’m sure I’ll figure it out eventually”	“I just don’t find any great frustration with the device, it’s fairly simple, straightforward, user-friendly so I don’t ever have any trouble figuring it out”	“Now it’s just using the tool – you’ve explored it – you understand it, you’ve got it”
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Throughout the first year of implementation, Jim showed high level of self-efficacy. The above quotes show that Jim started the implementation feeling efficacious and maintained this high level throughout the first year of implementation. Associated with this, a high level of device competence is also reported by Jim as he participated as a trainer rather than a participant in the training:

“I chose to teach workshops at that time on things that I had done instead of attending workshops. I did attend one workshop on the basics of iMovie and photos, or something, something basic, so it was a programme that I knew very well – I know iMovie on the, as a Mac programme very well so it was just a couple of quick ‘How do I do this?’ on the iPad as opposed to the, the larger version of the programme that I was used to” (Jim, Interview 1, November 2013)

While a level of efficacy was continuously indicated, Jim also did show some growth in confidence – with a shift indicated from using the device as a tool to looking at how to implement the device more innovatively into the curriculum in the future:

“...that’s where my concentration on developing new things and taking risks – it’s now in building the curriculum instead of using the device itself” (Jim, Interview 3, June 2014)

Jim’s value of the device was also strong, as we see below:

“I guess that that highlights for me the confidence and the convenience that the iPad has given, is where I am in classes that I don’t have it, I miss it” (Jim, Interview 3, June, 2014)

Throughout the course of the implementation, Jim indicated a strong resilience concerning the use of technology personally and within the classroom context.

While frustrations were mentioned, particularly surrounding internet infrastructure, these did not affect Jim's overall confidence, either with particular apps or the device in general:

"...no, not my confidence, but I feel limited" (Jim, Interview 2, February 2014)

4.3.4 Teacher Four: Annette

Annette is a general Science and Chemistry teacher who has been teaching for four years. She has used a range of technologies in the past related particularly to her subject area, including scientific digital probes, laptops and digital cameras. During the year of implementation focused on for this study, Annette taught one class who were involved in the iPad implementation.

Annette describes herself as 'in the middle' (Annette, Interview 1, November 2013) as a technology user, as she likes technology, but also sees value in the continued use of paper where appropriate. Annette also indicated that she thinks that her prior use of technology (particularly the use of a Macintosh operating system) influences how she feels about technology currently:

"I've been a Mac user for a while (ok) for five or six years I think that does play into it quite nicely as well" (Annette, Interview 1, November 2014)

In the initial online survey, Annette indicated a solid sense of self-efficacy when considering the use of technology and the iPad implementation, as seen through her responses, ten of which were rated mostly or higher in positively phrased questions. Annette also indicated in the online survey that she did not feel anxious regarding the implementation, responding with a 'seldom' rating for (Annette,

Online Survey, October 2013). Similar to several other teachers (Jim, Leslie, Arthur), Annette indicated that some support was needed with success in using the device, as indicated by the response of ‘sometimes’ to question 18: “I feel I can only be successful with the iPad mini if I have lots of support”.

a) Use of the iPad

Classroom use of the iPad was reported as both directed by the teacher (such as using spreadsheets) and also student-directed – students were able to choose whatever program (from existing applications preloaded by the school) they wanted to demonstrate their knowledge. Brushes, PuppetPals and Penultimate were indicated as specific apps used.

Table 4.11: Annette's use of the iPad mini

Ipap Use	Evidence
Classroom use (student use)	<p>“I like using them for doing data collection as well as taking photographs of the lab and taking photographs” (Interview 1, November 2013)</p> <p>“...they actually are using the Brushes a lot too with pictures of the microscope” (Interview 1, November 2013)</p> <p>“I had them write it down on the iPad and then hold it up and then it was a quick, sort of yep, no, yep, yep.” (Interview 3, June 2014).</p>
Subject specific tasks (student use)	<p>“...teaching them how to draw graphs using Numbers on the iPad”(Interview 1, November 2013)</p>
Personal use of the iPad (teacher)	<p>“I was using the penultimate app and sort of was figuring that out and just me being in the seat of learning allowed me to kind of see it from a different perspective” (Interview 3, June 2014)</p>

b) Sources for self-efficacy judgments

“I think you just become more confident when you have time to practice things and use things” (Annette, Interview 3, June 2014)

Annette’s sources for self-efficacy judgments were centered on the practice of personal exploration and investigation, as opposed to attending specific iPad

training sessions. This was a regular approach used by Annette and included personal exploration (without necessarily direct classroom application) as well as prior exploration of a particular app or process prior to introducing it to the classroom context:

“I’ll learn how to use it on the iPad and so I’ll have you know half an hour just trying things out, trying to make something and then, you know, practicing oh where’s the Export and just kind of seeing that kind of stuff ahead of time. I find that most useful” (Annette, Interview 3, June 2014)

School provided training was also mentioned as contributing to iPad knowledge, often targeting specific applications for use in the classroom:

“I took the Nearpod one which was how to use the one app Nearpod. And it was interesting because it was a way of having a PowerPoint and having control over them on their iPads” (Annette, Interview 1, November 2013)

Modeling use of apps, (as was occasionally showcased in secondary staff meetings), was also mentioned as useful for being exposed to new apps and their various uses:

“I think when we share each other’s ideas that’s when, because I don’t have time to just sit and look at apps and websites so when I hear of something new or see something new I want to try it” (Annette, Interview 2, June 2014)

How did Annette’s iPad mini self-efficacy change over the year?

Table 4.12: Annette’s changes in self-efficacy over the investigation=

<i>Interview One</i>	<i>Interview Two</i>	<i>Interview Three</i>
<i>“I could say that I can usually figure out most things”</i>	<i>“I think I don’t need help, like I don’t need to, I can usually figure things out on my own versus having to go ask someone”</i>	<i>“You can kind of change things on the fly and I think that’s when you know you are pretty confident”</i>

Annette indicated a high sense of self-efficacy at the beginning of the implementation, demonstrating a strong confidence in terms of learning how to use the device. Similar to Jim, Annette indicated an overall sense of confidence with the device. This included the ability to make connections between apps and how they are used, and a confidence that regardless of being introduced to a new app, solutions would be found or alternatives found to engender success in terms of use in the classroom:

“You don’t need to know everything beforehand, that you can kind of – apps are similar and once you kind of get the idea of things you know like it’s more of a general framework so oh you probably export it this way or what kind of file is this or kind of it so you can let go of it more” (Annette, Interview 2, Feb 2014)

Concerns raised were centred around infrastructure and student use (classroom management of the device):

“The main one is like the exporting ‘cause that’s the only time that I ever really found it difficult to actually just transfer files or send files to each other” (Annette, Interview 2, February 2014)

“They are more interested in general I find than if it was just paper, but there are also the issues of maintaining that trust, and that they are aware that, what they need to be doing, being on-task and not playing games or whatever” (Annette, Interview 2, February 2014)

4.3.5 Teacher Five: Rita

Rita is a technology teacher who has been teaching for seven years. She teaches both hard materials technology, and a digital media technology elective. Rita indicates a high level of both general digital technology self-efficacy as well as with the iPad mini device.

In the initial online survey, Rita indicated a consistently high sense of self-efficacy when considering the use of technology and the iPad implementation, as seen through her responses, fourteen of which were rated mostly or consistently in positively phrased questions. Rita also indicated in the online survey that she seldom felt anxious regarding the implementation (Rita, Online Survey, October 2013). Rita also indicated that she only sometimes needed a lot of support regarding new learning in technology, indicating that she is comfortable being an independent learner.

a) Use of the iPad mini

In Rita’s classroom, use of the iPad mini is varied and students are given some choice as to what app or presentation tool they would like to use to present their knowledge.

The iPad mini is used as a documentation device, taking photos and video to support student learning:

“In the beginning of the year, I would only let students use specific things or apps that I was already familiar with myself, where now I will let them choose to use an app I’ve never seen before if they felt confident that they could use it” (Rita, Interview 3, July 2014)

As we can see in Table 4.13, Rita reports an extensive use of the iPad mini, using it both as a tool to support student learning (with the creation and use of such resources as tutorials, blogs, and visual recording) as well as in a subject specific manner, where subject-related apps are explored.

Table 4.13: Rita's use of the iPad mini

Ipad Use	Evidence
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App specific use (teacher)	<p>"I've started using far more IBooks, I've done things in Poplet which was totally new to me, I've used OwnCloud" (Interview 2, February 2014)</p> <p>"I've been teaching myself how to use a drawing tool that's on the iPad, that does 3D modeling" (Interview 2, February 2014)</p>
Personal use of the iPad (teacher)	<p>"I use it, I occasionally it for, for taking notes, I use it a lot for photography and I use it a lot for film-making" (Interview 1, February 2014)</p> <p>"I occasionally will use it for email" (Interview 1, February 2014)</p> <p>"I've used Garage Band since then" (Interview 1, February 2014)</p> <p>"I also have started making tutorials using not only the iPad but because it's more easily accessible to my students now" (Interview 1, November 2013)</p>
Personalised learning (student choice, task difficulty)	<p>"...they can do it in a variety of ways, either by narrating something or by performing it or by making labeled photographs that they narrate simple words to" (interview 2, February 2014)</p>

How did Rita's iPad mini self-efficacy change over the year?

Table 4.14: Rita's changes in self-efficacy over the investigation

<i>Interview One</i>	<i>Interview Two</i>	<i>Interview Three</i>
"I think I'm impatient and, and I'm frustrated at the pace that the courses go at, and that it's too basic."	"Even when I knew nothing I felt quite confident that I would find a solution."	"I don't think there's any situation where I wouldn't feel confident about using the iPad in the class now."

From the initial interview, Rita expressed a high level of confidence in her ability to master the iPad mini device. Over the course of the implementation, Rita expressed a change in her approach to the iPad through an accrued confidence in the ability of

students to choose and use the device to present their information. Rita reported a growth in confidence with the iPad, and in particular finding solutions when faced with technical and infrastructure difficulties. An area of growth that was clearly indicated was that of both classroom personalised learning and confidence in the student use of the device:

“I think for me the biggest change to see how it can benefit especially the language learners who are....are still acquiring the language skills that we are teaching, or, the students who have organizational challenges um, and then also the gifted students have really been able to fly because I have it. So for me, those have really been the biggest changes” (Rita, Interview 3, July 2014)

As well as finding solutions to technical problems when they arose:

“I started believing that there will always be a solution” (Rita, Interview 3, July 2014)

Resilience was indicated, wherein confidence in acquired knowledge and competence was consolidated to the point that it did not affect perceived ability and competence when using the device;

“So I think the issue is that if it doesn’t, if technology doesn’t work I don’t feel like it reflects on me”(Rita, Interview 2, February 2014)

4.3.6 Collective analysis

The following section seeks to identify the common findings and serve as a summary of the previous section.

a) Use of the iPad mini

As shown in the previous section, teachers indicated a range of uses in the classroom, including substitution, synthesis and creation. Some teachers used the

device as a substitution tool, using the device in a manner similar to a laptop, and creating spreadsheets, keynote presentations, or iMovie, focusing primarily on using the iWork suite. Other substitution uses reported include using the device as a mobile camera, internet search engines, as well as similar to a classroom whiteboard.

