How does tablet usage by K12 schools impact parent-child homework involvement in Ireland?

Muireadach O Connor

A dissertation submitted to the University of Dublin in partial fulfilment of the requirements for the degree of M.Sc. in Management of Information Systems

1st September 2017

Declaration

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university. I further declare that this research has been carried out in full compliance with the ethical research requirements of the School of Computer Science and Statistics.

Signed: 

Muireadach O Connor

1st September 2017

Permission to Lend and/or Copy

I agree that the School of Computer Science and Statistics, Trinity College may lend or copy this dissertation upon request.

Signed: 

Muireadach O Connor

1st September 2017

Acknowledgements

I would like to thank my supervisor Nina Bresnihan for her invaluable guidance and advice which greatly helped me to keep on track and complete this thesis.

I am forever in debt to my wife, Guangqiong, for putting up with me whilst looking after three young children during the last couple of years! It has been a long road to this point and you walking every step of the way with me has kept me going.

Finally, I would like to thank all fifteen parents that volunteered to participate in this research, without your help this would not have been possible.

Abstract

With more and more primary and secondary schools in Ireland bringing computer tablets such as the iPad into the classroom to replace traditional textbooks, this thesis examines the knock on effect on parental homework assistance. Most parents today would not have used computers in their school going days so the impact on their ability or willingness to assist when these devices are used is examined. Parents of children that do not use tablets may hold strong opinions that may or may not have a bearing in fact which is also examined. Semi structured interviews were held with 15 parents across the country from various differing backgrounds to get their opinions and perceptions. Data from these interviews are examined and broken into themes. Findings suggest parents of children using tablets may have noticed an effect on retention of information. The research suggests that parents, in general, do not have great awareness of security concerns with tablet usage. Parents also have concerns regarding prolonged usage of tablets in terms of health, behaviour and social skills. Finally, schools should be mindful that parents strongly feel that traditional skills such as handwriting should still be taught. Suggestions are made for further research and limitations of the current research are discussed.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

K12	Pre third level educational years
CSO	Central Statistics Office
GUI	Graphical User Interface
ICT	Information and Communication Technology
VEC	Vocational Educational Committee
Wi-Fi	Wireless Fidelity (common usage), actually a trademark
TAM2	Revised Technology Acceptance Model
SES	Socioeconomic Status
TRA	Theory of Reasoned Action
EQ	Emotional Intelligence (Quotient)
CSV	Comma Separated Values

Chapter 1. Introduction.

1.1 Context and General Background

Today's generation of school children sometimes referred to as "Generation Z" are the first generation to grow up with the ubiquitous presence of computers in their lives, from Facebook to YouTube and from the iPhone to tablet computer technology is everywhere.

The first commercial mobile phone, the Motorola DynaTAC 8000X, was released in 1983 and cost around $4000, a lot of money even by today's standards.

Ten years later, in 1993 mobile phones were still a rare sight with just 1% market penetration in Europe, fast forward to 2007 by which time market penetration had reached 106% or more phones than people with many owning multiple phones (Samuel Kornstein, 2016). It is forecast that about seven out of ten people worldwide will own a smartphone by 2020 and 90% of people over the age of six forecast to own one (Williams, 2015).

It is no longer strange or unusual to see school children on the bus or other public areas posting onto Facebook or trying to catch a "Pokémon" on their smartphone. These devices are no longer just for making calls, they are cameras, video recorders, organisers, virtual credit cards, web browsers and typewriters. They have become quickly integrated into society in the same way the car did when Henry Ford started rolling his Model T off the production line back in 1908.

The most recent figures from the CSO put 87% of households in Ireland with computers and internet access at the time of the last census in 2016 (CSO, 2017). In the office workplace today it is almost unimaginable to conceive any business that would not use computers in some shape or form. To generation z the world has always been like this and take it as a given that computers are everywhere in their lives.

However, their parents, most of whom, bar the very youngest, will have grown up in a very different world. There would have been little or no mobile phones around, and those that were, performed as a telephony device and nothing else and would have been owned by quite wealthy individuals.

In the classroom, there was limited exposure to computers. The desktop computers of the 70's,80's and early 90's were quite unlike the computers of today with the first widely used operating system with a graphical user interface (GUI) and mouse released in 1984 by Apple computers called the Mac System 1.0 (Walter Apai, 2009) , a year later Microsoft followed up with a GUI driven operating system of their own called Windows 1.0. There was

no internet in these times and computers were relatively much more expensive than now with an Apple Macintosh costing around $5,700 in today's prices (Comen et al., 2016). In the 70's and 80's lack of funding was a constraint for schools with parents sometimes making donations to schools help make up the shortfall. In addition, the focus on programming from the Department of Education, which needed specific skills to be learned by teachers often led to disillusionment. (Leahy and Dolan, 2014).

It wasn't until August 1995 when Windows 95 was released when computer usage started to become more mainstream with a revamped interface which was much more user-friendly than the previous Windows releases (Arbuckle, 2015).The internet arrived in Ireland on 17th June 1991 when Trinity College Dublin connected to the internet using a 19.2kbps link. It wasn't until the mid to late 90's when Ireland On-Line and Indigo started providing internet access to the general public (John Kennedy, 2016)

The Digital Strategy for Schools 2015 – 2020 (Department Of Education And Skills, 2015) policy document sets out how the government is planning to "*integrate ICT into teaching, learning and assessment"* in both primary and secondary schools. It is an ambitious plan in both scope and implementation timeframe. As a part of this research thesis, a school inspector was interviewed to get a background for that is happening in the classroom today from the government perspective. That inspector (who agreed to participate on an anonymous informal basis) said that this policy is just starting to be implemented now. As a major part of it, all schools will in time introduce tablets or laptop computers into the classroom. Schools will be able to choose whether to use Windows, Android or Apple operating systems on the computers. It is his experience that most schools are choosing to use the Apple iPad so far with mainly VEC schools choosing an Android variant. Laptops are chosen in very few schools so far.

The computer tablet has been around for quite a while with the first tablet computer, a GRIDpad in 1989 which ran MS-DOS, was very bulky and cost $2,370, Microsoft came out with their own version called "Tablet PC" in 2000 but sales were not impressive (David Nield, 2016). It wasn't until April 2010 when Apple released the iPad that tablet computer sales really took off. The iPad was like a larger version of the wildly successful iPhone and already had a massive library of applications (often shortened to "app") at launch which could be used on it. The first version of iPad did not have a camera in it, however, the second version, released in March 2011 did. Today there are many different variations of tablets mainly running Windows, Android and iOS operating systems (StatCounter, 2017).

Tablets come in different sizes with the popular iPad measuring 9.7 inches across diagonally. They are rectangular in shape and come with inbuilt speakers, microphone and

camera for taking pictures and video. Tablets connect to the internet over Wi-Fi or in some cases can use a Sim card to connect via mobile network in the same fashion as a smart phone. Indeed, larger smartphones are often referred to using a portmanteau as “phablets” as they are essentially crossover devices. Tablets use finger or stylus for human input although limited speech recognition capabilities are also built into the latest operating systems. Peripheral devices such as keyboards, mice and larger screens can also be connected either physically through USB ports or over Wi-Fi and Bluetooth.

Tablets make a good choice for schools because they do not have moving parts like a laptop (screen hinges and keyboard) which can break and can be used with a cover on for protection. They are lightweight and screen size is close to that of standard textbooks. Tablets typically have enough battery power to last a full school day between charges with an iPad having approximately 10 hours battery life (Apple, 2017).

1.2 Importance of the Research

With the introduction of the tablet into Irish schools being a relatively new occurrence, there has been very little research into its impact on the home. Outside of school parents spend the most time with school age children and are generally the ones that make sure that homework is done and are there to help children when they need assistance with their studies.

Today’s parents however never used tablets themselves in schools so may have misgivings or fears about their introduction and find assisting their child’s homework more challenging than before. It would help inform schools that are intending to introduce tablets be mindful of parents concerns so that the rollout is as smooth as possible and help bring parents on board by allaying concerns found in this research.

It may also be that parents have noticed effects on the child in terms of learning and retention and quality of work being produced. Are they spending less time assisting with homework as a result of their children using tablets and if so, why is that? Are there behavioural and social skills changes noticed by parents with prolonged use of these devices? If these are found to be the case it would strongly suggest that these are areas that need further targeted research to understand and find solutions for.

Finally, are parents concerned about the usage of ICT in the classroom potentially affecting what exactly is being taught in the classroom and what is being left behind, is the introduction of ICT at the expense of something else that is useful in the world outside of school?

1.3 Research Questions

The main research question being investigated in this thesis:

How does tablet usage by K12 schools impact parent-child homework involvement in Ireland?

In order to understand the impact of tablet introduction has on parent-child homework involvement this thesis will explore and attempt to answer the following sub questions:

- *How do parents of children, using tablets in school, feel that this impacts their interactions with the child, in particular during homework?*
- *Do parents of children, using tablets in schools, feel that the tablet device aids their child's learning more than traditional pedagogical learning tools such as blackboard, pen and paper?*
- *What are parents, of children not attending tablet using schools, perceptions about these questions?*

1.4 Research Scope

In order to investigate the research question and sub-questions, 15 parents from 14 families were interviewed and recorded face to face individually. Effort was made to be as inclusive as possible in the parents chosen so that parents from city and rural backgrounds were chosen. Working and non-working parents were included. Parents under 18 years old were not included in the research.

The qualitative data from the interviews will be considered in the light of the revised Technological Acceptance Model (Venkatesh and Davis, 2000) which is a theoretical framework used to estimate the likelihood of a new technology being used and adopted.

1.5 Chapter Roadmap

Chapter 1 gives an overview of the usage of computers in computers over time and explores the differences in upbringing today's parents experienced from an ICT perspective to their children. It looks at the importance of the impact of tablet introduction on parent-child assistance from the parents perspective and suggests that the information learned in this research will be of use to schools currently using tablet and those considering introduction

Chapter 2 is the literature review which explores the current research into school homework, parental homework assistance, gender differences between parents in terms of homework assistance and attitudes to technology in the classroom.

Chapter 3 looks at the methodological basis for the thesis being used and describes how the research was carried out, the sampling used and resultant data subsequently analysed. Limits of the chosen approach are discussed and ethical considerations explained. The conceptual framework is also discussed.

Chapter 4 presents the findings from the interviews and breaks that into particular areas which can be used to help answer the research question. Several theories regarding what the data is saying are discussed.

Chapter 5 analyses the findings in the context of the research questions and presents answers which are concluded from the data gathered. The limitations of the research are discussed and several theories arising from the research are suggested for further research.

Chapter 2. Literature Review

2.1 Introduction

The purpose of this chapter is to review research literature into the areas of homework, parental homework assistance, tablet devices and how they are viewed and used by teachers and students. This will help to find the answer to the research question being investigated in this thesis. The chapter finishes with an overview of the background to the TAM2 model which is being used as a framework for the research being carried out.

The research was carried out online using Google Scholar as well as the Trinity College Dublin online library search engine “Stella” and associated library database subscriptions. In many occasions, the references in the research papers themselves proved to be a valuable aid in finding relevant material. Hard copies of books were on occasion borrowed from the Trinity library where there was no version available online.

Section 2.2 looks the topic of homework overall, what it is, why it’s given and what the research argues both for and against it.

Section 2.3 examines the area of parental assistance with homework with relation to age, socioeconomic status and student age.

Section 2.4 explores the differences between maternal and paternal assistance as well as whether there are any gender effects from the student side of parental assistance.

Section 2.5 looks at the area of tablet usage in general from teacher and student perspectives to understand what the unique opportunities and challenges these type of digital systems present over traditional pedagogies and materials.

Section 2.6 examines whether there has been research into physical and behavioural effects of prolonged computer usage.

Section 2.7 concludes the chapter by summarising the literature review findings in the context of the research being carried out.

2.2 The Relevance of Homework to Learning Outcomes

In order to review the literature published about the usage of tablets in the classroom and its relationship with parent and homework, it is important to establish what the research considers homework to be and what it is not.

This definition excludes work done within the school by students such as during study times between lessons or after school study classes

The definition of homework proposed by Professor Harris Cooper, a well renowned educational researcher, is used as it specifically mentions noninstructional time and so fits into the context of parental assistance being researched in this thesis:

Homework is "*tasks assigned to students by school teachers that are meant to be carried out during noninstructional time*" (Bembenutty, 2011)

The case for and against giving homework to students been debated since the 19th century at least (Vatterott, 2009, p3). One the arguments against, back in the 19th century, for example, was that children that did attend school would have had household chores and responsibilities that would have been inconvenienced by further after school studies (Kralovec and Buell, 2000a).

2.2.1 The Case for Homework

The reasons for homework assignment are many, with differing viewpoints between teachers, parents and students (Cooper et al., 2006; Epstein and Van Voorhis, 2001; Xu, 2005) and with effects extending beyond school years into future careers and life styles. (Kalenkoski and Pabilonia, 2012)

One of the most studied areas is the correlation between homework assignment and achievement, measured by Grade Point Average (GPA) or standardized testing (Bembenutty, 2009; Cooper et al., 2006).

Achievement can be measured at class and student level with sometimes differing results found. One example of this would be the (Rønning, 2011) study of elementary (primary) school students which found that weaker students did not get better grades as a result of homework, especially if coming from a poor socioeconomic background. They tended to receive less help from their parents, whereas students from better economic backgrounds tended to benefit more due to the better home environment and greater interest and help from their parents. At a class level, this suggests that there will be greater achievement

variance where homework is given. A further examination of parental influence on learning outcomes grades will be discussed later in this review in particular.

Another important aspect of the question of achievement is the debate of time over the quality of time spent on homework, and the amount of homework given. One study (Eren and Henderson, 2011), which looked at American 8th grade (approximately 10-12-year-old students) students across the areas of math, science, language and history found that there was no significant gain in score by an additional hour of homework per week for all but math. Conversely, the (Trautwein et al., 2002) 7th Grade study found greater returns on increasing lengths of homework, in particular for weaker students, up to a point. Eventually, the gains became negative for both strong and weaker students which Trautwein suggests may be for reasons of boredom, fatigue of the student and internalizing bad study habits which are counterproductive. In addition, Trautwein suggests that some teachers that give too much homework may be using homework as a substitute for not covering the material in class and may be less organized than others. (Epstein and Van Voorhis, 2001) concluded similarly and discussed the importance of teachers designing interesting homework of sufficient challenge and length in order to have better outcome and caution that homework should not be used as a punishment as it may be counterproductive in terms of long term outcome.