Teachers reported exploring the various apps available on the iPad mini to various degrees, with some implementing researched apps directly related to their teaching subject (such as Leslie). Teachers engaged with a range of apps that were pre-installed on the device such as the iWork suite, Book Creator, Explain Everything, Popplet and PuppetPals. During the course of the first year of implementation, several teachers (Rita, Jim, and Leslie) indicated that, increasingly, they allowed students to choose which apps they would like to use to demonstrate the knowledge required of tasks.

Teacher use of the iPad mini varied among participants, with two teachers (Leslie and Arthur) indicating that their personal use of the iPad mini was limited, with the focus being on student use of the device rather than their own. This is held in contrast to Annette, Rita and Jim who personally explored the device and attributed this practice to a clear growth in their confidence in using the device.

b) Sources for self-efficacy judgments mini

Teachers indicated a wide range of learning sources, as can be seen in the Table 4.15 below:

Table 4.15: Reported iPad mini learning strategies

Theme	Quote	Participant
Independent learning/Experimentation	"The more I play with the iPad, the more I realise how simple everything on the iPad is"	Jim
	"You have to just dive into that experimentation because it's a steep learning curve, but it's a short one"	Jim
	"If I play with a thing myself I quickly identify how I can use it"	Rita
	"I'll just play with it"	Rita
	"10, 15 minute YouTube tutorial seems to be plenty of time to get all the basics of an app"	Jim
	"I normally self-teach myself"	Rita
	"I've taught myself"	Rita
	"It fits into my lifestyle better to do it when I have time"	Rita
	"You just go through and have a look at these apps and play around with them (yeah) and see what you can learn"	Arthur
	"I think the more time you have with something even if it's just you are wasting time, you have an extra 20 minutes and you try out something, you're just really confident in how it could be used"	Annette
Mastery/Expert Modeling	"I run into a problem I'll go and ask a specialist"	
	"I often speak with the ICT coordinator if I am running across a challenge"	Rita
	"I will discuss it with other people who are proficient users"	Rita
	"Find out more about it from (colleague) who's done a lot with it in the course of the year"	
	"I think (they) showcased those at some of our meetings and that is something that I've really wanted to - at the beginning of the year I really wanted to find out more about"	Arthur
	"It's good at our staff meetings you know when people share"	Leslie
Coaching	"That colleague very kindly showed me how to do that"	Leslie
	"A colleague this morning helped me with online resources"	Leslie
Vicarious Experiences	"I'm also still learning from other people"	Rita
	"I think just seeing other ways that you can use it and maybe that spawns some inspiration"	Annette
Training	"We learnt about a lot of apps... we learnt about Explain Everything, we learnt about other apps"	Arthur
Student Sharing	"On a good positive note would be things where the kids find stuff where I hadn't even tried some of the apps"	Annette
	"Students have come to me with solutions that they've found"	Jim
	"Students know how to do everything in those applications"	Jim

Rita, Jim and Annette indicated a strong preference for independent learning, citing the use of online tutorials, forums and experimentation as central contributors to their knowledge of the iPad mini. This independent approach to learning is also coupled with a strong indication of confidence in use of the device. This sense of learning competence was expressed early in the implementation from Jim, Annette and Rita, demonstrating clear confidence regarding the use of the iPad mini.

c) The role of experimentation in learning

As we can see from the Table 4.15 above, several teachers also indicated that exploring the device was an active part in enhancing familiarity as well as efficacy. The idea of 'digging in' (Jim, Interview 2, 2014) and playing with the device was a repeated characteristic of mastery in those with higher general iPad mini self-efficacy (as evidenced in the data provided by Jim, Rita, and Annette).

This theme was foreshadowed in the online Survey, where teachers indicated that they believed that the ability to play with technology was an important aspect of learning (with eight out of ten respondents replying with either 'mostly' or 'consistently' to the relevant question).

4.4 Research question two: What were the influences on teacher mobile technology self-efficacy?

Throughout this section, findings will be presented in answer to research question two: what were the influences on teacher mobile technology self-efficacy during the first year of a one-to-one iPad mini implementation programme? This will be presented by outlining key influences found across participants, including collective

classroom efficacy, perceived value of the device, and Sources for self-efficacy judgments when regarding the iPad mini.

Key forms of efficacy presented in these findings include personal use efficacy (where a teacher feels comfortable using the technology personally), student use efficacy (where a teacher is comfortable with students using the device, while they themselves may not be confident), collective efficacy (where teachers expressed a sense of confidence in the joint efforts of both student and teachers to find solutions when using the device).

The findings in this section are presented in terms of the most salient to the least. Throughout the interview data, several key themes emerged. Collective classroom efficacy, device value, personalised learning, and 'becoming the expert' were all themes that were reported by more than one teacher throughout the course of the study. Further explanation of the emergent themes will be explored under the relevant headings throughout the rest of this chapter.

a) Collective efficacy

The concept of collective or shared efficacy was one of the most salient themes that arose out of the data, and was reported by all teachers. An element that seemed to be present in this form of efficacy was the collaborative approach to the use of the device in the classroom evidenced by teachers' use of inclusive language, such as 'we', 'together' and repeated indications that the class would discover solutions as a whole. Repeated reference was made collaboration with students regarding

technical solutions, and a reported confidence that when problems arose, knowledge of a solution was sure to be found through shared knowledge:

“What do I do when I strike a problem? I ask the kids” (Leslie, Interview 2, February 2014)

This was increasingly mentioned in the second and third interviews (twice in both Interview two and three, compared to once in interview one), indicating a higher sense of efficacy when regarding the role of the students in problem solving, as compared to personal use.

Similar to other teachers, Jim indicated a sense of collective efficacy regarding the iPad mini. Referring primarily to technical problem solving, this efficacy includes a belief that within the combined experience present in the classroom, someone (student or teacher) will be able to help solve the issue at hand:

“... before I can even breathe to answer said question, another student has leapt in and answered the question for me, which is fun and exciting, it’s great for their teamwork and their building as co-learners, that they’re helping each other along...” (Jim, Interview 2, February 2014)

Annette’s experience also resonated with this sense of collective efficacy – including a belief that between all members of the classroom, solutions to technical problems on the iPad mini could be found:

“The kids know how to do it and so do I, so it’s just like okay, yep, let’s share” (Annette, Interview 3, June 2014)

Mentioned by multiple teacher participants is the continual problem-solving approach to using the iPad mini in the classroom. Closely connected to the collective efficacy shared by students and teacher, this element of iPad mini efficacy

refers more to both perseverance and resilience on the part of both teachers and students:

“The nature of... of positive problem-solving is something that we always try and model for the students, that we always can find solutions for problems or keep going at problems until we find solutions, and it’s really helpful and, and good when the students model that behaviour back” (Jim, Interview 2, Feb 2014).

The attitude of working together to find a solution is a key element of this perceived collective efficacy that resounds throughout the data collected, as indicated in Table 4.16 below:

Table 4.16: Collective classroom efficacy evidence

Annette	“...once some kids have figured it out I send them around to as helpers, and so t- so that we’re all on the same page”	Interview 1
	“...you don’t have to stress about knowing everything (ok) and that it’s ok if you don’t know something and if the kids find something out you learn as well and you can have them teach each other (right)”	Interview 2
	“I am willing to try things that I know that I don’t necessarily know how to do because we can kind of try to figure it out together”	Interview 3
	“...now, the kids know how to do it and so do I, so it’s just like okay, yep, let’s share.”	Interview 3
	“...we’ll go slow today, we’ll figure it out together”	Interview 3
Jim	“I remember I spoke about the fact that often when problems arise it’s often the students that have gotten to know the systems and the programs really well.”	Interview 3
	“Everybody knows what they are on about”	Interview 3
	“...most of the kids now, have either solved all the problems or they know who the kid is in the class that absolutely knows what it is”	Interview 3
	“...the kids have explored all the nook and crannies and we know what we are on about”	Interview 3
Rita	“I’m quite happy to let the kids find a solution for me actually”	Interview 2
	“I think right at the beginning I wouldn’t have been so confident about just trying something new but I feel confident because the students knew what they were doing although I didn’t.”	Interview 2
	“I was kind of learning from them rather than them learning it from me”	Interview 2

	"the process of getting there can actually be governed by other people as long as we get to the end solution in some way."	Interview 2
	"...the technology has made me feel more confident of standing back compared to how I did before	Interview 2
	"I think, a year into the programme the students also have solutions."	Interview 3
	"Now I do feel sometimes that if I'm not sure I can ask and someone will say, hey, have you tried this – and often they will have a solution that really works."	Interview 3
	"I solve a lot more through collaboration with the students"	Interview 3
Leslie	"...the kids are great at solving, so then they get an expert, I call them the expert and they get help"	Interview 1
	"...we watched a YouTube thing the other, er clip the other day and it wouldn't work and another student gave me a tip to click somewhere else and so I used that technique in another class"	Interview 2
	"I'll defer to the kids if they are having technical things, probably – uh, I know that the knowledge will be out there. Somebody in the class will know"	Interview 3
Arthur	"...some of the students might actually volunteer"	Interview 2
	"...students also showing me how it works"	Interview 2
	"...the students are familiar with it, Um, I'm familiar with it to some extent, and, uh, in general I think it works smoothly, and I think we know what to expect and how to use the iPad as a tool."	Interview 3
	"I'm confident, and the students are more confident, we can solve new problems easier, um we can discuss the problems, we have a common language. Something along those lines I would say."	Interview 3
	"I think it, it gives me uh, it um, shows me that students can share material. It means that the flow of information is obviously not always from teacher to student, which is good"	Interview 3

b) Student use efficacy

A subtheme related to this sense of classroom collective efficacy is the theme of student use efficacy. Jim indicates this confidence in student use of the iPad mini in several instances, but particularly highlights this in the following quotes:

"Most of the kids now, have either solved all the problems or they know who the kid is in the class that absolutely knows what it is.....It doesn't require that the teacher is in there, shaping their ability to use the device" (Jim, Interview 3, June 2014)

“You give them that freedom and all of a sudden everyone’s going four steps beyond what they’ve been able to do in the classroom in the past, and I think that that is just the most telling bit about the whole thing” (Jim, Interview 3, June 2014)

Rita’s data also supports this sense of student use efficacy regarding the iPad mini. Throughout the first year of implementation, Rita in particular shows evident growth in this area, as the following quote reveals:

“In the beginning of the year, I would only let students use specific things or apps that I was already familiar with myself, where now I will let them choose to use an app I’ve never seen before” (Rita, Interview 3, July 2014)

A distinction between the teacher’s personal use efficacy, and teacher efficacy regarding student use of the device was also evident in the case of Leslie, where this sense of collective classroom efficacy existed separate to her own reported sense of efficacy with the device. Leslie indicated that she did not necessarily feel confident with her own personal/individual use of the device and this was held in direct contrast to the efficacy felt regarding student use:

“I’m really confident with the kids using it, but I don’t use it much myself” (Leslie, Interview 3, June 2014).

Distinct from individual teacher use efficacy, characteristics of this student use agency included a confidence from the teacher regarding the ability of students to use the device effectively in the classroom.

“They are now using them so often in so many classes that they have become little masters at the iPad” (Jim, Interview 3, June 2014)

“The process of getting there can actually be governed by other people as long as we get to the end solution in some way” (Rita, Interview 2, February 2014)

Jim also echoed Rita’s comment regarding a potential shift in the role of the teacher, which suggests that the use of the iPad mini in the class enhances the agency of students as they collect, process and present knowledge and skills:

“It doesn’t require that the teacher is in there, shaping their ability to use the device” (Jim, Interview 3, June 2014)

What is perhaps most important regarding this theme is that even if the teacher concerned does not possess a high level of personal efficacy regarding use of the device, that this did not limit or impinge on their beliefs concerning student use of the device, as we see in the case of Leslie.

c) Negative experiences

Teacher participants mentioned device limitation and internet connectivity/access as negative or frustrating aspects of their experience with the devices. In addition, although less salient, were classroom management issues as an area of concern for teachers.

Within the data, teachers reported technical difficulties that resulted in frustration with the use of the device:

“Even in my own classroom, you know, plugging it in, getting all the wires. Then it being slow and that thing going around and around, waiting for that, yeah, and things are taking ages to download” (Leslie, Interview 1, November 2013)

Table.4:17 Technical Difficulty coding frequencies

Teacher	Interview 1	Interview 2	Interview 3
Leslie	1	1	0

Arthur	4	7	2
Jim	1	9	1
Annette	1	0	0
Rita	0	0	0

Although teachers indicated frustrating experiences particularly regarding either school infrastructure or device limitation, they also indicated that this did not affect their efficacy regarding using the device:

“No, not my confidence, but I feel limited” (Jim, Interview 2, February 2014)

Jim, Annette, and Arthur indicated that the limitations of the infrastructure did, at times, cause them to choose not to use particular apps in order to avoid the need for sustained and reliable Internet access:

“It’s not a choice made out of confidence – it’s a choice made out of convenience” (Jim, Interview 3, June 2014)

“...it would be feasible if we had better internet, because it’s internet based I can’t use that yet” (Annette, Interview 1, November 2013)

In these cases, (with the exception of Arthur who mentioned some effect on confidence) all teachers indicated that they chose to not use particular apps, rather than reporting any loss of confidence in the device itself or its usage in the classroom. As Annette indicates:

“...at first you find it frustrating and then you kind of almost expect it to happen, and so when it does happen it doesn’t really affect you” (Annette, Interview 2, February 2014)

This is also supported by Jim who says:

"I don't think it's stopping people from using the iPads or the technology of the applications, it's just a frustration point and if those solutions could be found, or the systems improved, then I think you'd have more teachers doing more stuff with it, but that is again and again a frustration point" (Jim, Interview 2, February 2014)

d) Classroom management

Classroom management was a brief theme mentioned by teachers, and this theme focused around the need to manage the devices:

"...from a classroom management stance it can be challenging because you have to adapt in a different way to be sure that everybody's on the same page" (Jim, Interview 3, June, 2014)

While teachers indicated some issues surrounding management of the devices (lost devices, flat batteries, distraction), no teacher indicated that it affected their self-efficacy negatively when using the devices in the classroom, rather that it was an element of the classroom that they needed to be mindful of when using the iPad mini in the classroom similar to other classroom management issues that may arise when using any equipment:

"...sometimes they forget to recharge the batteries or they leave it behind. It's more of a behavioural problem I think with the student rather than the technology itself" (Arthur, Interview 2, February 2014)

Off task behaviour was briefly mentioned as an issue that was frustrating in the use of the iPad mini, however again, teachers did not indicate that their self-efficacy concerning device use in the classroom was negatively influenced. As Jim notes, the classroom management when the device is involved is no different to a normal approach to classroom management:

"...kids that are off task are always off task, whether they're off task on their instrument or talking to a friend or passing a note or now they're just doing something on the iPad they shouldn't be, and it's all the same type of

classroom management, it's just a new distraction" (Jim, Interview 1, November 2013)

e) Mastery

The place of mastery experiences (in which individuals achieve a sense of confidence through competent accruing of particular skills) in influencing self-efficacy was evident from the data collected in the study. Practice with the device and exploring the different ways the device works were key elements that aided in the achievement of a sense of overall confidence using the device:

"Ok today I'll learn how to use it on the iPad and so I'll have you know half an hour just trying things out, trying to make something and then, you know, practicing oh where's the export and just kind of seeing that kind of stuff ahead of time. I find that most useful" (Annette, Interview 1, November 2013)

Knowledge of individual apps was not necessary to achieving this sense of mastery, as connections made between how apps worked and the overall structure of the device were the key elements. Teachers Rita, Annette and Jim indicated that although they did not know how to use every single app, they were confident using the device for particular purposes, as appropriate to their desired classroom use:

"Now it's just using the tool – you've explored it – you understand it, you've got it" (Jim, Interview 3, June 2014)

"You start to see similarities and then you understand it" (Annette, Interview 2, February 2014)

"I don't think there's any situation where I wouldn't feel confident about using the iPad in the class now" (Rita, Interview 3, 2014)

For some teachers, mastery (and subsequent improved confidence) was distinctly limited to particular apps and the relevant use of such in their classroom:

“When do I feel more independent? Well I know how to use Reflector now more independently, yeah” (Leslie, Interview 2, February 2014)

As the teachers mastered the use of the iPad mini, they were able to accommodate infrastructure issues (either with device limitations or contextual limitations such as the internet speed) as they arose, and were able to distinguish these issues as separate from the positive functionality of the device:

“but still even with all of those issues infrastructure wise at the school – I’d still rather have them in the classroom than not have them” (Jim, Interview 3, June 2014)

These elements were acknowledged as part of the process of using the device, and accommodated into the use/teaching with the device, indicating teacher:

“It’s not that the school doesn’t have a plan to address them, it’s just it’s a plan that isn’t going to be in effect until next year, so I’ve just gotten over the fact that it’s not as effective a tool as it can be if the infrastructure within the school isn’t there” (Jim, Interview 3, June 2014)

Several teachers indicated that they felt a high level of confidence which held characteristics of both being comfortable taking risks with unknown apps, as they felt their coping strategies would suffice for any issues that came up, as well as being able to contribute towards a solution. The term ‘second nature’ was also used related both to the everyday nature of the device, as well as integration of the device. Three of the five teachers (Rita, Jim, and Annette) commented that the nature of the device is simple and therefore this simplicity allows for mastery of the device after a sharp learning curve. This feeling of mastery was then transferred to the use of other apps and the belief that all apps are by nature simple and therefore able to be mastered, even without prior knowledge:

“... to realise that you don’t need to know everything beforehand, that you can kind of – apps are similar and once you kind of get the idea of things you know like it’s more of a general framework” (Annette, Interview 2, February 2014)

“the way the iPad operates is actually quite simple and so once you know one or two apps it’s really easy to learn other apps” (Rita, Interview 3, July 2014)

“...none of the programs are particularly difficult they are all very simple by nature because it’s a small system” (Jim, Interview 3, June 2014)

Whereas Arthur and Leslie reported a more limited sense of mastery:

“Depends on the on the application, depends on the situation. As I said if it’s something like Pages then I’m relatively confident about them or any of the iWork suite” (Arthur, Interview 2, February 2014).

This indicates a distinction in efficacy between teachers, and perhaps suggests that a higher sense of efficacy with the iPad mini device includes the characteristic of an overall sense of understanding of the device, as indicated by Jim, Rita and Annette.

f) Becoming the expert

“So coming from a place of nothing, I think, that made me feel good too.....I realise I have got some knowledge” (Leslie, Interview 2, February 2014)

Feeling competent enough to share knowledge with others was a minor emergent theme mentioned in Leslie, Annette and Rita’s comments. This theme involves an indication of growth of confidence through becoming the person who ‘sits in the seat of knowledge’ and sharing this knowledge with others as the proficient

professional. Commenting on a presentation made at a Professional Development conference, Leslie indicates:

“Well, I know that I’m in no way an expert but at least the name of the presentation was Integrating iPads and so I’m a person that’s had experience doing it so I was able to stand up in front of people and talk about it..... so coming from a place of nothing, I think, that made me feel good too, so someone, so I realise I have got some knowledge” (Leslie, Interview 2, February 2014)

Annette also indicated that this ability to share experience aided her own confidence as she shares her knowledge with others, stating that “ I was sort of able to give advice so that also obviously boosts my own confidence in it” (Annette, Interview 3, June 2014). This thought is also echoed by Rita:

“As the year progressed, I started to find out more and more that I’m using the iPad far more than a lot of other people and successfully using it, and um, started planning to do it, teaching other people how to use the iPad and that was really good for my confidence in seeing myself as skilled user” (Rita, Interview 3, July 2014)

g) Device value

A recurrent theme was the value of the iPad mini as a tool in the classroom. These affordances allowed by usage of the device within the classroom indicate several related themes as indicated by teacher participants. As these positive aspects can be seen to influence teacher value (and thus investment in using the device), they have been collated into one area, with subthemes. Personalised learning, Student enjoyment, Student agency, improved efficiency, and quality of work were all salient subthemes related to device value, and are reported in the following section.