Meta-analysis research carried out (Cooper et al., 2006; Cooper, 1989; Marzano and Pickering, 2007) on the effect on homework achievement indicated that achievement is greater in later K12 grades than earlier ones with percentage gains of about 6% in lower grades up to 24% in grades 10-12. Cooper felt that in earlier grades the focus on homework should be more aimed at personal development, reinforcement of material covered in the classroom and in later years building on this with additional focus on improving standardized test scoring as well.

Apart from measuring the effect of homework quantitatively on test scores and GPA research has also looked at other areas such as self-efficacy (Ramdass and Zimmerman, 2011) and self-regulation (Bembenutty, 2009). Through homework, students learn the benefits of timekeeping, delayed gratification and good homework environment and organization. Self-efficacy or a ‘can do’ attitude was linked to higher achievement.

(Xu, 2005) investigated intrinsic (knowledge transfer for example) and extrinsic reasons (my parents expect me to do it) for homework completion and found that as students became older they appreciated more the intrinsic reasons for doing homework. One interesting outcome of the research was that boys, in particular, were more likely to have intrinsic reasons for homework when assisted by parents and higher (self-reported) grades.

2.2.2 The Case against Homework

Much of the research cautioning against homework focuses on the socioeconomic background as a reason for not doing it. One highly cited researcher in this area is Etta Kralovec whose book "The end of homework" (Kralovec and Buell, 2000a) argues that time spent on homework is time that could be better spent on other social activities such as team sports going to the park, swimming, dance and music lessons (Kralovec and Buell, 2005). "The Case Against Homework" (Bennett and Kalish, 2006) takes a similar tone and claims that "replacing play with hours of nightly work has created a nation of homework potatoes who are inactive and sleep deprived". Something which research previously mentioned by (DeSimone, 2006; Kalenkoski and Pabilonia, 2012) would appear to otherwise indicate – hours of employment replaced television watching in the main rather than park visits and swimming.

(Bennett and Kalish, 2006; Kralovec and Buell, 2000b) point out that students from lower socioeconomic background and ability do not benefit from homework due to poor home conditions, parental assistance and ability. This argument has broad agreement in the research as previously discussed (Cooper et al., 2006; Cooper, 1989; Eren and Henderson, 2011; Rønning, 2011; Trautwein and Lüdtke, 2009).

One possible solution to the homework leaving students, from poorer socio economic background or where their parents do not speak the local language, behind is the idea of after-school programs where students can do their assignments in a safe and supervised environment and get assistance as needed from their peers and supervisors (Bang et al., 2009; Bang, 2011; Cosden et al., 2001, 2004). Cosden, however, cautions against this approach being a one size fits all as their research found that for middle-class children the benefits of after-school programs were not found. Costen believes may be due to the better home environment, higher education and ability and interest of parental assistance and safer environment outside for non-academic endeavours.

2.2.3 Summary

The arguments both for and against setting homework both have merit within certain circumstances. Overall the argument for setting homework has the weight of evidence for it, with detractors tending to argue it disadvantages students from lower socioeconomic backgrounds however this doesn't take into account the fact that students not from this

group clearly do benefit and increasingly so at higher grades. The case is particularly strong for math, which multiple research papers have concluded, does benefit from homework assignment.

The importance of the teacher in setting adequate amounts of relevant homework that doesn't take too long to complete and thus retains student interest has been highlighted. Where possible, after school homework assistance would appear to bridge the learning and achievement disadvantage for students from a lower socioeconomic background and from homes of some immigrant parents which do not speak the local language and are unable to assist their children with homework assignments.

2.3 Should Parents assist their Children with Homework?

The impact of homework assistance by parents is an area of mixed debate with some studies showing highly positive outcomes (Cooper et al., 2000; Davis-Kean, 2005; Patall et al., 2008) in terms of achievement measured by GPA or standardised state exams and others even showing a negative effect (Bang, 2011; Castro et al., 2015; Silinskas et al., 2013b)

When taken in isolation these disparate views may appear to indicate that there is no consensus on parental assistance with homework, however, there are learnings that can be made from the research that does explain possible reasons for the negatives and many strong arguments in the positive.

Academic achievement in school is not only partially explained through homework completion at home, the role of the parents at home plays an important part also. Research has shown that children being read to by their parents from a young age are a good predictor of academic success up to eight years later and possibly even further onwards (Silinskas et al., 2013a)

As discussed in the previous section, children of parents with higher socioeconomic status (SES) tend to have greater academic success. (Davis-Kean, 2005) found in their research that children with high SES background tend to participate in intellectually stimulating activities outside of school more than those that are not, such as visiting museums and galleries and visits to the park.

Parents can also assist in academic achievement by providing a good environment for their children to complete homework such as a quiet space with few distractions, in the case of multiple children households, this can be particularly important (Cooper et al., 2006; Dudley-Marling, 2003). Parents can help their children with planning and goal setting such as

reminding them about when assignments are due and how long they are likely to take (Fan and Chen, 2001).

The way parents assist in the homework is important also. Parents who direct their children rather than give them autonomy can have a negative effect. (Daw, 2012; Dumont et al., 2012; Silinskas et al., 2010, 2013a) found that parents with lower SES tend to take a more directional than granting autonomy and getting intrinsic agreement and buy in from their children.

(Katz et al., 2011) applied self-determination theory to parental assistance. Self-determination theory is the idea that humans have innate needs to better ourselves which feeds into self-motivation and personality. These needs can be categorised into "competence" or a want to get better at things or gain mastery, "relatedness" or wanting to relate to other humans in some fashion and "autonomy" or wanting to make one's own decisions or chose our own path.

(Pomerantz et al., 2007) research found many parallels with this theory and parental assistance and academic success. The importance of autonomy is highlighted in many of the research papers such as (Doctoroff and Arnold, 2017; Pino-Pasternak, 2014). Self-determination theory encompasses motivation both intrinsic and extrinsic, intrinsic motivation such as the need to learn or complete a task rather than extrinsic ones such as "my teacher or parent expects it to be done" has been found to be a stronger predictor of greater academic achievement.

(Xu, 2005) found that for boys in particular intrinsic reasons were a strong motivational factor in homework completions. (Tan and Goldberg, 2009) research indicated that when parents enjoyed assisting their children with homework and who felt confident and motivated to do so, there was a correlation with better needs assistance to their children with the corresponding positive academic outcomes. Interestingly the research from Tan and Goldberg also showed a correlation between increased mothers age and academic outcome, indicating parental maturity and age may be a positive indicator also.

Some studies have shown a negative correlation between paternal assistance and academic performance, (Dudley-Marling, 2003; Silinskas et al., 2013b) suggests that this may be because with increased involvement decreases the child's intrinsic motivation. Most parents do indicate that they would like to assist (Epstein, 1986) which correlates with stating that the poorer the academic performance the more likely that the parent will increase homework assistance efforts thus giving an apparent negative correlation. (Castro et al., 2015) suggests that schools can help parents in such situations by aligning up school and parental goals and offering training on how to offer assistance to their children.

(Pomerantz et al., 2007) research found that when a process based assistance approach (for example – "you must have worked really hard to get that result") versus a person based approach (for example "I want you to complete this by dinner time) motivation was higher, students didn't give up when encountering more difficult assignments and academic achievement was higher.

2.3.1 Summary

Whilst it is true to say that some research has indicated little or even a slightly overall negative effect from parental assistance in the home with homework, when account is taken for why increased parental assistance is given for example when children are underperforming or in subject parents had difficulty themselves and how it is given – authoritative or directional leading to poor motivation in students what remains positive.

With the right kind of parental assistance, which research (Henderson and Mapp, 2002) indicates is autonomy enhancing, process rather than personal driven and warm or encouraging, there are gains in self-efficacy, academic performance, school anxiety is lessened and with better behaviour at school. Both parents should be involved where possible, as both can bring different skill sets which research indicating that mothers are more nurturing whilst fathers can teach self-control and management of emotions (Perriel, 2015)

2.4 Is There a Gender Aspect to Educational Assistance in the Home?

Historically the maternal and paternal roles of the parent in the home were defined by the traditional role identity model (Lamb, 2010). Fathers were seen as the main bread winner and mothers' responsibilities primarily lay in the home as a care giver. As such, matters of education and schooling assistance were considered to be within the mother's remit.

However, with more and more mothers returning to the workplace, these roles have become blurred somewhat (Kim and Hill, 2015) though the manner in which assistance is given can still be broken down along gender lines to a certain extent. Kim and Hill found that mothers tend to be more highly involved in their child's education from a young age and as the child ages and moves into higher grade levels they usually give less assistance and more autonomy. Paternal involvement tends to remain the same in both primary and secondary level albeit at a lower level.

Paternal assistance at all levels can be influenced by how the child is achieving academically in school with research indicating correlation with greater paternal involvement as a result of poorer student grades, this relationship is not causal in nature,

as the fathers were getting more involved because their child was performing poorly and not the other way round (Chui et al., 2016; Grolnick, 2015; Pomerantz et al., 2007).

Where assistance is given by either parent the outcome is positive, with children being equally likely to ask for assistance from a father or mother (Normandeau and Goindin, 1996). In addition, when both mother and father assist with homework and are involved with the school (attending parent teacher meetings, volunteering, attending sporting events etc.) the positive effects are cumulative in nature rather than concurrent. Doubling the amount of assistance or school involvement by one parent, for example, doesn't equate to each parent giving equal assistance.

(Doctoroff and Arnold, 2017; Kim and Hill, 2015) found that the nature of assistance given differs between father and mother with fathers tending to be more goal driven with more mentally challenging questions and new words and checking that there is understanding. Mothers tended to offer more warm and supportive assistance and be more involved with the school (unless as mentioned above the child is achieving poor grades). (Grolnick, 2015) noted that mothers tended to have greater involvement when there were intrinsic reasons for doing so, such as when they found the interaction with the child to be enjoyable and fun.

Where the parents are living apart and the child resides with the mother, paternal assistance can still play an important role in the child's development. (McBride et al., 2005) found that when fathers who lived apart from their children still played a part in the child's education by assisting with homework and getting involved with the school that the child was less likely to have behavioural issues in school, better school grades, found it easier to make friends amongst their peers.(Jethwani et al., 2014) found similar benefits with findings including children less likely repeat grades or have been suspended or expelled and more likely to get higher grades.

2.4.1 Summary

Both parents have a part to play in their child's educational upbringing. Each parent contributes in different and valuable ways as paternal assistance and approaches tend to differ from maternal. The net effect being cumulative rather than concurrent

Even in families where there has been marital breakup and the child resides with the mother, there still is a valuable part for the father to play in the child's upbringing with research showing multiple benefits from the fathers continued involvement in the child's educational upbringing.

2.5 What are Parents and Teachers Attitudes towards Usage of Technology in the Classroom and Home in Terms of Education and Homework?

This literature review so far has looked at the importance of homework in general and of parental assistance. So how do parents and teachers feel about using technology such as iPads and tablet devices in general in the class room?

As part of understanding how the usage of iPad like devices within the school and home may impact parent student interactions with regards to school and homework, it is worthwhile investing what the research shows on how teaching and learning differ from traditional pedagogical methods when using these devices. The most obvious difference between traditional and tablet based teaching and learning is the device itself – it is a small, light device that can take pictures (since version 2 released in 2011 (Apple, 2011)) which features dynamic content and can access the internet over a wireless connection.

It is this dynamic nature that has been associated with positive (Audi and Gouia-Zarrad, 2013; Falloon, 2015; Heinrich, 2012) and neutral or cautionary (Ertmer et al., 2012; Henderson and Mapp, 2002; Hu, 2011; Pegrum et al., 2013; Ward et al., 2013) conclusions within the research reviewed.

The application design on tablet devices or “apps” are one area of where dynamic content has been giving sometimes conflicting research conclusions. (Falloon, 2015; Heinrich, 2012) cite the interactive nature of the apps as being more dynamic and interesting to the students and facilitated greater discussion and learning. However, the very dynamic nature of app design is what others criticise it for, some say the plethora of option and imagery can be a distraction (Ward et al., 2013). Similarly (Murray and Olcese, 2011) caution against the design of apps being consumptive in terms of content and not conducive to creation or collaboration of new content.

Collaboration is another area where the dynamic aspect of tablet usage which can be either positive or negative. Some applications as previously mentioned are by design aimed at consumption rather than content creation or criticism which is a feature or traditional teaching pedagogies (Murray and Olcese, 2011). (Noorhidawati et al., 2015) found that in apps where children could interact, such as by highlighting words or reading along with parents or teachers that outcomes were more positive. (Falloon and Khoo, 2014) found that unless teachers led a discussion of content in the app that children were less likely to question the content and internalise the information.

Where there is good connectivity in the classroom which facilitates collaboration between the teacher and students, and student to student such as when an Apple TV is used

alongside iPad devices (the students can send questions or comments to the Apple TV from their iPad device which is then viewable to the class for all to see there are greater benefits (Falloon, 2015)

Interestingly (Aesaert and van Braak, 2015) found that girls, in general, are better than boys in using ICT systems for communication which would suggest that perhaps girls might find collaboration using the tablet like devices more intuitive than boys. (Noorhidawati et al., 2015) however found that young students (aged 4-6) social interactions with each other increased as a result of using tablet apps for storytelling related activities compared to using traditional books. One possible interpretation of this is that gender gap in communication may be less for the youngest students who have been exposed to mobile technologies such as tablets and phones all of their lives.

(Reid and Ostashewski, 2011) cite as a positive that within the classroom environment students can find explanations and expansion on ideas being discussed online without having to ask for assistance from their teacher. In addition, they cite the experience of a special needs student that couldn't vocalise questions within the classroom but was able to type questions which the teacher could read and answer using an iPad.

However, this begs the question about content and quality – if students can find any information from any source online, then who controls that and who evaluates it? (Stillar, 2012) argues that today's students have grown up with technology and today's educators need to adapt. It is becoming less about disseminating information and more about becoming experts in sifting through all the online content available and teaching students how to do so themselves. (Hutchison et al., 2012) cite their experience of when students were presented with a list of digitalised books as supporting material for the classroom. They found that students tended to choose too many books and browsed through them without necessarily choosing relevant material for what they were supposed to be studying.