Personalised learning

Confidence in the use of the device to improve personalised learning for students was indicated throughout the data. While this this not related directly to individual teacher self-efficacy regarding the device, it indicates value of use of the device in the classroom, as we can see from Jim's comment below:

"It's increased the learner's toolkit. That for me is invaluable" (Jim, Interview 3, June 2014)

This theme is attributed to factors influencing self-efficacy as it can be seen to contribute towards the perceived value of the device, and in turn, potentially influence perseverance and resilience as the perceived value outweighs potential barriers to use. Leslie indicates this with references made to student use of the iPad mini to enhance personalised learning:

"Because it... opens it up, you know, gives freedom of choice, you know, it's ah.. so the ones who want to, they stayed with the safe little chart, you know, with the columns, and putting the words in columns but it enables kids who want to just go for it" (Leslie, Interview 1, November 2013)

Commenting on what the most valuable thing about the iPad mini is, Annette also indicates that the personalised learning that the iPad mini offers is a highly valuable aspect of using the device in the classroom:

"...a lot of our students are language learners, or um people with dyslexia – it gives an opportunity to be on a level playing field" (Annette, Interview 3, June 2014)

Rita's comments also support this theme of personalised learning that the iPad mini provides. This form of differentiation by choice - regarding

language, educational needs and skills sets - were all mentioned as ways that the iPad mini increases this aspect of perceived device value:

“It can benefit especially the language learners who are, are still acquiring the language skills that we are teaching, or, the students who have organizational challenges um, and then also the gifted students have really been able to fly” (Rita, Interview 3, July 2014)

“Maybe a year or a year and a half ago the same student would not have been able to show their understanding because he didn’t have the same kind of tools and that it didn’t mean he didn’t understand, it just meant that I couldn’t access what he could understand in the same way” (Rita, Interview 2, February 2014)

Allowing students to engage with a range of meaning-making strategies, particularly benefits learners of other languages – which is a highly relevant benefit in an international school context such as the place of this study. As Rita states the use of the device allows students to share knowledge *“in a way that’s wider than words and that really appeals to the multi-language students we have” (Rita, Interview 1, November 2013).*

Student enjoyment

“She was just so excited to show me her video that she made of her drawings.” (Annette, Interview 1, November 2014)

Reference to student enjoyment, shared class enjoyment, and student engagement was a common answer to questions regarding positive experiences for teachers:

“It was a way of showing your work and being excited about it to the point where you actually want to display it..... ‘Look what I’ve done!’” (Annette, Interview 1, November 2013)

“If it’s done right, it’s making our teaching more engaging, more interesting, you know, more active for the students too” (Jim, Interview 1, November 2013)

Closely connected student enjoyment, student engagement and efficiency was cited repeatedly as a benefit of the device usage, with several teachers mentioning that tasks were achieved through using the device that otherwise students may have struggled with completing, as Rita explains here:

“They tend to do everything on one device and they have the device with them, so it’s easy to then find the information and check that information and check it, whereas in the past they maybe didn’t get a, or they got a negative comment or... for not having homework to submit – maybe just because they had poor organizational skills” (Rita, Interview 3, July 2014)

“I feel that they are pretty good at staying focused. I don’t know if that’s more so that say if it was pen and paper. I would say so” (Annette, Interview 2, February 2014)

These positive experiences were reported to add value to the perception of the device, which in turn aided confidence in the use and purpose of the device, even when personal efficacy of the teacher concerning use of the device varied.

Quality of student work

Related to student use efficacy, was a theme emerging from the data indicating an improvement in the quality of student work. Connections were made to improved literacy, the quality of work produced and the efficiency of the device to help students complete their work:

“The quality of the work that the students have been turning in has been brilliant” (Jim, Interview 1, November 2013)

Int: What experiences do you think have contributed the most to how you feel about using the iPads at this stage?

Leslie: The progress.

Int: Which particular progress?

Int: The progress in their writing ability

(Leslie, Interview 3, June 2014)

Limitations

While a recurrent theme was the improved quality of student work, this also is held in tension with the perceived limitations of the device. Teachers did not indicate that the iPad mini improved student work in all cases, rather that the immediate access to knowledge and use of the device for presenting content was beneficial. There was also an acknowledgement that the device by its simplistic nature and size had limitations – particularly for those students lacking fine motor skills, or for projects that required fine details:

“The children that have difficulty with fine motor skills. It’s so fiddly. And you know, correcting work and also because they hastily do things because it’s that kind of - it’s like a texting as opposed to this [laptop]” (Leslie, Interview 3, June 2014)

4.5 Other findings

In the course of data analysis additional findings were recurrent. While these do not directly relate to the research questions and study, they do provide interesting insight to both teacher and student reported use of the iPad mini device.

a) Student agency

In addition to a strong sense of belief in student competency using the device, an additional nascent theme was that of student agency in regards to both use of the

device and problem solving technical issues. Teachers indicated a shift in their role in the classroom, as evidenced by the quote below:

“In the beginning of the year, I would only let students use specific things or apps that I was already familiar with myself, where now I will let them choose to use an app I’ve never seen before if they felt confident that they could use it” (Rita, Interview 3, July 2014)

The ability for students to engage with research and take control both over the guided collection of content and creation of knowledge, as well as the presentation of such was also an emergent theme from the data. Strongly connected to personalised learning and student-use efficacy, this element of the mobile device classroom shows a development and transference from the teacher centred learning space to student-centered space:

*“It gives students more control”
(Arthur, Interview 1, November 2013)*

“It doesn’t require that the teacher is in there, shaping their ability to use the device” (Jim, Interview 3, June 2014)

“...they not just users but they are starting to become creators” (Rita, Interview 1, November 2013)

As we can see from the quotes above, teachers showed a progression from the teacher being the central agent for knowledge to the iPad mini being a conduit for student agency in the construction of knowledge. The teacher does not become obsolete, rather becomes a verifier of collected information, seeking to partner with the student in their pursuit of connections, skills and mastery of subject matter.

4.6 Conclusion

The findings outlined in this chapter report the changes in teacher mobile self-efficacy and influences on self-efficacy of five teachers, as well as the respondents of the initial online survey. This data was collected throughout the first year of an iPad mini one-to-one device implementation in Grades 6-8 classes.

Teacher participants experienced changes in self-efficacy to varying degrees, although all indicated some sense of efficacy growth. A distinction was observed between those who reported a sense of device mastery (Annette, Jim, Rita), and those who reported a more discrete sense of confidence growth linked with particular tasks or applications. At the end of the first year of implementation, those with higher initial self-efficacy reported a sense of overall device mastery. Those who had perhaps a lower sense of efficacy (Leslie and Arthur) at the beginning of the implementation year, still reported confidence growth, and this growth was more connected to individual tasks or applications.

A variety of influences on self-efficacy emerged in the data. A repeated theme was that of a sense of collective classroom efficacy, which emerged in all teacher findings, regardless of their sense of personal efficacy regarding the device. Several mentioned influences related directly to the perceived value of the device in the classroom. Student use of the device was also a recurrent theme, wherein teachers indicated that student enjoyment, student engagement, efficiency and student agency were all positive elements to use of the device, thereby influencing their own attitude towards the device. Teachers reported infrastructure with both school

systems and the device itself and (to a lesser degree) time as barriers to use of the device, however they also reported coping strategies that allowed them to continue use of the device, revealing a level of resilience to the challenge of the implementation.

As can be seen from the reported findings, commonalities in self-efficacy influences exist between participants. These findings will be discussed and interpreted in relation to existing literature in the following chapter.

Chapter Five: Discussion

This chapter seeks to discuss the key findings reported in Chapter Four and to compare and contrast it with the literature presented in Chapter Two. This discussion chapter also seeks to discuss the findings in relation to the guiding research questions for the study:

1. How does teacher mobile technology self-efficacy change over the first year of a one-to-one iPad mini implementation programme?
2. What are the influences on teacher mobile technology self-efficacy during the first year of a one-to-one iPad mini implementation programme?

Through the comparison between reported literature and key findings, this chapter seeks to compare or contrast against existing theories and research regarding self-efficacy influences and development. Firstly, this chapter will discuss the initial online survey and contrast these findings against existing literature. Following this discussion, the findings of the longitudinal interviews will be examined in comparison to existing literature, and in connection to the guiding research questions.

5.1 Online survey findings

The quantitative findings collected from the online survey indicated that participants valued time to explore the iPad mini device, and that prior learning (both in personal use and before classroom implementation) was valued. This

echoes existing literature that suggests that prior experience is important in building self-efficacy (Celik & Yesilyurt, 2013; Paraskeva et al., 2008).

Both value and enjoyment of technology were also reported, where enjoyment in using technology is connected to an overall positive attitude to the use of technology reported in the results. This connects with existing literature, which suggests that underlying teacher attitudes (such as value and enjoyment) influence teacher approaches to technology and subsequent uptake (Holden & Rada, 2011). Teachers reported an enjoyment of experimentation and risk taking when using new technology which connects with the findings of the online survey.

5.2 Longitudinal Interview data

Both individual and cross-case thematic analysis of qualitative data in the findings chapter highlighted several key themes. The findings revealed that consistent with self-efficacy research; enactive mastery was the most prominent source of information reported for self-efficacy formation. Modelling, coaching and physiological responses regarding the iPad mini device were all also reported as contributing sources of information on which self-efficacy judgments were made, with modelling and coaching being more prevalent, as suggested by Margolis and McCabe (2006). Infrastructure barriers were present, however were not seen to overly hinder self-efficacy growth in teacher participants, indicating a sense of resilience and perseverance.

Teachers, overall, reported a growth in efficacy regarding the iPad mini device, although this varied in degree and form, with some teachers demonstrating clear growth related to personal use, and others demonstrating growth in their efficacy concerning collective classroom use of the device. A recurrent theme in the findings was that of a sense of collective classroom efficacy between teacher and students. This was a salient theme in all teacher participant experience, and was a factor that impacted their self-efficacy regarding the use of the iPad mini device in the classroom. Teacher collective efficacy is documented in literature (Goddard et al., 2000), however is mostly focussed on teacher-to-teacher peer relationships and subsequent connection to student achievement rather than teacher-to-student collective classroom efficacy

5.3 Forms of personal mobile technology self-efficacy

Two distinct types of personal device use self-efficacy were reported by teacher participants. Several teachers (Jim, Annette, Rita) indicated a strong sense of efficacy in both specific app use as well as overall understanding of the device infrastructure, whereas the remaining two teachers (Arthur, Leslie) indicated a more discrete self-efficacy that was based on specific apps. While Arthur and Leslie indicated a growth in their self-efficacy, this efficacy was more restricted to particular apps that had been researched and applied in the classroom. This perhaps indicates various levels of mastery – those with higher iPad self-efficacy demonstrated a more broad-based sense of efficacy regarding the iPad mini. This sense of competence in addressing any barriers that one encounters supports existing research which posits that those with a higher sense of self-efficacy have

more resilience towards encountered barriers and are able to form strategies to address them (Pajares, 1996).

5.4 Common factors influencing teacher self-efficacy

a) Enactive mastery

Aligning with literature identifying enactive mastery as a key source of information for self-efficacy judgments, all teacher participants indicated that mastery experiences (although seen to varying degrees) played a part in the development of their iPad mini device self-efficacy (Bandura, 1982; Joët et al., 2011; Schunk & Meece, 2005)

Teacher participants indicated varying degrees of experimentation. Jim, Annette, Arthur and Rita all indicated that exploration and experimentation with the device were strong factors in their development of confidence with both their personal use of the device and integration into the classroom. All teachers who reported this intentional experimentation also attributed a strengthening in their confidence of the iPad mini device.

A common characteristic among the higher efficacy participants (Jim, Rita, Annette) was an extended and sustained approach to personal device use, despite obstacles or barriers to integration. This connects with literature that suggests a high level of efficacy which supports perseverance in new skills (Bandura, 1986, 1994; Dweck & Leggett, 1988; Schunk & Meece, 2005).

b) Modelling

Learning from observing the skills of other colleagues through modelling was reported by all teacher participants, although to different degrees and in different manners. Several teachers indicated that they were both observers of peers' behaviour, as well as the one being observed (Jim, Leslie, Rita, Annette).