The need for change in pedagogical methods is a common theme across much research if iPad's and other tablet like devices are to be used in a way that results in better outcomes. For example, (Pegrum et al., 2013) research into teacher training found that if teachers were to utilise these devices in their classrooms, they themselves should get explicit training on the best pedagogical methods to utilise them. Teachers should choose applications that are open ended and encourage creativity and collaboration (Kucirkova et al., 2014). (Robin, 2008) cautions that without adequate teacher training to utilize the unique affordances given by technologies that inappropriate ones may be chosen and used. Indeed (Zyad, 2016) found that teacher collaboration even within the school was a barrier as some were more committed or interested than others in using the technology than others. (Gasparini and Culén, 2012) found issues along the same lines and cite lack of support within the school

as being a barrier in addition lack of teacher training and time to integrate learning and researching how to use these devices optimally as a barrier.

2.5.1 Summary

Some of the research is very positive about the introduction of iPad and tablet like devices into the classroom and argues that in the past, the world was more slow moving and that a college education was sufficient, however in today's world we need to equip students with the tools and knowledge to move with it and learn how to use the technology to keep up (Tapscott, 2009) . The dynamic and interactive nature of the iPad and other tablet devices can help facilitate learning in this ever changing and evolving technological world.

Other research cautions that without appropriate training for the teachers, appropriate applications being chosen and collaborative support within the school and curriculum that these devices may not be used in a manner that gives greater outcomes and may result in the devices at worst becoming underutilised or unused at all.

2.6 Are there Physical or Behavioural Effects Associated with Tablet usage?

2.6.1 Physical Effects

Tablet computers are physically different in size and weight to desktop computers and lighter than most laptop computers (Joe Roberts, 2016) so there has been much research into whether there are physical effects associated with their usage.

(Straker et al., 2008) carried out research into the posture of primary school children when using tablets and found that they tended to use tablets in a similar fashion to paper, flat on the desktop or on a student's lap, when carrying out tasks that involved interaction with the tablet such as drawing or writing. They conclude that this may lead to concerns with younger children's growing musculoskeletal systems and recommend minimising, where possible, this style of usage as well as general guidelines being drawn up regarding correct usage. Correct usage is suggested to be elevated screen at desk height.

Research carried out by (Vasavada et al., 2015; Young et al., 2012) found that the increased head tilt their research found with tablet usage would likely lead to neck and shoulder pain.(Sommerich et al., 2007) carried out research into high school (secondary in an Irish context) which had access to tablet computers and found that approximately 30-40% of them reported at pain sometimes in their neck, eyes, and back with the shoulders most commonly cited.

As well as physical pain being experienced in the neck, shoulders and back by tablet usage, there has been much research into the effects of computer usage on eyes and eyesight in general. The term Computer Vision Syndrome (CVS) is often used to describe the collective effects from a prolonged time spent looking at a computer screen. Effects of CVS include eye tiredness, pain in and around the eyes, headache and blurred vision.

One often cited meta-review of the research into this area, (Gowrisankaran and Sheedy, 2015), states that previous research has found that between 64 and 90% of computer users experience CVS. One of the causes of eye problems is altered blink rate when viewing a computer screen with the research finding that blink rate is much lowered leading to dry eyes and associated problems (Rosenfield, 2011). Screen position again is a factor with the research finding that hand held screens such as those on mobile phones and tablet oftentimes not being held at a correct distance and orientation from the eyes (flat on a table or lap for example) leading to eye strain (Ibid.).

Research by (Wimalasundera, 2009) discusses the effect of the nature of characters on a computer screen being made of pixels as opposed to solid when printed causes the eyes to constantly try and refocus leading to eye strain and symptoms associated with CVS. Wimalasundera also cites research in Taiwan which found that myopia rates have risen from 12.1% to 20.4% since 1995 which he attributes to increased computer usage. He also mentions children lack awareness of correct screen positioning and as long as the image is seen as being normal to them they will often continue to use in an incorrect fashion (too close, too far, too low down etc.). He says that parents need to monitor how they are using the computer. As children in K12 schools are using tablets in the classroom this duty of responsibility by extension should pass to the teacher, once again highlighting the need for specialist training with correct usage of these devices. Other research by (Straker et al., 2008) concurs with this and found that younger children were more likely to incorrectly position computer screens than older users.

2.6.2 Behavioural Effects

There has been much research into the area of behavioural changes associated with computer usage. One of the most researched areas is so called computer anxiety where individuals feel stress or anxiety when using computers and also the internet in particular (Durndell and Haag, 2002). The research indicates that when people are asked to use new programs that they are unfamiliar with they will experience anxiety at different levels correlated with age, experience and gender. With females and older people often found to experience more anxiety than males in general (Chua et al., 1999; Durndell and Haag, 2002). Correlated with anxiety is “internet addiction” where heavy internet users become addicted to posting on social media as well as online gaming or even virtual worlds such as

"Second Life" (Young, 2004) with consequent negative effects on their lives in the non-virtual word such as depression.

Research carried out by (Pantic et al., 2012) found a correlation between increased social networking and depression on high school children. Similar research carried out by (Kim et al., 2006) found a correlation between internet addiction and depression and suicide rates amongst Korean children.

From a shorter term viewpoint into the immediate effects of computer usage amongst children research into the effects of gaming can lead to short term aggression and mood changes immediately after use as the stimulus is removed (Fleming et al., 2001; Lee and Peng, 2006; Russell and Newton, 2008). Researchers measured physiological changes such as heart rate, blood pressure and oxygen consumption and found that all were raised above normal during gameplay and were higher when children were exposed to another stimulus such as music, reading or watching television (Kubey and Larson, 1990).

2.6.3 Summary.

The research strongly shows that there are physical effects with using computers in general on the eye and specifically in with tablets in the neck, shoulder and back due to improper positioning. Improper positioning has been suggested to be more likely with younger children due to inexperience with a subsequent responsibility of their care givers like teachers and parents to monitor correct usage. Without training in this area, it is possible that many parents and teachers may have poor awareness of the importance of correct tablet handling and positioning.

The research also shows a correlation with depression and heavy internet use, particularly of social media and in children as well as an increased suicide rate amongst heavy users. In the immediate term, children have been found to be more aggressive and have mood changes after game playing on computers due to stimulus withdrawal. This would suggest that parents and teachers should limit social media and internet time on tablets and be conscious that if the child has been using the tablet playing a game or interacting on social media that there may be behavioural changes immediately post usage.

2.7 Overall Summary

Whilst there has been considerable debate over the efficacy of parental assistance during homework for K12 students, and indeed of assigning homework at all. It could be argued that the weight of research leans in the direction that parents should assist where needed

and wanted and that reasonable amounts of homework should be assigned to students, with more assigned to older and less to younger.

Benefits of homework extend beyond merely learning material by rote, self-efficacy, denial of gratification, planning and problem solving are but a few of the additional skills students can learn from homework. Parental training might help some parents feel confident giving assistance, particularly those from a lower educational or SES background.

The research is mixed on the benefits of using tablet devices in the classroom with many researchers suggesting that pedagogical methods need to change to utilize these devices to their maximum potential. Other concerns include appropriateness of material to the syllabus and technical issues such as Wi-Fi, hardware maintenance and availability on a one to one basis (one per student). Where teachers feel confident using tablet devices in the classroom and have appropriate materials, such as open ended apps to support them, they report that the learning experience is enhanced.

The introduction of tablets into the classroom and at home will possibly have physical and behavioural impacts also with the research indicating improper usage can lead to neck, shoulder and back pain as well as many eye related effects or CVS. There may also be short and long term behavioural implications with heavy usage and gaming such as increased possibility of depression longer term and increased aggression or moodiness immediately after playing games or other highly stimulating interactive activities on the computer. Correct usage training for both parents and teachers should help lower the likelihood of these effects.

With more and more schools in Ireland adopting the usage of tablet devices it is important to evaluate how this is impacting parental ability to give effective homework assistance. The research has shown that for teachers to utilize tablet devices to their maximum potential, they would benefit from additional training, this would suggest that there is also an impact on parental homework assistance as well.

Despite there being quite a lot of research into the usage of tablets in the classroom, there appears to be little or no research into the effects of tablet usage on homework efficacy and parental homework assistance. This thesis will investigate parental perspectives on homework assistance with tablets and compare and contrast the opinions of parents who have currently got children attending schools which use tablets and those who do not.

Chapter 3: Methodology

3.1 Introduction

This chapter discusses the approaches that could have been taken for the research and offers a considered view of the type taken.

Section 3.2 looks at the research questions being investigated

Section 3.3 looks at research philosophies, approaches, strategies and timeline utilising the "The Research Onion" by (Saunders et al., 2009) as a visual template for the methodological components considered.

Section 3.4 looks at the conceptual framework and the TAM2 model.

Section 3.5 looks at the sampling used with discussion on why this approach was taken.

Section 3.6 there is a discussion of the instruments used and triangulation with discussion of how the instruments were developed and tested.

Section 3.7 describes how the data was analysed and how conclusions were arrived at

Section 3.8 looks at the time horizons and how this influenced the research

Section 3.9 looks at the ethical considerations approval for the research

Section 3.10 concludes the methodology section with limitations and possible future approaches as well as revisions of the methodology used and lessons learned in the process.

3.2 Research Questions

This project seeks to gain insight into how parents feel about their children using tablet computer devices, such as the Apple "iPad" in the classroom and how they feel it affects the child's learning and the parent-child interactions during homework and at home in general.

The research questions are:

1. How do parents of children, using tablets in school, feel that this impacts their interactions with the child, in particular during homework?
2. Do parents of children, using tablets in schools, feel that the tablet device aids their child's learning more than traditional pedagogical learning tools such as blackboard, pen and paper?
3. What are parents, of children not attending tablet using schools, perceptions about these questions?

3.3 Research Process and Approach

The frequently cited so called “research onion” (Saunders et al., 2009) describes the philosophies and approaches a researcher may take when formulating a methodology for the research. There are six layers to the onion – philosophies, approaches, strategies, choices, time horizons and techniques and procedures. This research will be described in the context of Saunder’s onion from philosophies to techniques and procedures

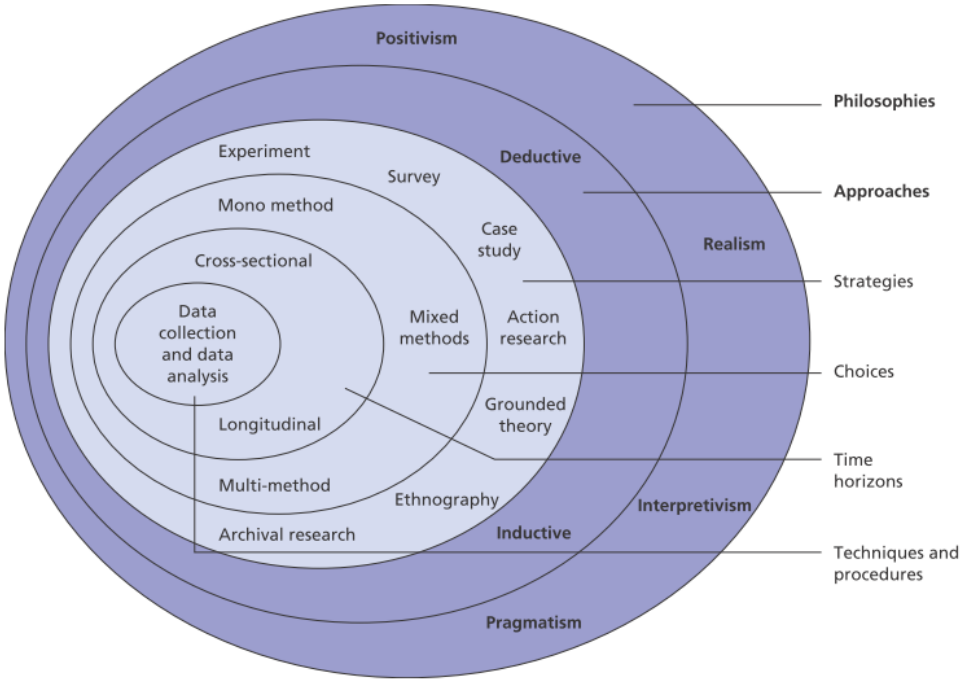

Figure 3.1 The Research Onion, Source: (Saunders et al., 2009)

3.3.1 Philosophies

The research philosophy encompasses where knowledge comes from, how it was generated and what kind of knowledge it is or its nature. The philosophy a researcher adopts informs how they view, interpret and analyse the objects or people they are researching.

(Saunders et al., 2009) outer layer covers four major philosophies positivism, realism, interpretivism and pragmatism.

Positivism is not felt to be appropriate for this research as it deals with in statistically measurable and quantifiable objects. It has also been referred to as the “scientific method” (Mackenzie and Knipe, 2006) This research is based on the human subjective option so a positivist approach was not suitable.

Realism deals with the perception of reality as seen through the human mind and senses. It can be broken down into two general sub types – direct where what is seen is taken at face value and critical where the researcher acknowledges the limitations of our senses and that our perception of what is real may not be the case. Critical realist research is multi-level, it tries to get differing viewpoints to establish a complete view of what is real (Trochim and Donnelly, 2001) Realism is deductive by nature, the facts are looked at and a theory is deduced from those facts.

Interpretivism is a research philosophy often used when studying social objects and their interactions. The data is subjective and does not lend itself towards prediction. It seeks to understand what is happening and thus is inductive in nature (Smith and Osborn, 2015). As the main research question is related to the impact of tablets on homework assistance by parents, which is a social interaction, this philosophy is a good fit. Research following this philosophy often utilises interviews as its primary source of data

Pragmatism acknowledges that there may be different ways of viewing reality and that the research being undertaken may need different approaches (Hickman et al., 2009). A pragmatic approach may encompass elements of all three philosophies above when seeking out new knowledge and understanding.

3.3.2 Research Approaches

Two main research approaches are deductive and inductive.

A deductive approach starts with a theory which predicts something, hypotheses are formulated how to test the theory and then these hypotheses are observed and measured and the resultant data either proves or disproves the theory. An example of a deductive approach in the context of this paper might be “voluntariness of use of tablet computers is correlated to parental acceptance”.

An inductive approach looks at the data and asks the question “why it is so?”, and attempts to formulate a theory that explains it. An example of such an approach in the context of tablet computers might be “why does voluntariness of use influence parental acceptance?”