Where teachers had the opportunity to "become the expert" they perceived this as encouraging in their continued use of the iPad mini device. This suggests that comparison with colleagues allowed them to gauge their skill level and extend their own efficacy, as was evident with Leslie, Rita and Annette. At other times, observing the expertise of colleagues led to an anxiety of sorts where, in comparison, individuals felt they would not be able to reach those standards (particularly Leslie). This aligns with literature on modelling in self-efficacy, which indicates that similarity in skill level in modelling is necessary to enable the individual to feel that the desired skill is within reach, otherwise the effectiveness of the modelling experience is significantly reduced (Bandura, 1994; Schunk & Meece, 2005; Schunk & Zimmerman, 1997). Literature also suggests that not only is the perceived similarity of the model necessary, but the skills presented must be also perceived to be of value by the observer (Bandura, 1994). Modelling is most beneficial when there is perceived similarity between observer and the observed. As this is a common form of skill development for teacher professional development in a school environment, differentiation by skill, interest and subject area may help strengthen teacher mobile technology self-efficacy and subsequent skill acquisition.

In contrast to how observing others affected her self-belief, Leslie also indicated risk taking in choosing to present at a conference in order to share the knowledge she felt she did have. This allowed her as the one being observed to feel knowledgeable in comparison to others and this positively affected her efficacy. Leslie, Annette and Rita also mentioned this 'sitting in the knowledge seat' sense of modelling, as a source of confidence regarding the device.

These teachers reported that when they compared themselves to others (and found themselves more knowledgeable in the given situation), this helped them feel a sense of improved confidence with the device. While much literature on modelling is focused on the observer being influenced positively through this process (Margolis & McCabe, 2003; Schunk & Pajares, 2001), this data suggests that when the model feels successful, their own confidence may be influenced, suggesting a reflexive benefit to modelling behaviour.

Three teachers (Annette, Leslie and Rita) made mention of observing modelling in the form of short demonstrations in faculty meetings. Both Rita and Annette found these experiences helpful, with both indicating they explored skills demonstrated and subsequently employed them. Leslie, however, indicated that while the demonstration was useful, she felt more guidance and step-by-step information would be necessary to engage with the demonstrated material. Jim and Arthur did not refer to this.

Exploratory use of the iPad mini device is consistent with Rita, Annette, Jim and Arthur's approach to learning with the iPad mini device. Conversely Leslie's consistently lower confidence regarding new skills on the device can be seen in her limited exploration of the device outside of specific apps. In accordance with existing literature, we see a higher sense of self-efficacy is linked to motivation in learning as reported by those who have consistently experimented with and explored the iPad mini device (Margolis & McCabe, 2006; Schunk, 1991; Schunk & Zimmerman, 1997) and persistence in learning (Schunk & Zimmerman, 1997).

c) Physiological factors

Both positive and negative physiological factors were reported by teachers, with some experiencing excitement over the use of the device (Jim, Rita, Annette) and others experiencing anxiety regarding the implementation (Leslie). Arthur did not report physiological responses.

Leslie was the only participant who indicated a clear sense of apprehension towards personal use of the iPad mini device, suggesting that anxiety was present in her experience. This may be seen to contribute to her hesitance to explore use of the device over the first year of implementation and her coping strategy of avoiding personal use of the device.

d) Coaching

In terms of coaching as a source of self-efficacy information, Arthur indicated that this was particularly helpful. Specific task-based coaching by technology support personnel (such as the school iPad technician) was cited by Arthur as inspirational, and resulted in him persevering in using the device in new ways. This use of verbal persuasion or coaching as a source of self-efficacy information is consistent with literature which suggests coaching can encourage individuals to attempt new tasks (Schunk & Meece, 2005).

Coaching or verbal persuasion was not a clearly reported finding apart from a brief mention by Arthur. This may be consistent with literature that suggests that this form of influence alone is one of the least effective sources of information for self-efficacy formation (Bandura, 1977). However, this may also indicate that verbal persuasion (particularly in the form of exhortation) was not readily present in the experiences of the teacher participants, or was eroded through contradictory experiences, which literature also indicates is possible (Bandura, 1977).

5.5 Other influences on teacher self-efficacy

a) Device value and self-efficacy

Perceived value of the device was a key theme evident across all teacher participant interviews. This finding concurs with existing literature, identifying it as an important element to technology integration (Mueller et al., 2008; Uslu & Bümen, 2012). Value aspects reported by teachers were largely centred on the affordances of the device, such as improved task efficiency, quality of work, student personal

management, student extension/acceleration, and support for English as an Additional Language (EAL) needs. This aspect of perceived value of technology influencing technology acceptance (and subsequent self-efficacy) is supported by existing research, which suggests that perceived value of technology can affect teacher use and integration (Donnelly et al., 2011; Mueller et al., 2008; Oblinger, 2014; Shinas et al., 2013; Soa et al., 2012).

b) Collective classroom efficacy

A further theme (mentioned by all teachers) that arose was a clear two-way flow of information between students and teachers regarding technical problem solving in particular. This may indicate that modelling is still influential when a sense of shared purpose is perceived – as the exchange of information was between both teacher and student, and was reciprocated.

A salient finding was the notion of a sense of collective efficacy, reported to exist primarily between teachers and students and focused primarily on technical problem solving. The collective efficacy found in this study enabled the teachers with lower self-efficacy (such as Leslie and Arthur) to still engage with the use of the device in the classroom, regardless of their own personal efficacy regarding the device.

Jim indicated an extension of this, with a reciprocal learning of new ideas and innovation being noted through observation of student skills. Existing research acknowledges collective efficacy, and in particular how teacher collective efficacy affects student achievement (Goddard et al., 2000). Current research defines this

element of efficacy in regards to peer collective efficacy, with particular reference to peer or collegial relationships, rather than more disparate relationships such as teacher to student, or vice versa . This sense of collective classroom efficacy was reported as being present in the classroom to different levels, with some teachers (Jim, Rita, Leslie) reporting a shift in their own perspective to a more agentic approach to this collective classroom efficacy, where they actively sought to create conditions where this could develop.

This collective classroom efficacy as reported by all teacher participants was evidenced both between teacher and student and in student to student interactions. In some cases, teachers also saw this extended to reciprocal learning (as in Jim's findings), where students were spontaneously sharing their learning and innovations regarding app use with the teacher, rather than just technical problem solving. This belief in the synergistic capability of the group to achieve particular outcomes is consistent with existing literature on collective efficacy (Goddard et al., 2000; Klassen et al., 2010).

c) Perceived ease of use

Research indicates that perceived ease of use can positively affect teacher use of technology (Davis et al., 1989; Holden & Rada, 2011). This, in turn, can influence self-efficacy through enactive experiences, because if usability is perceived as high, individuals are more likely to attempt technology usage. Teachers with higher self-efficacy in this study also reported perceived ease of use (Jim, Rita, Annette), along with an overall sense of mastery of the iPad mini. Both Arthur and Leslie indicated a sense of ease with particular applications, however this was limited to apps they

were distinctly comfortable with. Perceived value can also be seen to influence teacher uptake of technology and persistence with the use of the technology (to some degree) regardless of personal teacher self-efficacy. This was clearly seen in the case of Leslie who, despite her own low self-efficacy concerning the device, was still able to actively engage with students' use of their devices in her classroom.

d) Barriers to technology use

All teachers indicated that infrastructure issues such as slow internet and device limitations were potential barriers to their use of the device in the classroom. Despite this being a salient theme in terms of frustration, all participants continued to use the device in the classroom (although there were varying degrees of personal use). This continued use can be attributed to several factors – both extrinsic and intrinsic motivations. Extrinsic motivations include expectations from the school environment (such as the a school-wide implementation approach), and professional commitment, which research indicates can encourage technology use regardless of an individual's efficacy (Brown et al., 2002). Similar to existing literature, intrinsic motivators included perceived value both pedagogically and in affordances of efficiency (such as student access to the internet), which can be connected to perceived value, which in turn influences persistence with technology usage (Donnelly et al., 2011; Lai & Pratt, 2008).

While literature suggests that a potential barrier to technology use is a perceived sense of challenge to traditional roles of the teacher in the classroom (Ertmer, 1999; Paraskeva et al., 2008), this was not apparent in this study. All teachers indicated a high perception of value of the device and while various self-efficacy

levels were evident, no teacher indicated a sense of challenge to their role as a reason for anxiety or avoidance of device usage.

Leslie repeatedly reported value in the use of the device in her classroom, while her personal use remained limited. This aligns with research that indicates that personal technology efficacy and technology integration can be seen as separate domains (Shinas et al., 2013; Soa et al., 2012). Leslie also indicated at the commencement of the implementation, her comparison to others and ‘keeping up’ was also a motivating factor, indicating that her perseverance may not be only linked to self-efficacy, but rather extrinsic factors, as research also suggests may be an overriding factor to continuation with technology usage (Brown et al., 2002).

Despite comments regarding limited level of device usage, Leslie reported continued use of the device in a variety of ways in the classroom. This may indicate further discrete subsets of particular efficacy domains, or an incongruent relationship between perceived self-efficacy and use of skills concerning the device. This aligns with Bandura’s research which suggests that perceived self-efficacy and actual skill can be quite disparate (Bandura, 1993). Perhaps of most interest was the contrast between the perceived personal efficacy regarding the device and the positive attitude regarding the value of the device.

5.6 Prior learning impact

Research suggests that prior learning with technology can have direct impact on the development of self-efficacy when engaging with new technology (Celik & Yesilyurt,

2013; Paraskeva et al., 2008). While this was evident for highly efficacious teachers (specifically Jim and Rita who both expressed high levels of prior technology experience), this was not evident in all teachers. Leslie confirms an extended and varied use of technology over her teaching career and personal life, and yet is identified as having a lower sense of efficacy in relation to the other teacher participants. In contrast, Leslie also reported consistently avoiding personal use of the iPad mini device, indicating a lower sense of self-efficacy regarding the device (Bandura, 1994). What is of particular note is that where both Jim and Rita discussed prior experiences with technology, they indicated that this positively effected their sense of overall self-efficacy concerning learning new tasks – with experimentation and openness to failure being accommodated into the learning experience. Persistence in tasks and ability to take informed risks were indicated by all teachers and as such aligns with existing literature suggesting these behaviours are consistent with a higher level of self-efficacy (Dweck & Leggett, 1988; Pajares, 1996; Schunk & Meece, 2005).

5.7 Changes in self efficacy

Within the context of this study, a distinction was evident between teachers who reported higher self-efficacy (Annette, Jim, Rita) and those who reported some apprehension with the device (Arthur, Leslie). For those with higher self-efficacy at the commencement of the study, a shift was evident in the collective classroom efficacy concerning the device. Although individually highly efficacious regarding the device for personal use at the beginning of the implementation, these three teachers also grew in their sense of efficacy in the classroom throughout the first

year of implementation. In particular, Annette and Jim indicated a shift in their role as the teacher, reporting that the use of the device in the class gave them freedom to embrace the role of facilitator and co-collaborator.

Research suggests that technology integration exists as a separate domain in teaching (Shinas et al., 2013). Digital technologies were integrated by teacher participants to varying degrees and was seen primarily through the use of the iPad as a tool by students in the classroom. While some teachers indicated avoidance of particular applications or forms of use due to lack of confidence (Leslie, Arthur), in contrast both Jim and Rita indicated that by choice they did not use the iPad as a teaching tool in certain circumstances, as its limited ability with specific subject-related programs meant it was not suitable for particular purposes. This indicates that decisions not to use the device as a teaching tool were also made due to intentional and informed choice rather than as avoidance behaviour, which literature suggests is also a coping mechanism when a lack of confidence is present (Bandura, 1994).

Time was also mentioned as an element that influenced learning how to use the iPad mini device. All teachers indicated that they had invested time learning how to use the device, whether through attending training, or independently exploring the device's capacity. Some teachers indicated that they felt they would benefit from concentrated or additional time to explore subject-related applications of the iPad mini, or that their mastery of the device was somewhat limited due to time restrictions in the light of the general teaching load. This is consistent with research

that indicates that time to learn and develop skills is important in technology use and uptake, as well as the restriction of available time also being cited as a hindrance to teacher uptake of technology (Ertmer, 1999).

Data suggests that no teacher experienced a decline in their self-efficacy. This indicates that, over time, given a range of experiences that these teachers were able to build efficacy even if through minimal personal usage. Enactive mastery experiences were most prevalent in teacher's data, also aligning with existing research. All teachers experienced a change in efficacy, with some reporting both personal and collective classroom efficacy. This sense of collective efficacy (in this case collective classroom efficacy) enabled teachers to engage with implementation of the device in the classroom, regardless of their own personal efficacy regarding the iPad mini.

The next chapter consists of the conclusion for the thesis. This final chapter seeks to recap the major findings, address the implications arising out of the study and identifies the limitations of the study.

Chapter Six – Conclusion

This chapter draws this research together by summarising major findings, as well as discussing the implications for the use of mobile digital technologies in secondary school classrooms. This chapter also identifies and discusses the contributions this study makes to research on mobile digital technology use and teacher self-efficacy. The limitations of the research are outlined and the summative ideas of the researcher are presented. Future research suggestions are also outlined.

6.1 Key factors which influenced teacher mobile technology self-efficacy

The aim of this study was to explore factors that influence the self-efficacy of teachers using mobile digital technologies within secondary school classrooms. A combination of identified sources of information such as the traditional sources for self-efficacy information (enactive mastery, modelling, verbal persuasion and physiological responses) and the student-teacher collective classroom efficacy were seen to contribute to the development of self-efficacy and subsequent mobile technology usage of teachers in this study.

6.2 How did teacher self-efficacy change over time?

All teachers experienced some change in their self-efficacy, although this was seen to varying degrees. Those with higher self-efficacy at the beginning of the implementation maintained this efficacy and experienced growth and overall mastery of the device. Those with lower self-efficacy at the beginning maintained

their initial self-efficacy in addition to developing a more discrete sense of efficacy, centred around particular apps or specific uses of the iPad in the classroom.

6.3 Key factors influencing self-efficacy and iPad mini device use

Three (out of the four) recognised main contributors to self-efficacy construction, including enactive mastery, modelling, and physiological responses (Margolis & McCabe, 2006) emerged in the data, consistent with existing literature. In addition to these sources of individual self-efficacy, teacher-student collective classroom efficacy further contributed toward teacher self-efficacy through the belief in the ability to address any problems that arose.

6.4 Significance of the research

This investigation contributes to existing research concerning teacher mobile digital technology self-efficacy and technology use. The research in this study focuses on specific contextual elements such as investigating mobile devices in a one-to-one device program in a secondary school. The research highlights and aligns with literature regarding influences on self-efficacy in relation to technology usage such as enactive mastery. It contributes to a small field of research on self-efficacy when using technology in a secondary school classroom and is unique in its context of being conducted in an international school setting.

Of particular note in this study is the contribution made to our understanding of collective efficacy. Much of the research on mobile and collective technology efficacy focuses on self-efficacy from the perspective of teachers, rather than the

classroom collective efficacy reported between teacher and students. The findings in this study suggest that this sense of collective efficacy may be wider than similar/peer relationships and can also be context specific when a group of diverse individuals (such as in a classroom setting) are working towards a common goal.

Affordances provided by the introduction of the mobile device into the classroom (such as efficiency and differentiation) were also significant findings in this study. These reported affordances can also be used to encourage teachers in their perseverance with technology use in the classroom.

The findings in this study also provide a potential additional source of technology support for the teachers – that of the combined skills of the students and teacher. If mindfully engaged with, this collective classroom efficacy can work towards reducing potential anxiety experience by teachers in the primary stages of mobile technology integration.

6.5 Implications

As this project is a small-scale mixed methods investigation, its role is not to make generalisations regarding what factors influence teacher mobile technology self-efficacy concerning mobile device usage in the secondary classroom.

As the school in this research study seeks to extend the one to one device programme throughout the remainder of the school, these findings can help identify and support targeted experiences to help teachers feel more competent

regarding with the use of the iPad (or other mobile device). Experiences tailored to individual skill level (with adequate time to master skills), as well as value-oriented skills (where the skill or tool is clearly valuable to curriculum areas or school levels) would help contribute to these mastery building experiences.

Implications for schools include ensuring that adequate time for experimental learning and training is factored in when introducing new digital technologies. Time for experimentation with new technologies allows teachers to gather experiences which can positively affect self-efficacy. As enactive mastery is the most effective and strongest source of self-efficacy information, allowing time for this also provides the opportunity for teachers to develop hardy efficacy when facing issues regarding infrastructure when these technologies are introduced into the classroom. For schoolwide implementations, this may mean that introduction of new digital technologies could benefit from staggered introduction to teachers and students, with new technologies being made available to teachers prior to full classroom/student implementation in order to provide ample opportunity for enactive mastery experiences. Differentiated training provided for teachers by school environments may also aid in providing similarity modelling, where teachers are able to better align their own skills with those they observe, in order to make this more effective for developing efficacy.

As the findings in this study suggest, teachers' beliefs in students' skills and abilities (i.e. classroom collective efficacy) may form when mobile devices are introduced into the classroom, regardless of a teacher's own self-efficacy This finding has

implications for teachers as it may contribute towards alleviating anxiety for teachers who are unsure of the technical aspects of using mobile technologies in the classroom. Teachers who are aware of this As many technology programmes in schools are school-wide or government initiatives, this consideration may increase in importance as teachers are faced with mandated technology implementation.

6.6 Future research

Research regarding collective efficacy is primarily based on peer to peer/collegial networks (Goddard et al., 2000; Klassen et al., 2010), or familial systems (Bandura, 2006), and as such, further research that explores the student-teacher cross-generational, context based dynamic in collective classroom efficacy is warranted. Transference of classroom collective efficacy and problem solving to other classroom dynamics such as curriculum knowledge would also be an area for further research.

The use of mindful similarity modelling (including subject, level and skill specific elements for differentiation) may be useful to consider as an influential factor that could be more significant for the building of teacher mobile technology self-efficacy than currently presented in this context. Further study would also be useful on what characteristics of highly efficacious mobile technology teachers look like in technology integration, rather than just use.

Currently, research regarding avoidance of technology use focuses on avoidance as a coping mechanism present in low efficacy individuals (Bandura, 1982; Schunk, 1991; Zimmerman & Cleary, 2006). Additional research into the reasons why

teachers choose not to use technology, specifically indicating a distinction between avoidance for reasons of low confidence and avoidance for reasons of device limitation. The findings presented in this study suggest that self-efficacy is only one of many contextual, personal and intrapersonal influences on technology use and integration in the classroom (Ertmer, 1999; Ertmer & Ottenbreit-Leftwich, 2010).

The results of this study also indicate a perceived change in the role of the teacher in the classroom into more of a facilitator and collaborator role by several participants. Further research into how this behaviour continues over time - after mobile technology has been present for sometime – could potentially contribute to further knowledge regarding this element of collective classroom efficacy and resultant collaboration.

6.7 Limitations of the research project

As with many research fields involving human systems, the field of education is a complex system of interactions between a range of system members. Therefore, any methodology used to study it may bring with it unanticipated factors. As such, assumptions regarding the methodology used, data collected and analysed are present. Through transparent acknowledgement of these underlying assumptions, those viewing this study can take these elements into consideration when viewing the findings and discussion resultant from this study. However, the findings can provide specific information for those in similar contexts such as schools who seek to implement one-to-one mobile device programmes.

The study was conducted with a small sample size (10 respondents in the survey, and five participants in the longitudinal interviews). While this provided a rich set of data, it does not represent the views of the teachers as a whole at the school, nor those outside of the research setting.

As research suggests that changes to perceived self-efficacy can take place over extended periods of time (Bandura, 1982), in order to gather further in-depth data an initial survey prior to iPads being given to teachers, and a further extended series of interviews may have provided more data to present a fuller spectrum of self-efficacy development. A more extended study that follows a cohort of teachers (and potentially students) over multiple years, may give a broader picture of self-efficacy growth over an extended period of time.

6.8 Concluding thoughts

The role of self-efficacy is only one contributing factor to the uptake and integration of technology in classrooms. The link between an individual's self-perception and these beliefs is a complex and multi-faceted issue.

What is promising about the integration of mobile technologies into secondary school classrooms is the shift in roles it can enable where teachers and students become co-collaborators when using technology in the classroom. As we seek to understand how to provide experiences or engender classroom cultures that encourage teachers to integrate new technologies into their classes, teacher

technology self-efficacy and classroom collective efficacy provide intrinsidically important areas for future investigation.

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Appendices

Appendix A

Massey University Human Ethics Approval



MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

27 August 2013

Josephine Tilton
Steubenring 6
Bonn 53175
GERMANY

Dear Josephine

Re: HEC: Southern B Application – 13/49
What factors influence self-efficacy in teachers using mobile technology within the secondary school classroom?

Thank you for your letter dated 27 August 2013.

On behalf of the Massey University Human Ethics Committee: Southern B I am pleased to advise you that the ethics of your application are now approved. Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Dr Nathan Matthews, Chair
Massey University Human Ethics Committee: Southern B

cc Dr Maggie Hartnett
Institute of Education
PN500

Dr Tracey-Lynne Cody
Institute of Education
PN500

A/Prof Sally Hansen, Director
Institute of Education
PN500

Mrs Roseanne MacGillivray
Institute of Education
PN500

Massey University Human Ethics Committee
Accredited by the Health Research Council
Research Ethics Office

Massey University, Private Bag 11222, Palmerston North 4442, New Zealand T +64 6 350 5573 F +64 6 350 5622
E humanethics@massey.ac.nz animalethics@massey.ac.nz gtc@massey.ac.nz www.massey.ac.nz

Appendix B

Letter to research site governance team



C/- _____

Dear _____,

I _____ am currently in the process of completing my Masters of Education (Teaching and Learning) through Massey University, New Zealand.