If this was a finding from the data coming out from the interviews, then related areas need to be looked at to see if an explanatory theory arises. An example of this could be that if parents felt that their interaction with their child was more productive when using the tablet they might be more inclined to use it regardless if they felt an obligation to or not. If they were obligated to use something that they felt did not result in better homework quality it is possible that the bare minimum would be done or they may rebel and decide to refuse to use it at all.

This research will, therefore, use a qualitative, interpretivist, inductive approach to answer the research question.

3.3.4 Research Strategies

Whilst there are many research strategies that could have been used, the time and resource limitations pointed towards semi-structured interviews and grounded theory as being the best fit for the research being undertaken.

Other strategies such as experimental, where a hypothesis is tested, case study which is too narrow, action research where there is participation, archival research which deals with secondary data and ethnography which deals with social interaction were deemed unsuited for this research.

3.4 Conceptual Model

In order to evaluate acceptance of iPad and tablet devices in the home as well as the parental impact this thesis will use the revised TAM model, referred to as TAM2 from here on as proposed by (Venkatesh and Davis, 2000).

This model was chosen because it can be used to predict the likelihood of a new technology being accepted and used. For tablet usage, in the area of homework assistance to be successful and effective, parents need to accept that tablet users will be worthwhile and therefore modify their assistance behaviours to incorporate using the device.

Whilst this can be used in a quantitative approach, here it is being used as a framework for a qualitative approach to suggest areas which may have an impact on tablet usage in the area of parental homework assistance. It was used to help to formulate questions for the semi-structured interviews as well as interpret the findings and induce theories to explain the behaviour.

TAM2 was an update on TAM proposed by (Davis Jr, 1986) which itself was an IT specific revision of the Theory of Reasoned Action (TRA) as proposed by (Fishbein and Ajzen, 1975)

3.4.1 Theory of Reasoned Action

This model suggested that a person would carry out a particular behaviour based on their behavioural intention (BI) which itself is predicated on an individual's attitude towards carrying out a behaviour and the subjective norm.

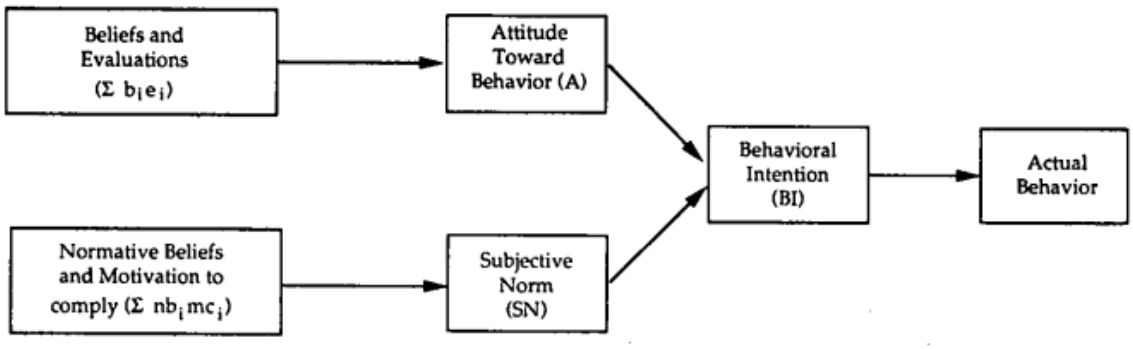

Figure 3.2 Theory of Reasoned Action (Fishbein and Ajzen, 1975)

Behavioural Intention can be conceptualised as a measure of how strongly a person wishes to carry out a particular behaviour and can be estimated using a regressive weighting of Attitude Toward Behaviour (A) and Subjective Norm (SN). Attitude toward a behaviour is calculated based on a person beliefs about the consequences of carrying out a behavioural action and the evaluation of those consequences, mathematically this can be expressed as $A = \sum b_i e_i$ (Fishbein and Ajzen, 1975, p. 302)

Beliefs (b_i) are the subjective probability that carrying out a certain behaviour will result in consequence *"i".* Evaluation (e_i) is a measurement of the likely response. Or to put this another way, what is the likelihood this behaviour will result in a particular consequence and how do I feel about that?

Subjective Norm can be conceptualised as a person's subjective evaluation about how people important to them would feel about doing or not doing the behaviour (nb_i*) and whether they feel motivated to comply with the norm (*mc_i*) Mathematically this can be expressed as* $SN = \sum nb_i mc_i$ *(ibid.)*

The TRA was developed in the field of psychology to describe and predict behaviours in general. It looks at the internal processes involved in behaviour and breaks them down to attitude and subjective norm, external influences (such as design, implementation, organizational styles etc.) act on these internal processes indirectly.

3.4.2 Technology Acceptance Model

(Davis Jr, 1986) developed the TAM model with information systems specifically in mind. This included measuring the influence of external inputs on internal attitudes and behavioural intentions. Two new external influences, perceived usefulness (U) and Perceived Ease of Use (E) were introduced as important in the area of computer acceptance and usage.

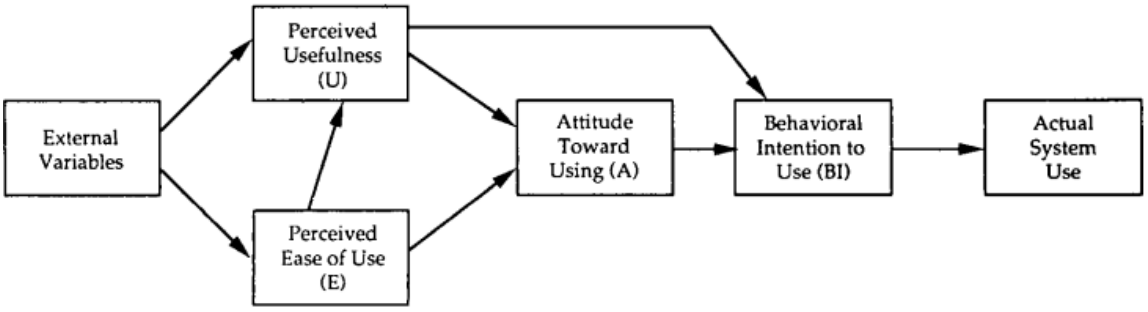

Figure 3.3 Technology Acceptance Model (Davis et al., 1989)

BI for computer usage is now influenced by attitude (A) and perceived usefulness (U). Subjective norm is not included as it was felt that it had "uncertain theoretical and psychometric status " and that "A might influence SN" (Davis et al., 1989)

Perceived usefulness is described as being the subjective probability that using the system will increase performance from the context of an individual's role within the organization. From the context of this paper, the organization will represent the school assigning homework to the child.

Perceived ease of use is simply how easy the individual perceives the system to be to use. It directly affects the individual's perception of how useful they feel that the system is. External variables such as system design, training etc. are viewed as influencing both perceived usefulness and perceived ease of use.

3.4.3 Technology Acceptance Model Extended (TAM2)

(Venkatesh and Davis, 2000) extended the TAM model to by looking closely at what the determinants of perceived usefulness are and how they may also affect the intention to use (see BI in the TAM model above). They state that perceived usefulness accounts for a large part of usage intentions with a retrogression coefficient of around 0.6.

The model extended TAM to additionally look at what are the determinant for perceived usefulness and usage intention (BI previously above) and how this might change with user experience over time.

The model builds on TAM and brings back Subjective Norm from TRA (discussed previously) as well as six new constructs – voluntariness, image, job relevance, output quality, result demonstrability and perceived ease of use.

- Subjective Norm – defined as in TRA above as a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein and Ajzen, 1975, p. 302). In the context of this research subjective norm can be thought of how parents perceive that assisting their child with homework utilizing a tablet is a normal thing to do
- Voluntariness – a measure of how much choice a person has about using a computer system normalizes though compliance, the intention to use, over and above perceived usefulness, and ease of use. Where there is choice this effect will not be significant. In the context of the research question, this might be whether the parent feels obligated to use the tablet when assisting with the homework or not and if over time they find that they choose to use it more and more when giving assistance.

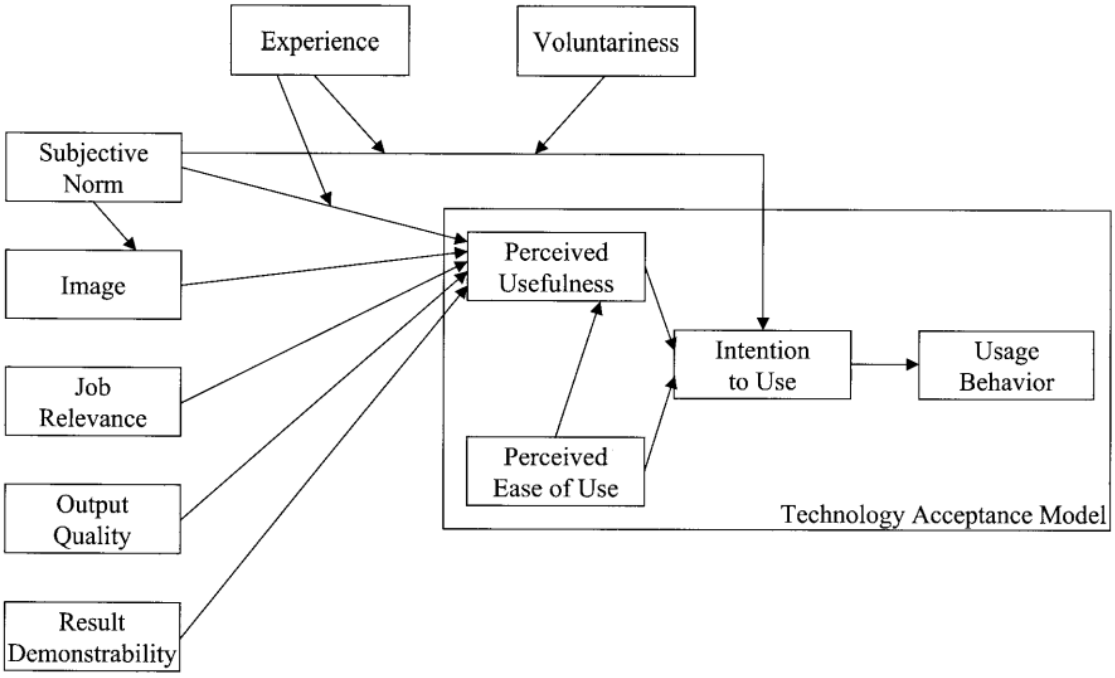

Figure 3.4 Technology Acceptance Model Revised (TAM2) (Venkatesh and Davis, 2000)

However whether usage is voluntary or not (Venkatesh and Davis, 2000) propose that due to internalization effect of Subjective Norm, users will perceive the computer system to be more useful in response to how, to paraphrase Fishbein's TRA, "important people" feel about it. If other parents feel positive about using the tablet

and talk about it with each other, parents may feel it is the norm to use it and would, therefore, be more likely to use when giving homework assistance.

- Image – How an individual perceives that they are viewed by individuals important to them or to put in another way, their social standing. If individuals perceive that doing a certain behaviour is the subjective norm than this may have a positive impact on their image which positively feeds into the perceived usefulness of the IT system. Some parents may feel that their self-image may be affected if others perceive them to be backward or resistant to change they may be more likely to use the tablet

- Experience – Over time as individuals become more expert in using the system the positive effect of subjective norm on intention to use will wane. In addition, the positive effect of subjective norm on perceived usefulness will wane over time, regardless of whether usage is voluntary or not. Over time parents should become more expert at using tablets when giving homework assistance which should drive more intention to use.
- Job relevance – The perceived relevance of the IT system is to an individual's job. In the case of measuring the impact of iPad's (or tablet devices), this will be how relevant the parent feels that using the iPad/tablet is to assisting their child with homework. Job relevance will have a positive effect on perceived usefulness.
- Output Quality – The perception of how well the system performs the tasks it is being used to do. Output quality impact on perceived usefulness should be positive. If parents perceive that they can give better assistance quality and that their child's resultant homework is of better quality this should have a positive effect on intention to use.
- Result demonstrability - (Venkatesh and Davis, 2000) succinctly put this as "tangibility of the results of using the innovation". As in output quality above, if parents feel that the end results are better as a result of giving assistance using tablets, such as in state exam scores, they will be more likely to accept them as a useful device.

3.5 Sampling Methodology

It was decided to use a preliminary online survey based on the TAM2 model with closed and open-ended questions to gather initial data which could be incorporated into semi-structured interviews utilising a qualitative inductive approach.

The following approaches were made to enlist parents to participate in the research:

1. A school inspector was approached through a family contact and was asked for help by making an introduction to several schools known to use tablet computers. However when this was done, the schools, whilst willing to participate, felt that the autumn term would be a more suitable time, unfortunately, that was beyond the timeline allocated for this research.
2. Research was carried out online to determine schools in the Dublin area and which used tablet computers. Ten such schools, chosen at random, were posted letters inviting them to ask student parents to participate of which three indicated interest. Two of these suggested the autumn term as being appropriate and the third one did not get board approval to proceed.
3. Parents that are work colleagues and in my social circle were chosen at random to be as representative of a cross section of Irish society as possible – urban and rural and high computer literacy to low. This decision was made as some of the findings from the literature review indicated that these groups may have differing opinions, which would be worth exploring. They were then approached by email and asked to voluntarily participate an online survey and participate in a follow-up interview. Fourteen survey responses were received from this with quite a lot of comments in the open ended questions. Most participants indicated interest in attending a further follow up interview.
4. After the survey stage was completed, further parents using the same selection process as above were approached directly and invited to participate in an interview. This resulted in parents from fifteen families being interviewed, eight from families of children that do use tablet computers and seven from ones that do not.

3.6 Instruments and Triangulation

It was felt that a multi-method approach would be suitable for the research utilising an initial survey of a random group of parents from different cross-sections of Irish society (urban-rural, high versus low to medium computer literacy) to get an initial perspective of parents feelings regarding tablet computers in general with the option to answer three open ended questions to elaborate. This was then used to inform the questions for the semi structured interview from a more specific standpoint. It was hoped that this triangular technique would, to quote (Cohen et al., 2007) "*attempt to map out, or explain more fully, the richness and complexity of human behaviour by studying it from more than one standpoint*"

The questionnaire was adapted from the original TAM2 paper (Venkatesh and Davis, 2000) to be tablet computer specific rather than IT in general. In addition, three open ended

questions were added to allow participants to expand on the areas covered in the questionnaire in more detail. The “SoSci Survey” website was used for the questionnaire. SoSCi Survey is a survey website which is free to use for university students and has a user-friendly interface which allowed creation of the survey in compliance with all Trinity College Dublin ethical considerations.

3.6.1 Instrument Development – Survey

The TAM2 model as discussed in the literature review was chosen as it was designed to measure and predict acceptance of a new technology. It breaks this down in different predicators such as ease of use, voluntariness, image, experience, subjective norm and perceived usefulness. Perceived usefulness, according to the authors of this model can account for up to 60% of the variance in intention to use (Venkatesh and Davis, 2000).

The survey questionnaire was trialled with a group of five testers in order to check for understanding and clarity of wording in order to ensure validity (Cohen et al., 2007, p. 144). Once feedback was received and the questionnaire finalised and ethical permission received it was made live on the SoSci Survey website and survey invites were emailed.

Due to the fact that the sample of parents surveyed was quite small as a result of not being able to enlist school participation in time, the answers were not statistically significant and thus not used in the findings. However, the answers to the open-ended questions helped the development of the main data gathering stage – the semi structured interviews.

3.6.2 Instrument Development – Interview

The interview questions were designed to be open-ended and centred on the research questions being asked, for example, the question below:

Did the fact that your child's school used/did not use tablet computers play any part in the decision to send them there and why?

Correlates with questions about image, subjective norm and perceived usefulness. Strong correlations (positive or negative) would indicate this area is worth exploring more deeply during the interview with the aim of gaining insight and inductive theory being formulated as a result. The guideline interview questions are included in appendix two at the end of this thesis.

Trial interviews were held with two parents to check overall interview time, understanding of questions, loose question order and to get suggestions on question-wording. Question order was primarily determined by the flow of conversation during the interview, a rigid order was not adhered to as at times there was answer overlap from one question to another.

Trial interviews were held using the Dictaphone to record and also using pen and paper to simulate the recorder failing or permission not being given to record the interview (Saunders et al., 2009, p. 333).This was quite a useful exercise as it was quite difficult to cover the same ground when note-taking only and not having the luxury of the transcription afterwards. In addition, it was useful to gauge the interview time on average in order to prioritise questions deemed most relevant early in case of time overruns.

The decision was taken to note-take as much as possible on all interviews to ensure that notes were consistent if permission to record was not given and that there was a backup should there have been an unnoticed technical issue with the Dictaphone during the interview.

3.6.2 Interview Process

Interviews were conducted with participants in their homes and in several cases, their place of work. In both situations, care was taken to ensure that the interviews were in quiet place with as few distractions as possible (Cohen et al., 2007, p. 380)

All interviews were recorded on an Olympus WS-853 Dictaphone and were transcribed later using Scribe - https://www.scrb.co/. This saved a large amount of time versus manually transcribing the interviews which according to (Bell, 2010, p. 168) can take four hours or more per hour of recording. All transcriptions needed manual editing afterwards as sometimes transcribed words incorrectly but this was relatively quick to do as in most occasions the incorrect words sounded close to the correct one, “bone” instead of “phone”, “eye patch” instead of “iPad” etc.

The Dictaphone was chosen because it had a feature whereby a marker can be placed at specific points along the recording. This allowed marking the start of a new question by pressing a button on the device. This facilitated easy skipping to particular points of the recording afterwards. As questions were asked the order was also noted down on paper as notes were being taken. This was necessary as the exact order of questions being asked varied between interviews depending on the flow of conversation and at times there was a crossover between one question asked and another in the participant's replies. It was important to be able to listen back to the answers as well as read the transcription in order to get contextual information such as voice emphasis, emotion and because it aided recall of the interview afterwards.

The questions were kept as open ended as possible to elicit as detailed a response as possible and great attention was given to be impartial and not to lead the response to questions in one particular direction or another so that answers given would accurately

reflect the participants' true feelings and opinions on the area as much as possible (Bell, 2010, p. 169; Cohen et al., 2007, p. 382) .

Care was taken at the beginning of the interview to explain to the participants that the recordings would be held securely on Google Drive and not accessible by anyone else apart from the researcher. Recordings of the interviews will be deleted once research paper has been submitted and graded.

3.7 Data Analysis

Initial survey data was exported to the SoSCI Survey website to a CSV format and uploaded to Excel. The open-ended questions were a rich source of information for the interview questions as participants expressed their feeling about certain topics in good detail. As the number of responses was not statistically significant the responses to the closed questions were discounted.

The interview questions were broken down into loose topics such as school choice, quality of work and outcomes, classroom teaching, homework assistance and parent child relationships. All participants were also invited at the end of the interview to comment on any other area regarding tablet usage by K12 children that had not been covered in the interview so far which they thought might be helpful in the research.

Transcriptions and audio recordings were analysed in "atlas.ti" software and coded. Coding results were then grouped into particular groups such as "homework", "assistance", "teaching" and "relationships" amongst others to get an overview of the data and allow deductive hypotheses to be formulated.

Transcriptions of interviews as well as on some occasions recording playback allowed for contextual understandings such as emotion and emphasis which were not always apparent from the written word alone.

3.8 Time Horizons

Due to the limited time available for the research, a longitudinal approach was deemed unsuitable. Longitudinal research is where the person or object being researched is continually measured and evaluated over time either iteratively or continually. Given the time frame for this research was quite short this approach was unsuitable.

Instead, a cross-sectional approach was taken. Cross-sectional research aims to get as many viewpoints of the subject being researched as possible within a fixed or short time point. In the case of this research, parents were surveyed with differing educational

backgrounds, gender and age groups simultaneously. It was expected that there may be differences in findings by each of these criteria.

A longitudinal approach might have indicated that, over time, these differences may lesson in some regards or polarise in others leading to new theories being induced as a result which may be an area worth looking at in future research especially as today's students over time become parents themselves and the utilisation of tablet computers in the classroom will not seem like a new or strange concept to them, or indeed they may have a more polarised viewpoint based on their own experiences previously.

3.9 Ethical Approval

Ethical approval for the research was granted by the Trinity College Dublin Ethics Committee on March 2nd, 2017. No approach had been made to schools, school inspectors or parents prior to this being granted.

All participants were over 18 years old and volunteered to take part in the research. All survey data were anonymised and participants were provided with an information sheet describing the research and how the information would be used. Participants were free at any stage to choose not to complete the survey and exit without their data being saved. Interview participants were similarly given an information sheet and advised they could request at any time for their recordings to be deleted and discounted. All participants were assured that their answers would be anonymised. All participants signed consent forms granting permission to record their answers and use the resultant data in this research.

3.10 Lessons Learned, Limitations and Revisions of Methodology

Initially, the intention was to take a quantitative approach through survey responses through direct school approach. The second stage was intended to be qualitative interview, primarily to explore the data quantitative data from the surveys in greater depth.

Recruiting schools to participate proved to be a very time-consuming process and whilst several schools did indicate a willingness, they were unable to participate in the timeframe allotted for the research.

Whilst quantitative research does give good statistically relevant data it is also limited in that the questions are fixed in advance. With qualitative research, the questions are open ended and where the subject has not been researched widely before there may be unanticipated useful data emerging from the interviews.

By conducting fifteen in-depth interviews the range of topics discussed is likely more varied than a quantitative approach which has to predetermine all questions in advance. The resultant data should be informative to future quantitative research in the area as well as extending the body of knowledge regarding parental homework assistance in the context of tablet usage.

Parents, known to me through work association (non-subordinate) and social circles, were approached via email and asked to voluntarily participate in the survey to gather initial data that could inform the qualitative research which now would form the primary source of data retrieval.

Despite efforts to eliminate bias as a result of participant selection there may have may be unintentional bias as most parents interviewed had third level education and were in professional office based roles or were homemakers.

Great care was chosen to not lead interviews and ask non-leading questions the nature of topic being researched is emotive and being a parent of three children myself, the questions asked may have indicated bias although much effort was made for this not to be the case by trial interviews and careful wording.

Parents were very interested in the interview process and all parents approached were happy to participate and there were definite commonalities in reply to some of the research questions being asked which may be indicative of areas worth further exploration from future research.

This research was cross-sectional in nature by design due to time constraints, a longitudinal approach in the future may result in further interesting insights as parents become more familiar with the technology and usage becomes more normalised.

A school inspector, approached during this research for assistance recruiting schools, stated that more and more K12 schools will use tablet computers in the classroom as it fits in with the (Department Of Education and Skills, 2015) “Digital Strategy for Schools” framework currently being implemented. As a result parents’ perceptions of these devices may become more normalised or in some cases polarised.

One parent commented on the survey that “*it is just an easy way for parents to be lazy and not to be forced to interact and explain homework to their kids*”. Whether this is the case would be interesting to investigate, it may be difficult to do that through a qualitative approach as taken here as it is unlikely that parents are going to admit that they are being “lazy” or disinterested in their children’s homework in face to face interviews. A future study using a quantitative approach could investigate this though comparing previous research into time spent on homework assistance with that of parents of children utilising tablet

computers and investigating reasons for why that may be. It could be argued that in today's Irish society where both parents work and own smartphones, that it is natural they may unconsciously deliver less homework assistance knowing the ease of use of tablet devices.

Chapter 4: Findings and Analysis

4.1 Introduction

This chapter presents the findings from the data collected during the interviews carried out with 15 participants.

The findings from the data are discussed and grounded theory used to hypothesise explanations. Correlations were found in many cases to areas covered in the literature review and in others, the lessons from the literature review can be applied to the data to inform resultant hypotheses.

The chapter starts with a description of the participants and their backgrounds and then moves on to cover the data coded from the interviews and resultant theories and recommendations arising from it.

The chapter closes with an overview of the main findings which will then be discussed in the following chapter in the context of the research questions.

4.2 Research Findings

4.2.1 Interview Participant Profiles and Setup

There were 15 participants in total interviewed. Participants were chosen to be from different backgrounds in order to give as wide a possible viewpoint to the research questions.

Of the 15 participants, 8 were female and 7 male, 8 of them had children with access to tablets in the school or at home and 7 did not. 10 participants were Irish, 2 Polish, and one each of Italian, Romanian and Chinese. Participant ages ranged from mid-thirties to mid-forties, there were no parents interviewed below 32 years old or older than 46.

13 of the participants worked in full-time jobs whilst 2 of them are homemakers. Only one of the participants had never used a tablet before at all. Of the 13 participants, 6 are in highly technical roles and would consider themselves expert in the area of computer usage in general. 5 of the participants are in managerial roles in the computer industry, however, would not consider themselves as technical experts and remaining two are both civil servants, one working as an accountant and the other in the area of construction legislation. The two homemakers worked as archaeologist and language translator individually previously.

Interview invitations were sent out by email and meetings were arranged in participant's home and work place. All meetings were face to face and were held in quiet rooms with no

distractions or interference by others. Meeting length ranged from 25 minutes up to 58 minutes, the median meeting time was 31 minutes.

Two-thirds of the participants were urban based with 10 from Dublin or urban Wicklow (Greystones, Bray) and the remaining 5 non-urban participants were from Delgany (rural Wicklow) Kildare and Sligo.

Parent	Gender	Nationality	Tablet Usage	County
A	Female	Irish	No	Wicklow
B	Male	Irish	Yes	Wicklow
C	Male	Irish	Yes	Dublin
D	Male	Italian	Yes	Dublin
E	Female	Chinese	No	Dublin
F	Female	Irish	Yes	Dublin
G	Female	Polish	No	Wicklow
H	Male	Irish	Yes	Kildare
I	Female	Irish	No	Sligo
J	Female	Romanian	Yes	Wicklow
K	Male	Irish	No	Dublin
L	Male	Irish	No	Sligo
M	Male	Irish	Yes	Dublin
N	Female	Irish	No	Wicklow
O	Female	Polish	Yes	Dublin

Table 4.1 Participant Profiles

All participants had access to broadband in the home apart from the two Sligo participants.

At the beginning of every interview, permission was asked to record the conversation and a brief description of the research was given as well as a handout information sheet. Questions were invited and answered if the participants had any queries. Participants all signed a consent sheet. Finally, in addition, all participants were advised that if they had any further questions or would like a copy of the finalised thesis they could contact me directly at the email address on the bottom of the information sheet.

Extensive notes were made in a journal at the time of the interview to act as a backup in case the Dictaphone had an issue. Interviews were uploaded to the Google Drive for back up storage afterwards which is password protected. Once the thesis has been submitted and graded these recordings will be permanently deleted. In addition, a copy of the recordings was uploaded to “atlas.ti” software installed on a password protected laptop, with “Dell Data Protection” software installed, for further analysis. Participant names were not used in the handwritten notes or on the audio files. In order to keep participant names anonymous on this thesis, their names have been changed to an alphabet letter (see table 4.1 above).

Effort was made to structure the interviews so that the questions would all be asked in the same order from interview to interview, however, there were times when participants raised subjects that were to be covered later on and rather than break the train of thought, that subject was covered then and there.

The end of every interview finished with an "anything else?" question to try and elicit information that by then the participants felt was relevant to the research and not covered during the course of the interview. TAM2 theory helped inform what areas would be likely good indicators of acceptance from parents of these devices, so for example, questions were asked regarding subjective norms, ease of use, perceived usefulness, output quality etc.

Great effort was made not to influence responses by not discussing data already collected prior to the interview. In addition, where the participant was asked to state a negative about something, they were also asked to give a positive around the same topic to try and keep the flow of conversation going in one direction only. The topic in question was quite an emotive one for the participants in general with the discussion quite animated and it would have been very easy to go off topic. *"When Adam is on the tablet, the house could be on fire and he's just totally like, one vision is on this device and that's it!"* – Participant K on his son's behaviour when using a tablet at home. In some cases, the participants had to be thanked for their opinion regarding something and then gently coaxed back on topic and back to equilibrium.

Questions were grouped into general subject areas broadly aligned with the research questions:

- School choice.
- Homework assistance.
- Perceived quality of homework and outcomes.
- Relationships in the home
- Perceptions of tablet usage in the classroom.
- Anything else.

4.2.2 School choice

School choice was chosen as a topic to pursue as it could be argued that choosing a school that uses tablet computers, might have an element of perceived school image that is progressive and modern compared with one that does not. As discussed in the literature review previously, TAM2 theory suggests that image may play a part in user acceptance.