The upcoming iPad implementation will provide lots of new learning for teachers, and I am very interested in the paths that individuals take to develop their confidence and comfort with new technology.

With your permission, I would like to carry out the research project within _____. This research would require voluntary teacher participants (those involved in teaching Grades 6-8) who would first participate in an online anonymous questionnaire (Phase One of research). Within the questionnaire, teachers will be given the option to identify themselves if they wish to participate in the second phase of research. Phase two of the research involves teachers being interviewed three times (per teacher) between September 2013 and April 2014. These interviews would follow up to five teachers throughout their personal journey regarding the integration of mobile technology into their teaching practices.

The time commitment for the initial questionnaire, will be approximately 25 minutes. If teachers participate in the whole research project, the time commitment for each teacher will be approximately 205 minutes per participant, with interviews (3 x 30 min per teacher) being scheduled at mutually acceptable times, with no disruption to teaching responsibilities. The anticipated total of 205 minutes also includes time for participants to review interview transcripts. Should permission be granted by the school for this research care will be taken to ensure teaching schedules are not interrupted, as all interviews will be scheduled around class contact hours.

Throughout the process of information collection, teacher identity will be kept confidential, and the questions asked will focus only on their own personal experiences, rather than any evaluative comment on the iPad initiative, or associated professional development provided through _____. While this may involve comment and discussion of the supporting professional development throughout the implementation, the project is not intended to judge or evaluate the professional learning opportunities provided by _____ in regards to the implementation of mobile technology .

the summary findings (Thesis) will be made available to you at the conclusion of the research and writing process.

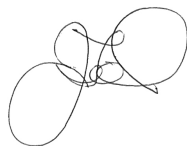
You are in no way obliged to provide permission, and you have the right to decline or to withdraw permission at any time. However, I do hope that you can see the potential benefit to the school and the wider research community. As self-efficacy is connected to both confidence and motivation, this research could contribute to a growing body of knowledge regarding teachers and their integration of technology into the classroom. If you are amenable to me carrying out the research, it would be most appreciated if you could respond in writing (via email or hard copy, whichever is most convenient).

Please feel welcome to ask me questions or to contact me with any questions or concerns you may have (jo.tilton@gmail.com). Throughout the process of this study, I will be consulting on a regular basis with two supervisors who will guide me in the completion of this research in an academically sound and ethically appropriate manner.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 13/49. If you have any concerns about the conduct of the research, please contact Dr Nathan Matthews, Chair, Massey University Human Ethics Committee: Southern B, telephone 06 350 5799 x 80877, email humanethicsouthb@massey.ac.nz

I look forward to receiving your response.


Kindest regards,



Miss Jo Tilton
Email: Jo.tilton@gmail.com
Mobile: 015114655639

Appendix C

Email invitation for Phase One participants

From: 
Subject: For Those Involved in the 1:1 iPad Program
Date: September 16, 2013 at 11:33 AM
To: Secondary Staff

Hello all

Please see the following invitation from Jo Tilton regarding the research project for her Masters of Education which she is currently completing.

Thanks

I am currently in the process of completing my thesis for my Masters of Education through Massey University, New Zealand. I would like to explore what experiences contribute to teacher self-efficacy when using mobile technology in the classroom. The upcoming iPad implementation will provide lots of new learning opportunities for teachers, and I am very interested in the paths that individuals take to grow their confidence and comfort with new technology, or things that could perhaps hinder this confidence.

In order to obtain data for my thesis, I would like to carry out research within International School. As a Grade 6-8 teacher involved in the iPad implementation, you are cordially invited to participate in this research.

The first part of this research involves an anonymous online survey involving questions related to how you as an individual feel about using technology. Within the survey, you will have the opportunity to provide additional information if you would like to be involved in the second phase of research (involving three individual interviews over the course of the 2013-2014 year).

If you would like to participate, please click on the link below to complete the survey:

<https://www.surveymonkey.com/s/iPadEfficacy>

Please find attached a more detailed outline of the research process, which I would encourage you to read before participating in the research.

If you have any questions or wish to know more about the research please don't hesitate to contact me at jo.tilton@gmail.com or _____.

You may also contact my supervisor(s) Dr Maggie Hartnett: M.Hartnett@massey.ac.nz or Dr Tracey-Lynne Cody: T.L.Cody@massey.ac.nz

Kindest regards,

Jo Tilton



MEd_Research_InformationSheet_Full.pdf

Appendix D

Information Sheet for Participants – Phase One of research



MASSEY UNIVERSITY
INSTITUTE OF EDUCATION
TE KURA O TE MATĀURANGA

Project title:

What factors influence self-efficacy in teachers using mobile technology within the secondary school classroom?

INFORMATION SHEET

Dear

I am currently in the process of completing my Masters of Education through Massey University, New Zealand. I would like to explore what experiences contribute to teacher self-efficacy when using mobile technology in the classroom. The upcoming iPad implementation will provide lots of new learning opportunities for teachers, and I am very interested in the paths that individuals take to grow their confidence and comfort with new technology, or things that could perhaps hinder this confidence.

In order to obtain data for my thesis, I would like to carry out research within _____
Teachers involved in the Grade 6-8 iPad implementation in the coming 2013-2014 school year are invited to participate in this research.

My particular interest is in seeing what experiences with technology either build or inhibit feelings of self-efficacy (the belief that we can master certain areas) when using mobile technology within the classroom.

The Research Process:

There are two phases to the research. Phase One is an anonymous online questionnaire, and Phase two is a series of three individual interviews.

Research outline		
	Format	Time commitment
Phase One of Research	Anonymous Online Questionnaire	Approx 25 mins
Phase Two of Research	Three interviews	Approx 30 mins per interview. Interviews will take place in September, January, and April. <i>In addition to the actual interview time, time will be required to review transcripts after each interview. This could approximately 15 minutes per interview transcript.</i>

This means that if you participate in the full research project, it will take a total of approximately 2 hours and 40 minutes, which includes the anonymous online Questionnaire, three separate interviews, and transcript revision time.



MASSEY UNIVERSITY
INSTITUTE OF EDUCATION
TE KURA O TE MATĀURANGA

Phase one of research:

I would like to invite you, as a participant in the Grade 6-8 iPad implementation to complete the preliminary anonymous questionnaire. Completion and return of the anonymous questionnaire implies consent for your responses to be used as part of the research investigation. You have the right to decline to answer any question. There is no expectation that completing this questionnaire means you have to participate in Phase Two of the research.

Phase two of research:

Through the initial online anonymous questionnaire, you can indicate if you would like to participate in the second phase of research. For the purposes of building a rich body of data, this study is seeking a maximum of five teachers to participate in the second phase of research. Should more than five teachers be interested in participating in the research, participants will be selected based on ensuring a range of self-efficacy beliefs.

The questions asked will focus on your own personal experiences, rather than on being a competent teacher or the technology professional development provided through _____.

Your rights as a participant:

Should you wish to participate in this research, it is important that you know your rights as a participant. You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study before completing the questionnaire.
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it has concluded.
- For those who participate in the interview phase, you have the right to ask for the voice recorder to be turned off at any time during the interviews.

Research Context:

As this research is taking place in your place of work, it is important that potential areas of discomfort are addressed. There is potential for some discomfort when exploring the development of your own self-efficacy in a professional setting, while working alongside other colleagues who may have different experiences and views. To help minimize this discomfort, the following measures will be put in place to protect you:

- The researcher does not and will not hold any committee/leadership roles connected with either professional development initiatives or implementation of the iPad programme during the course of this research.
- The initial online questionnaire will be anonymous (unless participants include their details for consideration in the next part of the process), and participants have the right to not answer questions they do not wish to.

Te Kunenga
ki Pūrehuroa

Institute of Education
Cnr Albany Drive & Collinson Road, Private Bag 11222 (PN900), Palmerston North 4442, New Zealand T +64 6 356 9099 www.massey.ac.nz

- Interview participant identities will be kept confidential, and pseudonyms will be used during the interview process and when referring to interview content in any reporting of research results.
- Interview participants will be provided a list of local counseling resources should they wish to discuss any issues that arise from the interview process.
- Contact details for Massey University supervisors are provided for participants should they have any concerns or queries about any aspect of the research.
- The location of the interviews will be decided by you, the participants, as appropriate to your privacy and comfort levels. It is envisaged that most (if not all) interviews may be conducted on school premises, in as confidential and private space as possible. It is also envisaged that interviews may take place during the working day, (or immediately afterward) as appropriate to the your schedules, with no disruption to your teaching schedule.
-

In the interests of full disclosure, it is important to note that while all precautions will be taken to preserve participant confidentiality, there is always some risk that participants will be able to be identified due to the nature of our small school context. The measures outlined above are intended to minimize this risk and protect the interests of the participants. A summary of findings will also be available to both participants and the school leadership. As mentioned previously, pseudonyms will be employed to protect participant identities.

Data Management

The data collected in this project is going to be used to contribute towards a research based Masters of Education thesis. As part of this academic process, there may be some possibility that publishing of parts of research in academic journals may occur.

Once data is obtained, it will remain with the researcher (under secure conditions) until the research is completed and the Masters thesis has been submitted.

If you participate in the second phase of research, you will be provided with one hard copy of the interview transcript soon after each interview. You will then have the opportunity to view responses of each interview to ensure that it is an accurate representation of the interview. These transcripts will be given directly to each participant by the researcher, and collected individually by the researcher to protect confidentiality of content.

Should you wish to participate in any phase of the research and have questions or concerns about the research you can directly discuss this with the researcher or their supervisor(s):

Primary researcher:

Jo Tilton (jo.tilton@gmail.com).

Massey University Supervisor(s):

Dr Maggie Hartnett: M.Hartnett@massey.ac.nz

Dr Tracey-Lynne Cody: T.L.Cody@massey.ac.nz

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 13/49. If you have any concerns about the conduct of the research, please contact Dr Nathan Matthews, Chair, Massey University Human Ethics Committee: Southern B, telephone 06 350 5799 x 80877, email humanethicsouthb@massey.ac.nz.

Appendix E

Online Survey Questions

Preamble:

Thank you for choosing to participate in this research. Your time and participation are appreciated.

Your responses are anonymous, unless you choose to identify yourself in response to the request for participants to take part in the interview phase of the research (Phase Two of research, to occur after this anonymous questionnaire).

By choosing to participate in this questionnaire, you are indicating your consent for the results to be used in the research project.

You have the right to not answer any of the questions in this Survey. There is also space for you to add comments regarding questions if you wish, although this is completely optional.