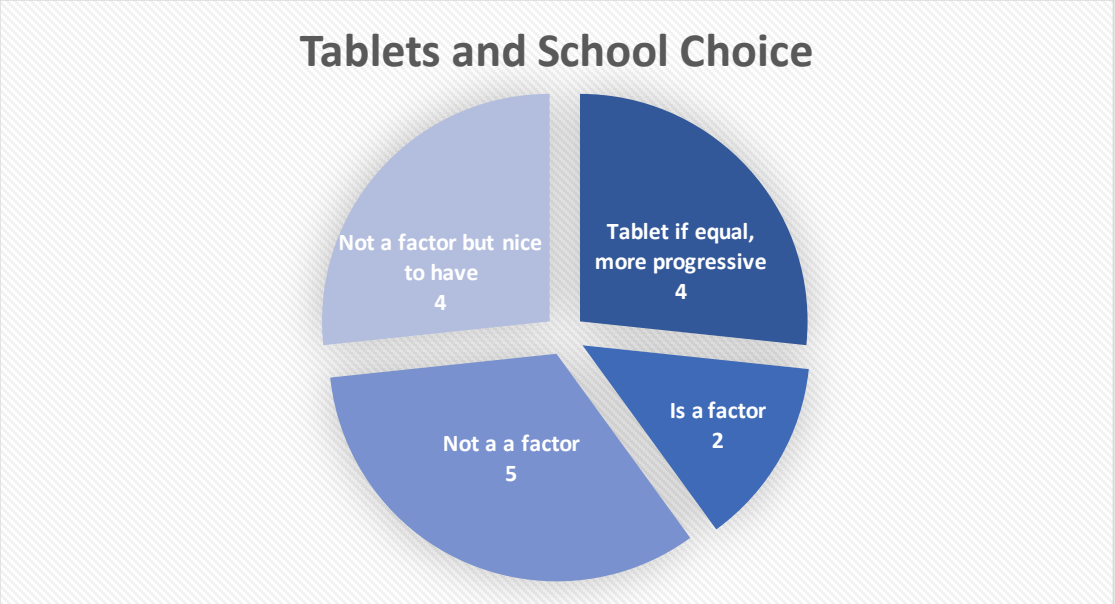

Figure 4.2 The Impact of Tablet Usage on School Choice.

Most participants did not feel that the choice of school was determined by whether the school used tablet devices in the classroom with only two saying that it would influence their school choice. One of these participants felt very strongly about the weight of school bags and this played a big part in their decision (the secondary main concern of this participant was proximity to home). The second participant that felt this was a deciding factor has a child with dyspraxia and dyslexia conditions and as such has a special need to use specific software, designed for tablet usage, to aid them in their studies.

Overwhelmingly the two main factors for school choice were proximity to home and overall school reputation. Eight of the fifteen participants did feel that use of these devices in the classroom was a positive with four of them saying that all else being equal, would sway them in their school choice because they felt that this would be a sign of the school being more modern and progressive.

There was a primary versus secondary aspect to this also, in particular parents of primary schools felt less need for these devices, and thus they played a lesser role in the choice of school. "*Primary school I would say no, but secondary school, because they may be doing the Leaving Cert and they need loads of information. If there's a chance I probably would send him to a school that use tablets when he is in secondary school"* – Participant G1 on tablets and school choice considerations.

The results from the interviews indicate that whilst image, as predicted by TAM2 theory, does play a factor for some parents in the area of school choice, its overall effect may be weak in this use case overall, however, the effect may be stronger in secondary schools versus primary schools.

4.2.3 Homework Assistance

It was expected that the amount of assistance given by parents would drop with the use of tablet computers in the home however the research did not indicate that. Eleven of the parents said the amount of assistance they would give to their children with homework would be unchanged. This does tie in with research discussed in the literature review which found that in general parents do want to give assistance (Epstein, 1986) so perhaps in that light, it could be argued that assistance levels would not drop by a significant amount with tablet introduction. Three parents said that the amount of time spent assisting their children would drop because the ease of use would make assistance more efficient and faster. One parent said it would take longer because only one subject can be reviewed at a time. Their reasoning being that whilst the student was busy with one subject the parent could review previously completed written work or look at the textbook for another subject to prepare themselves in advance, which wouldn't be possible to do with just one tablet device.

TAM2 theory predicts that subjective norm plays a part in user acceptance and this was indeed strongly borne out in the interviews. Nine parents mentioned specifically that they felt that it was their responsibility to learn how to use these devices as it becoming the norm and the children will need to use these in the future.

"I have actually like spoken to people who have asked me about their kids going to the school because everyone's nervous of it. But my feeling towards it is that the iPad is the way forward. It is an excellent experience, but 100% I believe the parents need to make sure that it is their responsibility to understand exactly the future. Because I do not think you should let your child learn something new and you just could not be arsed." - Parent F on parental responsibilities and subjective normalisation of tablet usage.

Whilst most parents felt that using these devices is the way of the future, how they give assistance to their children or how they perceived they would, with these devices is quite varied. TAM2 theory states that ease of use is an important consideration for acceptance. One area where that was a difference between parents of children that have and have not got a tablet is screen size and whether it affects the ability to give assistance. Five parents, all of whose children do not use tablets, believed that the relatively small size of the screen was a hindrance to giving assistance. Parents who did have access to tablets cited examples such as the ability to pinch and zoom easily and the light weight when compared to heavy textbooks so size was not considered to be a hindrance, rather a plus instead overall.

Another area where there was a clear difference in opinion between parents that have and have not tablets is the fashion in which assistance was given. Parents whose children do not use or have access to tablets felt that being able to hold the textbook and flick through

its pages as well as being able to see what has led up to the homework assignment as being an important part of giving assistance with five of these parents citing this exact example. In addition, two parents were concerned that as they wouldn't be familiar with the software and hardware being used, that it might impact their ability to give assistance and their child might get left behind as a result. None of the parents of children that do use or have access to tablets cited either of these concerns this as being relevant to their ability to give assistance.

"In fact, that might hinder me offering help because I'm a little bit intimidated maybe by the technology, where if it is a textbook, you know, you can flick through, you can look back, and see what they've previously done. You know if they've been working through a target much more easily" - Parent I on homework assistance using tablet devices.

This suggests that these parents have unwarranted assumptions and fears about the technology and how it would impact their ability to give assistance. One parent even said that they would give assistance with pen and paper first and only then if still needed would use the tablet computer. These findings concur with TAM2 theory that predicts with experience comes more acceptance and once again ease of use is an important predictor of intention to use.

Four of the parents that use tablets cited the ability to look up information online quickly and easily in comparison to having to look through a book and they felt that this helped speed up the assistance process. Three parents said that they would look up information with the child, providing guidance for the child rather than just finding the answer for them. The difficulty of the homework plays a part in the tablet assistance choice with four parents citing the fact that they would look up information online for different explanations of the topic if they didn't know or understand the problem themselves. Result demonstrability is another TAM2 input to perceived usefulness and this finding concurs with that. This was perceived to be a major positive over textbooks which generally just give a single explanation or view point of a topic.

"Also give the child a push to, to maybe look up documents that are you know are from a different a perspective, a different angle on the same subject, different opinions, even history, years after history, it is never black and white. There was never a good guy or a bad guy. History books tend to give you a flat information, while you google a king, you got his biography, his engagement with other people how do you know it's not just Henry VIII that chopped off women's heads?" - Parent G on historical perspectives using a tablet.

When parents were asked their opinion of whether the quality of their homework assistance was improved or not there was a big difference between the haves and the have nots.

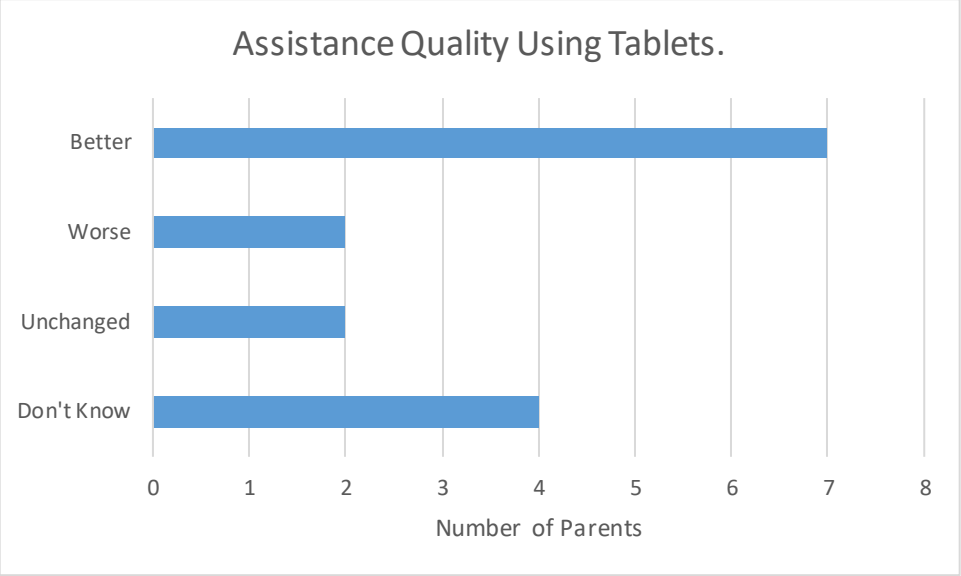

Figure 4.3 Perceptions of Assistance Quality using Tablets.

Most of the parents whose children have access to tablets, bar two, felt that the quality of assistance they gave is better when using tablets, One felt it was unchanged and the other was a very strong advocate of writing out manually as a means of reinforcement. The other parent that felt it would be worse, N3, didn't feel they have the knowledge or expertise to use these devices properly and was concerned that would affect their ability to assist their child. Perhaps unsurprisingly, half the parents whose children that do not have access to tablets felt that they didn't know if the assistance they would give would be better or not. TAM2 states that output quality is an important part of perceived usefulness. This finding would indicate that for parents using these devices that output quality is positive in general and thus overall acceptance is more likely.

Three parents, all of which use tablets when giving assistance, mentioned that the difficulty level of giving assistance was not any harder, despite being unfamiliar initially with the software installed as they feel it is the norm to use computers in our daily lives and the applications installed, which the children are using, are very straightforward in their opinions.

The TAM2 model suggests that perceived ease of use directly feeds into an intention to use and perceived usefulness. Given the gap between the haves and have nots perceptions around assistance quality, and the perception of ease of use from the haves, it could be argued that schools using or intending to use these devices should have open days or perhaps descriptions on their websites demonstrating or describing the ease of use which currently using parents are reporting.

This data would suggest that there is a positive qualitative effect from using tablet devices in parental homework assistance.

4.2.4 Perceived Quality of Homework and Outcomes.

Ease of use was a common theme in all the interviews, sometimes in a positive light and others not so positive. For example, ten parents commented that homework efficiency was improved by using tablets because the information was faster to retrieve on the computer versus reading through a textbook. However, seven parents said that sometimes this ease of use was a hindrance to learning in that it is too easy, for example when researching a particular topic online you get information about that instantly. When looking for that information in a textbook you would need to sometimes read through many pages to get to that information and in that process learn new facts along the way which was felt would not happen online. Parent D described it as *"if you have to make more effort on something, and do more research without a tablet, that will stick in your mind."* TAM2 says that results demonstrability feeds into perceived usefulness. These results would appear to indicate that result demonstrability from a TAM2 perspective is low in some use cases or even negative.

Researching online is something that parents should give guidance to their children with as the research discussed in the literature review indicates that children often do not choose appropriate material when searching online content (Hutchison et al., 2012).

Another concern cited by five parents was that the temptation to just cut and paste other people's work would be hard for young students to resist. These parents felt that it is important to rephrase information as this demonstrates thought and aids learning.

"If you had just gone, um, ok google what's the output of this and there it is, um, you just copy cut and paste and you haven't actually read it and learned anything" - Parent H on researching assignments online.

Despite the concerns of some parents that using the tablets during homework was almost too easy, when asked about their opinions on Irish state exam outcomes (Leaving Certificate and Junior Certificate) almost half, six, said results would be about the same, three said they would be improved because the students would be exposed to richer learning experiences (sound and video) on the tablet which they wouldn't get in a textbook and therefore, in the opinion of these parents, would be more likely to be memorised. Two parents felt that exam performance would be hindered because current state exams are written only and children using tablets would be less experienced writing and composing material using pen and paper. Four parents, none of which have children that use tablets, felt that they didn't know how exam results would be affected.

In the absence of school result figures before and after tablet introduction, it is difficult to draw a conclusion regarding how accurate these expectations are in reality. That said, when

a school inspector was interviewed as part of the background work for this thesis he commented that in the schools he has inspected he has noticed that the older children seem to be less interested in using the tablets and he speculated that this was because the actual exams are in written format and likely to stay that way for the foreseeable future. Again from a TAM2 perspective, this could appear to weaken output quality and result demonstrability and thus overall lower intention to use and user acceptance.

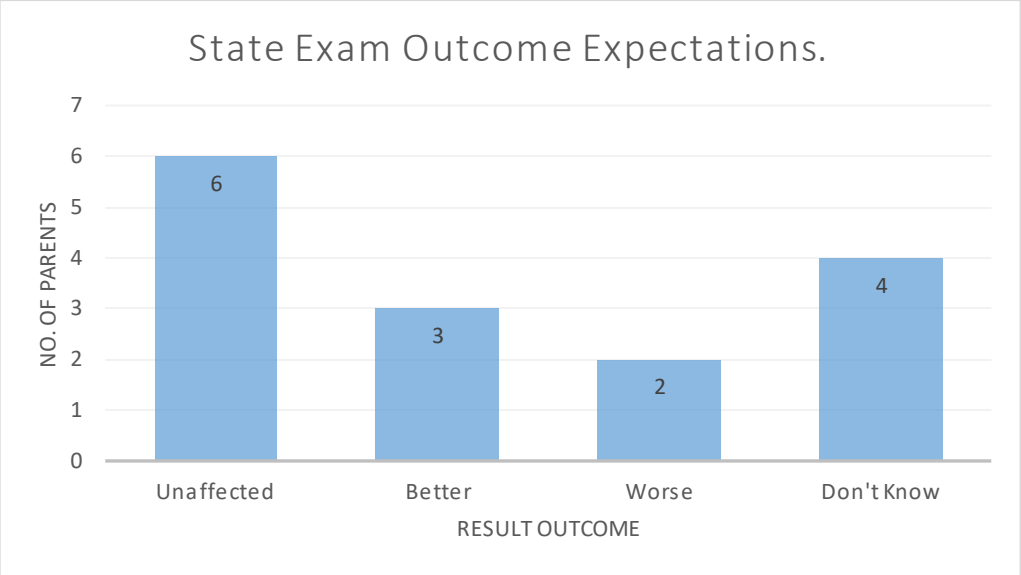

Figure 4.4 Parental Exam Performance Expectation of Tablet using Students.

When parents were asked if teachers should set homework that is to handwritten exclusively and not typed eights parents felt that if the tablet was used in the classroom that it would be unfair to not allow usage in the home as well, as they believed it would be harder for the children to complete the assignment. The remaining seven parents felt that there was a place for handwritten and for tablet usage. Parents cited examples of this such as preparing for presentations in the classroom or project work that involved utilising the tablets multimedia functionality such as camera and microphone. One parent mentioned that their child sometimes gets assignments that are group based which the students work on together using a communication application preinstalled on their iPads.

Six parents mentioned that giving the child the choice of whether to use the tablet or not to assist them with their homework would allow the child to show initiative and seek out information not covered in the classroom.

Handwriting is a very large concern for many parents with ten of them stating that it is important to be able to write as well as read for reasons such as learning reinforcement, ability to think through a problem and write out and as well as needing it in life in general. Parents may be correct in believing that writing out by hand aids learning as research into this area by (Mueller and Oppenheimer, 2014) comes to the same conclusion.

Several parents mentioned that the computer will not always be there or the battery may need charging and that there will be no alternative to handwriting. Parents also mentioned spelling autocorrect and ease of deleting on a computer as a bad thing as they believed it led to less thought being put into the material being written with the consequent lower quality of output. This aligns up with job relevance in TAM2 theory, if teaching through the medium of tablets results in lesser ability to handwrite, which parents feel is important, then job relevance is a negative influence on perceived usefulness.

Only one parent felt that tablets and computers would replace the need for handwriting altogether in the future. This parent has a child with special learning needs and cannot write at all without the aid of a computer so perhaps their judgement was influenced by that.

The TAM2 model predicts that job relevance and output quality are important ponderations if a technology is to be accepted and adopted. In the context of this research, relevance does play a part in certain types of homework assignment such as group work and multimedia capabilities however most parents also feel that there is a need for using pen and paper alongside the tablet also. Output quality does not appear to be strongly correlated with only three parents out of the fifteen saying that would expect their children to perform better if they used tablets than if not. This also correlates with comments from an interview conducted with a school inspector who said that older students did not seem to want to use the devices as much as the younger ones in his experience. The fact that only one parent believed that tablets or computers, in general, will eventually replace the need for handwriting is pause for thought. It could be argued therefore that schools should be very careful about designing their educational pedagogies to include traditional pen and paper study alongside tablet based work.

4.2.5 Relationships in the Home

When asked if they would limit screen time on the tablet, all fifteen parents said they would. Reasons given for this were, need for exercise and sore eyes/damaged eyesight after prolonged usage and changed behaviour. This does concur with other research such as (Ellahi et al., 2011) as discussed in the literature review which found that there are physical effects associated with prolonged computer usage as well as possible behavioural ones (Subrahmanyam et al., 2000).

"We do not know the potential damage might be, you know for a kid staring at a screen at school and homework, and then you know, it limits the social aspect as well. We just do not want our kids to end up like those screen glued zombies type of creature, so there has to be a huge dollop of real world, of real engagement with human beings" - Parent G on effects of extended tablet usage.

Six of the eight parents of children with tablet access commented that their children seemed to be agitated or grumpy after usage when compared to normal. Six parents commented that they were afraid that their child's social skills would be affected though using the computer all day. Interestingly one of the parents, F, said that she felt that social skills were enhanced as, in her daughter's school, the classroom environment was interactive and after school, her children could chat and collaborate with each other on homework online, though she still limits screen time after school.

I know like, [sons name] at home, you know, if it's been a rainy day and he's been looking at the device for a few hours, you know, his attitude can be a bit poor afterwards.- Parent J on her son and changed behaviour after tablet usage.

Social skills in general, as opposed to behaviour immediately afterwards was a concern for some parents of children that do not use tablets, none of the ones that have tablet access had concerns about social skills. As noted in the literature review, some research has indicated that social interactions increased as a result of tablet usage rather than the other way around (Noorhidawati et al., 2015). However as also discussed previously in the literature review, too much use of social applications online can have a depressive effect on some individuals.

TAM2 predicts that increased experience may be an influencer on intention to use, however in this case where the experience has led to perceived negative effects then it is a negative influence on intention to use.

This suggests also that there may possibly be potential disciplinary issues with some students in the schools which do use tablets over what they may have if not. Though teacher experience and training in delivering lessons using tablet technologies may mitigate such effects as discussed in the literature review (see section 2.6)

TAM2's Subjective norm plays a part here also, with six parents expressing feelings that computer technology is becoming ubiquitous in the world today and parents need to adapt to that and learn how to relate to the technology with their children. One parent shared an interesting anecdote to support this. They were visiting a family member and noticed that one of their nephews appeared to be withdrawn and sullen. His father complained that he was always "on the computer" and not in the real world when the parent asked his nephew about what he did online the child talked about an online game he is playing and became quite engaged and talkative. The parent's conclusion was that parents, in general, have a duty to keep up with the times and show interest in the things that interest their children.

Several parents also mentioned that they felt that their relationship with their child was enhanced by using the tablet together during homework assistance as it provided a common ground for them to talk about together. They would research websites for

homework material and discuss the pros and cons of the online content together. They did not feel that the tablet device became a barrier between them, rather the exact opposite.

4.2.6 Perceptions of Tablet Usage in the Classroom.

In order to understand how parents feel about student learning when using tablets in comparison to not it is important to also consider how they perceive the classroom environment and teaching pedagogies.

One of the consistent findings from the interviews was in response to whether tablet computers should be used to augment or replace traditional teaching methods such as using blackboards and pen and paper. Eleven parents indicated that tablets should be used to augment and not replace. This answer in conjunction with the data regarding the need to retain writing skills (asked in a separate part of the interview regarding homework quality) could be argued to be a very strong indication that parents feel it is very important for schools to not move entirely to teaching and giving assignments that can be done exclusively on tablet computers (or computers in general by logical extension). In TAM2 terms this would be considered to be a negative indicator in terms of job relevance as to be relevant it must encompass all the perceived educational needs of the students by their parents otherwise it will not be accepted as a complete replacement for pen and paper.

Using handwriting and textbooks was also strongly felt to be useful from a sensory perspective with seven parents commenting on this being important. Reasons given included tablets having a “paucity of touch” compared to a text book or pen. The fact that the experience is always the same when holding a tablet when compared to a thin or thick, colour or black and white book etc. Only one of the parents of children attending a school that uses tablets mentioned this as a concern for them.

“*You know, sometimes you have a visual memory of information, so I can still remember now some of the books from school like the visual memory of the image of it on a page, like a particular station the way that is highlighted, important points on a page, and I would be concerned that an iPad would not necessarily have that kind of visual memory, you know swiping left and right*” - Parent I on using textbooks.

There was a notable difference in the parents of primary school students, both with and without tablets. Many of them mentioned that they felt very young students need to spend learning time learning the basic skills such as reading and writing before learning about computers and technology.

"I think in primary there is enough going on, you know?, they are trying to learn and I think it works, its tried and tested and it works, I don't think there is a need to bring technology in" - Parent K on primary level technological needs.

These are quite interesting results, the (Department Of Education and Skills, 2015) policy document entitled "Digital Strategy for Schools 2015 -2020" talks about increased ICT integration in the classroom and how it is needed for the future, which may well be true, however the data coming from these interviews would strongly suggest that consideration to continuance of traditional teaching pedagogies in the areas of reading and writing, perhaps especially in primary school, should form part of this strategy also . When an Irish School Inspector was interviewed as part of background research he said that this policy will result in tablet introduction to most schools except those in very rural areas (due to lack of broadband).

As discussed in the literature review (section 2.5) for ICT integration to be successful in the classroom, the research has shown that teachers need to be educated on how to best adapt pedagogies to utilise its inherent benefits and potential pitfalls (Gasparini and Culén, 2012; Kucirkova et al., 2014; Pegrum et al., 2013; Robin, 2008). There are many different courses taking place in this area in Irish Universities and College in this area, however, so far, there does not appear to be a single ICT training programme that encompasses all current teachers in place. If tablets are being introduced into schools without adequate teacher training then results may not be optimal as found by (Gasparini and Culén, 2012)

The area of teacher training did come up in three interviews of parents with children attending tablet using schools. One felt that teachers needed to be more aware of what students were doing on their tablets during classroom, her daughter had been exposed to cyber bullying using an application called "Airdrop" on the iPad which apparently involved upsetting images. Another parent was afraid that some teachers might become lazy and just advise the children to read material on the iPad without actually explaining it. The third parent also had concerns about what applications were installed by the children. She said that her son liked to install games and social media applications on his iPad even though he wasn't allowed to do so and she was worried he and his friends might be not paying attention in the classroom because they were distracted by these, she felt that teachers should be checking what is installed and monitor what is being done by the students during class time.

Distraction was an area in general several parents had with tablets. To paraphrase one parent, if you are distracted reading a book, you stare into space for a couple of minutes then go back to reading, online you click a YouTube link which leads to another and then another and before you know it hours have gone by. Some research into this area, as discussed in the literature review agrees that the multimedia nature of tablet applications

can lead to distraction without adequate design considerations (Murray and Olcese, 2011; Ward et al., 2013)

One of the parents, O, has a daughter who attends a secondary school in the Dublin area. That school introduced iPad usage several years ago however discontinued usage subsequently due to the difficulties with data storage maintenance (apparently previous year's results were lost amongst other data) and upkeep of the hardware and wireless network. At the other end of the spectrum, parent F was very enthusiastic regarding the usage of iPads in her daughter's school and cited reasons such as after school collaboration online between students and even teachers as well as lowered bag weight which she felt was an important consideration for her daughters' health.

Another highly cited area was multimedia usage with six parents mentioning that they felt that aspects should as sound and video capabilities of tablet devices over textbooks was a big positive. Interestingly five of these parents were those of children that do not use tablet devices in the classroom which perhaps suggests that the expectation may be higher than the reality in practice. This concurs with other research, as discussed in the literature review which had similar findings (Ward et al., 2013) From a TAM2 perspective this is another example of increased experience leading to a lowering of perceived usefulness expressed by the parents.

All parents were asked if they believed that tablet usage was suited more for some subjects than others. There was a large variance in the answers with some saying that they felt languages were more suited citing reasons such as pronunciation and translation being readily available online, however, others said specifically that they felt languages were by nature spoke person to person and therefore were unsuited to tablet learning. Similarly with subjects such as math and science opinions were varied with some parents saying that online content would help understanding of complicated concepts whereas others believed that only a human touch with discussion and working through on pen and paper or on the blackboard in the classroom would lead to understanding and retention.

Retention of information was a concern for six of the parents with many citing the passive nature of using a tablet. This concurs with other research carried out previously as discussed in the literature review. Many felt that in order to retain information that a teacher was discussing in class you should be taking notes manually by hand.

"They could be reading something in front of them on a screen but they are not actually really retaining it because in the back of their head they know it is captured in the screen and they can go back to it" - Parent N on retention of information using tablets.

This was more of a concern of parents with children using tablets, with just one of the six being a parent of a child that doesn't use them (however she has experience of computers, in general, herself being an office manager). This suggests that there may be an effect here that experienced users have noticed and would be interesting to research in a K12 environment quantitatively.

4.2.7 Other Findings

Security concerns and parental training

Only two of the parents interviewed felt that training from the school should not be given as they believed that tablet devices were very simple and they didn't believe it was necessary. Both of these parents work in IT. Five parents believed that it should be given to all and the remaining eight believed that it should be offered as an optional service to parents.

Perhaps surprisingly, only six parents with an even split between with and without tablet usage, mentioned security concerns such as privacy, installation of inappropriate applications and checking what websites their children had been accessing on the tablet. This suggests that these matters are little understood or considered by parents, even quite technically literate ones as included in interviews for this thesis. It could be argued that schools should provide training parents on these matters and if the parents did not indicate interest then at least an email or perhaps a handout discussing these matters could be sent to them to build awareness.

Cost

Four parents mentioned cost as a concern. There were different aspects to this such as entrusting a valuable device to a young child, especially a concern for younger students, and the cost to the family if on lower income or with multiple children of school going age. Finally, one parent mentioned that she was worried about her daughter being targeted because she wears a school uniform and they use iPad's in the school, she worries that criminals may know this and decide to target students of the school who are bringing them home.

Size and weight

Nine parents commented on aspects related to size and weight. Apart from the tablet devices being much lighter than a bag full of textbooks, there was the benefit that all (virtual) books are carried all the time. There is no leaving a particular book at home or losing by mistake, the child either has all or nothing and this was felt to be a major positive. However, others did mention concerns around this such as forgotten passwords leading to all material being inaccessible, battery or hardware failures leading to complete loss of all material or worse loss of the tablet leading to loss of everything including notes.

Eyes and eyesight

Seven parents mentioned concerns regarding eyesight or sore eyes with extended usage, four of which have students attending tablet using schools and the remaining three not. These may be valid concerns with some research indicating this alongside as well as other physical effects such as shoulder, neck and back pain may result from prolonged usage. This is discussed in more detail in section 2.6 of the literature review. This suggests that schools should mix screen time with non-screen time to limit prolonged exposure with potential resultant effects.

4.3 Summary

This chapter covered the findings from the fifteen parent interviews as well as an interview with an Irish School Inspector.

No gender differences were noted in the areas being researched however in some cases there were significant differences in perceptions of parents that do have children attending schools which use tablet computers and those who do not, particularly in the area of information retention (memorization) and concerns around screen size inhibiting ability to give assistance. From a TAM2 viewpoint, this would indicate negatively for increased experienced and intention to use.