		Seldom	Sometimes	Usually	Mostly	Consistently
	Question	1	2	3	4	5
1	I like using technology in several areas of my life.					
	Comment:					
2	I am encouraged to try new technology when I hear about what others are doing					
	Comment:					
3	Watching other people use technology makes me feel like I can try new things.					
	Comment:					
4	If people around me feel confident with technology, I am more likely to try too.					
	Comment:					
5	I feel confident about using technology in my classroom regularly					
	Comment:					
6	I believe I can master new technology skills in general					

	Comment:					
7	I like to have a lot of support when learning about new technology					
	Comment:					
8	When I have a problem with technology I keep trying until I fix the problem					
	Comment:					
9	I like taking risks and trying new things when using technology					
	Comment:					
10	I think it is important to be able to play and explore with new technology					
	Comment:					
11	I have had many positive experiences using technology in my teaching					
	Comment:					
12	I feel technology can help improve my classroom teaching					
	Comment:					
13	I think previous technology training will help me in developing new skills, even if it is for something different.					
	Comment:					
14	If technology doesn't work once, I would be unlikely to try again.					
	Comment:					
15	I am looking forward to the implementation of the iPads.					
	Comment:					
16	I feel nervous about the iPad implementation					
	Comment:					
	Comment:					
17	I believe I can master new skills specifically when using the iPad mini					
	Comment:					
18	I feel I can only be successful with the iPad mini if I have lots of support.					
	Comment:					
	Additional questions:					

	<p>Please indicate if you would be interested in participating in the next phase of research by including your name. (Including this information indicates your consent to being invited to participate in the next phase of research).</p>	
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Appendix F

Open-ended responses – online Survey

Question		Response
1	I like using technology in several areas of my life.	Respondent 4 I find challenged by it at work (but can see the potential, it is mainly a confidence issue as I know we will be increasingly obliged to incorporate it into our programs), on a personal level I use it a lot to stay in touch with family and friends overseas e.g. Facebook and Skype. So, my feelings about it are mixed.
		Respondent 10 Depends on how you define technology.
2	I am encouraged to try new technology when I hear about what others are doing.	Respondent 4 I often wish I could do what I see other colleagues using, but due to lack of time for training I find that I don't utilise what I viewed as a great idea.
		Respondent 7 Sometimes others will inspire me to try something new - often though I try something new without being encouraged because other people are using it.
3	Watching other people use technology makes me feel like I can try new things.	Respondent 4 Sometimes I feel overwhelmed and think I could never be as adept as they are.
4	If people around me feel confident with technology, I am more likely to try too.	Respondent 4 See above
		Respondent 7 I feel confident that I can learn anything I put my mind to irrespective of what others are doing.
5	I feel confident about using technology in my classroom regularly.	Respondent 4 Sometimes it doesn't work, or there are problems/barriers for example - differences in set ups between Waves and Agora, logistics of getting the trolleys etc.
6	I believe I can master new technology skills in general.	Respondent 4 If I have sufficient time, and the content is delivered at a pace that suits my learning style.
7	I like to have a lot of support when learning about new technology.	Respondent 9 I am happy to self-teach, but a tutorial with a skilled person often speeds up the process.
7	When I have a problem with technology I keep trying until I fix the problem.	Respondent 4 I go to the IT people in the school for solutions when I can't work it out, they are very helpful.
		Respondent 10 Or break the technology!

8	I like taking risks and trying new things when using technology.	Respondent 4	I like trying new things with technology, I don't know if that is the same as taking risks though, because if I think my skills aren't up to it, or I don't have an IT person with me, then I will probably lack confidence about doing it.
9	I think it is important to be able to play and explore with new technology.	Respondent 9	Some things are nice to discover on your own. Sometimes it would be nice to have them explained because we don't always have time to reinvent the wheel.
10	I have had many positive experiences using technology in my teaching.	Respondent 4	Between usually and mostly. I love the moments when the students come up with solutions, which no doubt will be happening increasingly know with the iPads. It has already begun to happen, for example taking a photo of a textbook page instead of me having to photocopy it.
		Respondent 9	Slow programs, broken computers, slow internet, etc. can bring a lesson to a grinding halt and is very frustrating.
11	I feel technology can help improve my classroom teaching.	Respondent 4	This is a digital generation, so I think it is a way of hooking students in, however I am a bit concerned about them becoming distracted by all the Apps etc. on the iPad, also a little concerned about the lack of a full keyboard as writing tasks may diminish to simply texting?
12	I think previous technology training will help me in developing new skills, even if it is for something different.	Respondent 4	I need a more consistently positive experience of ipad training before I can tick further up the continuum on this.
13	If technology doesn't work once, I would be unlikely to try again.	Respondent 4	I think I persevere.
		Respondent 7	It will actually often encourage me to troubleshoot until I find the solution
14	I am looking forward to the implementation of the iPads.	Respondent 4	See answer for no. 12
15	I feel nervous about the iPad implementation.	Respondent 4	Concerned about not being good enough at it, having problems with the touch screen (which sometimes doesn't seem to work) and having problems with navigating around and between documents/sites when teaching

Appendix G

Email invite to Phase Two Interview Participants

Dear

Thank you very much for recently participating in the online questionnaire. You indicated in your response that you would be open to being part of Phase 2 of my research (entailing 3 x approx. 30min interviews). I would like to formally invite you to be part of the second phase of research.

I would also like to take the time to say thank you as well as reiterate some information about the next phase. Please see attached a detailed information sheet regarding all aspects of the research.

Please email me with several options of times that would work for you so that we can find a mutually suitable time for our first interview.

With kind regards,

Jo Tilton

Appendix H

Draft email to those not selected for participation in Phase Two of Research

Dear

Thank you very much for your response to the online Survey, indicating your willingness to participate the second phase of research for my thesis research:

What factors influence self-efficacy in teachers using mobile technology within the secondary school classroom?

As mentioned in the information sheet sent earlier, only five participants are required for Phase Two of the research. Due to more than five participants volunteering to participate, selection of participants was required. After reviewing the Survey results, five participants with a range of technology self-efficacy beliefs have been selected. I am writing to let you know that your participation is not needed, as you were not selected for Phase Two of research.

I would like to thank you again for your willingness to participate, and appreciate you agreeing to contribute to this research.

Kindest regards,

Jo Tilton

Appendix I

Interview Questions

Interview Questions:

Preamble for Interviews (to be shared with interviewees):

Thank you for agreeing to take part in my research. I would just like to take this time to remind you that our discussions, experiences you share and all matters concerning this research will be kept confidential.

These interview questions are intended to be primary questions, which will be intentionally open ended, and focused on your personal experiences.

Interview 1 – Scheduled prior to the iPad implementation:

General Background questions:

1. How long have you been teaching?
2. What subject area(s) do you teach?
3. What technologies have you used in the past? What technologies do you currently use?
4. How would you describe yourself as a technology user (experienced, novice, etc.). Please explain why you describe yourself this way.

Focus questions:

1. How do you feel about using technology in the classroom in general?
2. In what ways do you use technology in your classroom?
3. How do you go about learning new skills with technology?
4. Have you participated in any training in to do with the iPad initiative so far? If yes, could you describe what you have taken part in?
5. What are some of your most memorable events where you have used technology? What made it memorable?
6. Has your teaching changed in the classes that use the iPad? If so, how?

7. Could you describe any particularly positive experiences you have had using the iPad technology? In what way was this positive? Why do you think this was a successful experience?
8. Have you had any not so successful experiences with using the iPads. Why do you think this happened? How did you resolve this?

Interviews 2 – During the iPad implementation

1. Have you noticed any changes in how you feel about using technology since we last met?
2. Have you had any particularly helpful experiences since we last met in September/January? Can you describe your experiences? What is was about them that made them helpful?
3. Have you had any particularly not so helpful experiences since we last met?
4. Have you participated in any types of training to do with the iPad since the last interview?
5. How have these training sessions affected how capable you feel regarding the mobile technology of the iPad?
6. Do you feel more confident in being able to address student questions regarding technology?
7. Do you feel more or less open to trying new things with the iPads? Why do you think you feel this?
8. What do you do when you strike a problem with using the ipad in the classroom?
9. In which areas do you feel more independent using the ipad in the classroom? Why do you think this is?

Interviews 3 – During the iPad implementation

1. Have you noticed any changes in how you feel about using the iPads since we last met in Feb/February?
2. We have talked in our previous interviews about experiences that have been helpful in your use of the iPad either in the classroom or the curriculum. Have you had any more helpful experiences since we last met? How have these experiences affected your confidence with the iPad in the class/curriculum?
3. We have also talked in our previous interviews about experiences that have been unhelpful. Have you had any unhelpful experiences since we last met? How have these experiences affected your confidence with the iPad in the class/curriculum? Did you overcome these difficulties? How?
4. Do you still find using the iPad in the classroom challenging? In what ways? If not, why do you think that is?
5. Do you feel more confident using your Ipad or other forms of technology in the classroom? Why do you think this is?
6. Do you resolve any problems in the classroom any differently at this stage of the year than you did at the beginning?

7. Do you take more or less risks with the iPad in the classroom now compared to the beginning of the year?
8. Is there a difference in how confident do you feel about using the iPad to deliver curriculum than as a tool in the classroom?
9. As the school year finishes, are there any particular areas of using the iPad in the classroom that you feel most confident about? Why do you think you are confident in these areas?
10. What experiences do you think have contributed the most to how you feel about using the iPads at this stage?
11. Do you think they are a valuable part of your teaching? In which ways?
12. In what ways has your confidence regarding iPad use in the classroom changed over the course of the year?
13. Next year there will be more classes introduced to the iPads. How do you feel about this?

Appendix J

Participant Consent Form



What factors influence self-efficacy in teachers using mobile technology within the secondary school classroom?

PARTICIPANT CONSENT FORM --- INDIVIDUAL

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree to the interviews being sound recorded.

I wish/do not wish to have my recordings returned to me.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: _____ Date: _____

Full Name --- printed _____

Appendix K

Authority for release of transcripts



MASSEY UNIVERSITY
INSTITUTE OF EDUCATION
TE KURA O TE MATĀURANGA

What factors influence self-efficacy in teachers using mobile technology within the secondary school classroom?

AUTHORITY FOR THE RELEASE OF TRANSCRIPTS

I confirm that I have had the opportunity to read and amend the transcript of the interviews conducted with me.

I agree that the edited transcripts and extracts from these may be used in reports and publications arising from the research.

Signature: **Date:**

Full Name - printed

Appendix L

Transcriber's Confidentiality agreement



MASSEY UNIVERSITY
INSTITUTE OF EDUCATION
TE KURA O TE MATĀURANGA

Project title: What experiences serve to build positive self-efficacy in teachers using mobile technology within the secondary school classroom?

TRANSCRIBER'S CONFIDENTIALITY AGREEMENT

I,(Full Name - printed) agree to transcribe the recordings provided to me.

I agree to keep confidential all the information provided to me.

I will not make any copies of the transcripts or keep any record of them, other than those required for the project.

Signature: **Date:**