There is a lack of awareness amongst parents about security in terms of appropriate applications being installed and websites browsed by children. In some cases, the parental belief that these devices are so simple that they didn't require training could lead to this area being overlooked.

Another very strong finding was that parents from both schools that do use and do not use tablet feel that learning to write by hand is a very valuable skill and that tablets should be

used to augment and not replace this part of school learning. This was particularly strongly felt by parents of primary school students.

Parents have concerns about prolonged screen time, with all of them saying that they would limit this as they have noted behavioural changes after use as well as concerns around social skills and physical exercise. In addition, prolonged screen time led to concerns around sore eyes and effects on eyesight. There is research which indicates this is a valid concern which suggests that schools using tablets should limit periods of extended usage, perhaps with physical exercise and also with lessons involving handwriting which parents clearly feel is a skill very relevant even in these more technological times.

Parental and teacher training would help with perceived job relevance, output quality, perceived ease of use as well as perceived usefulness and thus according to TAM2 theory increase the chances of parental acceptance and usage.

Chapter 5: Conclusions and Future Work

5.1 Introduction

This chapter looks at the findings previously discussed and puts them in the context of how tablet usage in K12 schools impacts parent-child homework involvement in Ireland.

The sub research questions are addressed and limitations of the research are also discussed.

Finally, suggestions are made for future areas of research in this area which are indicated by the data uncovered in the interviews.

5.2 Answering the Research Question

In order to answer the overall question on how tablet usage impacts parent-child interactions during homework, it is useful to answer the sub questions which will inform the answer to the overall question.

5.2.1 How do Parents of Children, using Tablets in School Feel that this Impacts their Interactions with the Child, in Particular during Homework?

In terms of the amount of assistance given, overall parents do not feel that the ease of use of tablet devices would lessen the amount of time spent assisting. Parents of children that do have tablets do feel in general that assistance given is more efficient and productive. Parents that have little or no exposure to tablets are often uncertain about the quality of assistance they would give and appear to be making invalid assumptions regarding how hard it would be, citing reasons such as being unable to leaf through a textbook to find what led up to the area where their child needs help. In particular, this appears to be a bigger concern for parents of primary school children. None of the parents whose children use tablets cited this as a concern to them.

Most parents do feel that technology is the way of the future and feel that there is a need to move with the times and to an extent educate themselves on its usage so that they can assist their children better with homework.

Size matters, or at least it does to parents of children not attending schools using tablets. They feel that the relatively small screen size would present an impediment to giving assistance. Parents of children that do use tablets do not report this as an impediment and say that the ability to pinch and zoom in is actually a bonus as you can make the text as big or small as you like which isn't possible with traditional textbooks.

Most parents of children that do use tablets have concerns about prolonged usage in terms of eye strain and eyesight. All parents interviewed would limit screen time for various reasons such as lack of physical exercise and social skills. Many parents of children that use tablets also commented on the fact that their child seemed agitated and moody immediately after usage or if disturbed during usage. As discussed in the literature review these are very valid concerns which parents and teachers alike need to be aware of and take actions to prevent such as correcting handling and positioning and limiting prolonged screen time both in terms of physical effect as well as mental from online gaming and social network usage in particular.

Parents of children that do not use tablets have concerns about social skills not being developed, something the ones that do use tablets do not mention or feel when directly asked in the interviews. In fact, several of the parent interviewed felt that the shared interaction using the tablet enhanced the parent-child relationship during assistance due to the interactive approach used when researching online and discussing the material that resulted. As discussed in the literature review, there is some research that indicates social skills are actually enhanced due to tablet usage however other research cautions about behavioural changes due to prolonged usage.

5.2.2 Do Parents feel that the iPad Device aids their Child's Learning more than Traditional Pedagogical Methods such as Blackboard and Pen and Paper?

Overall parents feel that learning through the use of tablet computers augments traditional pedagogical methods rather than replacing them.

One very clear finding from the research is that parents both of children attending schools that use tablets and those that do not is that children need to learn how to write by hand as well as on computers. Only one of the fifteen parents interviewed felt that this would no longer be necessary in the future however their child has special needs that requires the usage of a tablet in school so perhaps their perception is altered because of this.

Parents of children that attend schools which use tablets have concerns regarding information retention or memorization, something that parents of those that do not have. This suggests an effect that these parents have noticed though experience when assisting their own children.

Most parents feel that writing out information such as in note taking or completing homework aids learning both in terms of understanding, conceptualization as well as information retention.

Interestingly parents that commented on the benefits of multimedia, which tablets can offer, were nearly all those of children that do not use tablets which suggests that perhaps the

effect of multimedia whilst may be initially more stimulating does not necessarily lead to better outcomes. There are mixed results in this area as discussed in the literature review with application design being found to be very important (Falloon, 2015; Murray and Olcese, 2011)

This is borne out by the data coming from parents when asked about potential state exam outcomes with almost half saying they would be unaffected and only three of the fifteen saying better (of which two did not use tablets).

Choice of school is only partially affected by tablet usage with most parents saying they are nice to have but this would only sway choice definitely in two of the parents and a further four all else being equal. Proximity to home and reputation were primary school choice concerns. That said it could be argued that use of these devices may enhance a schools reputation by being perceived as more modern and progressive which indirectly may influence school choice indirectly.

Mostly parents felt that if tablets were used in the school then they should be given the choice of using them for their written homework assignments as it would be unfair to them otherwise.

5.2.3 Do Parents Feel that the School should Provide Training to the Parents in how Tablets are used by the Children to Facilitate better Parent-Child Interactions?

Most parents do feel that training should be provided in the usage of tablets but that it should be optional. However, when asked about why type of training should be given less than half mentioned computer security. This is a concern when several did mention cyber bullying and also concerns regarding how easily their children can be distracted by games and websites with inappropriate material. Very few parents seem to have any awareness of the need to be vigilant in such matters. This was the case for parents of children attending and not attending schools which use tablets. Indeed surprisingly, the two parents which would be considered to be highly technical, working in IT themselves felt that they didn't need training yet did not mention any concerns regarding these matters either. It may be that they would be vigilant in reality, but it is also possible the thought may not occur to them having never used tablets themselves when previously in school.

5.2.4 Conclusion to the Overall Research Question.

Revisiting the overall research question regarding the impact of tablets in K12 schools on parent-child homework involvement in Ireland this research has shown that there are positives and negatives to it.

Parents of children that do not use tablets in schools appear to have misconceptions regarding the difficulty of assisting their children due to screen size which is not reflected by parents of children that do.

Parents, in general, do not feel that tablets or computers should replace traditionally taught skills such as handwriting.

Parents also have fears regarding children spending too much time in front of the computer screen both in terms of physical effects (eyesight, health) and also social effects with parents of children using tablets often citing changed mood after usage.

Parents of children not using tablets is a fear that their children may lose social skills as a result of too much time interacting with the tablet and not face to face with other children.

Parents, in general, have little awareness of the need for vigilance in terms of applications that the children are installing and using both in terms of appropriateness and in terms of using them to bully others.

Parents of children that do attend schools which use tablets have concerns regarding the perceived passive nature of learning by tablet and how much information is retained afterwards by the students, a fact reflected in the relatively few parents that expected their children to perform better in state exams as a result of using tablets in schools. As previously discussed, this correlates with other research which has found that note-taking by hand does enhance retention of information.

Finally, there is an overall belief amongst parents that they do have a duty to familiarise themselves to a certain extent with the technology so that they can assist their children better.

5.3 Recommendations

Based on the findings from the data gathered as a result of the interviews here are some recommendations:

- Parents do have a duty to appreciate that they live in a technological age and have a duty to make an effort to try and keep up with technological advances if they are

to ably assist their children to face a changing world. It is clear from the Digital Strategies for Schools policy document that ICT in the classroom is only going to grow with time. It may not happen overnight but it seems inevitable that over time there will more and more usage of ICT in the K12 school system.

- Parents strongly believe that technology should not completely replace traditional skills such as handwriting at least for the foreseeable future. The Department of Education should be mindful of this when planning for the future and design a curriculum that encompasses both.
- Teacher training in the use of tablet devices in the classroom should be rolled out to all current teachers in Ireland if students are to benefit from their usage fully. Whilst there is evidence of ICT training course in many Universities and Colleges there doesn't appear to be a single course or qualification being rolled out to all existing teachers nationwide. If tablet usage is to be standardised in Irish schools then it follows that teacher training needs to be inclusive and standardised also.
- Parents feel it isn't fair for students of schools that use tablets to not allow their usage during homework. Whilst the current state exams are handwritten from memory this would appear to be putting their own children at a disadvantage when the day comes to sit the exam without the aid of a tablet device. Schools have a duty to educate parents on proper usage of these devices to maximise potential and to also educate them in matters such as security and being mindful and vigilant regarding applications installed and websites browsed on the devices.
- Where parents decline training schools should at least email or written statements asking parents to be vigilant and check the tablet for signs of improper usage.
- Schools should bases class schedules that minimise prolonged usage of tablets to prevent fatigue and headache as well as potential long term damage to eyesight.
- The Department of Education should list or tender for, applications that can be installed on the Apple or Android tablet formats and that align with the school curriculum and which make use of the added functionality of such devices such as wireless internet, photography and video.

5.4 Limitations of the Research

Although effort was made to include as wide a selection of people for the interviews as possible, it was not possible to gather information from parents from all backgrounds. Most participants were college educated and would consider themselves middle class. It is possible that people with lesser levels of education and income may have differing views

on tablet usage. Similarly, parents from a more wealthy background may hold differing viewpoints.

Whilst the data from fifteen interviews is not statistically significant however it can reveal areas worth further investigation in future research though larger scale quantitative methods such as surveys.

All people interviewed came from a professional background or had worked professionally previously in an office environment which would have had computers in some shape or form. Manual workers and unemployed were not interviewed. It is possible that these people may have stronger views regarding cost and technology in general. That said one of the participants from a rural area in Sligo mentioned that a “Coderdojo” (computer programming club) was set up in the nearest town to her, Tubbercurry, by a local businessman and she tried to join her eldest son but all places were taken up within days of it being set up so she missed out.

Due to the practicalities of interviewing people face to face most interviews took place in Dublin with relatively few from rural backgrounds. Given that a large proportion of the Irish population is rural it would be worthwhile including a larger sample, where possible, to investigate if parental opinions differ from the city populations.

Originally the intention was to have a quantitative element to the research and schools were approached and asked to participate. Several did indicate interest however due to ethical approval for the research arriving late in the last term of the year they suggested participation in the next term which would be too late for this thesis submission.

5.5 Future Directions for Research

Many of the parents of children that use tablets commented on the changed behaviour of their children after using tablets for a period of time which is backed up by research as discussed in the literature review. Following on from this, it would be interesting to research if there are behavioural issues with children in schools that do use tablets which would suggest that specialised training should be given to teachers in order to prevent and deal with issues of computer tablet induced behavioural change.

Even amongst parents of children that do use tablets the expectation was that performance on state exams would, in general, be about the same as without tablets. This was not an expected result. In addition, many parents of children in schools that use tablets believed that retention of information was affected by tablet usage which research indicates may be true (Mueller and Oppenheimer, 2014). It would be worthwhile correlating school results post and pre tablet introduction in the state exams at a national level to rule out local effects to see if tablet introduction has led to changes in exam outcomes. Possibly going totally in

the direction of tablet usage is counterproductive. This research has shown that most parents would prefer to see tablet usage as augmenting traditional pedagogies and not as a replacement.

Several parents expressed concerns regarding social skills being affected by usage of tablets in the classroom and at home. It would be interesting to see if psychological measures such as “EQ” correlate with tablet usage.

5.6 Conclusion

The Irish Department of Education intends to have greater ICT integration in the classroom of both primary and secondary schools across the country. As a result, more and more schools will be using computers such as tablets in the classroom. Parents do appreciate there is a need to keep up with the times and use this technology. However, many parents have concerns regarding retention of information, behavioural and social changes, and physical effects such as eyestrain, headache and lack of physical activity. They also strongly believe that handwriting must still be taught in the classroom as it is a valuable skill that their children will use after school in the workplace and elsewhere.

Schools should provide parental training on tablet usage to those who need it as well as training on how to monitor what the children are doing on the tablet and what applications they are installing on them. Where parents do not take part in tablet training they should be provided with information by email or letter that highlights these points to raise awareness.

When looking at the interview findings in the light of the TAM2 model areas such as perceived usefulness, ease of use and subjective norm the findings are mostly positive. There are some negative which could likely be mitigated to an extent with parental and teacher training. Result demonstrability and output quality in terms of state exam performance could likely be improved in this regards. Curriculum design to include handwriting rather than replace completely with a tablet would improve job relevance. Two important findings relating to physical and behavioural effects in a TAM2 model could be argued to fit into perceived ease of use and are quite negative in indication, however as previously discussed training in correct usage to both parents and teacher can help with this. Overall from a TAM2 perspective, most inputs to the acceptance model are positive or could be positive or neutral (physical, behavioural) with training.

Whilst there has been much research into the area of tablet usage in the classroom its effects on the home and on parents of students has been an area mostly overlooked to date. This research has highlighted that parents do have some concerns which other research has indicated are valid regarding how these devices should be used in the classroom and in the home. It is likely that many of these concerns could be mitigated through ICT training and backup to parents and teachers alike.

References

Aesaert, K., van Braak, J., 2015. Gender and socioeconomic related differences in performance based ICT competences. Comput. Educ. 84, 8–25. doi:10.1016/j.compedu.2014.12.017

Apple, 2017. iPad Pro - Technical Specifications [WWW Document]. Apple Irel. URL https://www.apple.com/ie/ipad-pro/specs/ (accessed 7.29.17).

Apple, I., 2011. iPad 2 - Technical Specifications [WWW Document]. URL https://support.apple.com/kb/sp622?locale=en_GB (accessed 4.12.17).

Arbuckle, A., 2015. The hysteria over Windows 95 launch, 20 years ago [WWW Document]. Mashable. URL http://mashable.com/2015/08/24/windows-95-launch/ (accessed 7.29.17).

Audi, D., Gouia-Zarrad, R., 2013. A New Dimension to Teaching Mathematics Using iPads. Procedia - Soc. Behav. Sci. 103, 51–54. doi:10.1016/j.sbspro.2013.10.306

Bang, H.J., 2011. Newcomer Immigrant Students' Perspectives on What Affects Their Homework Experiences. J. Educ. Res. 104, 408–419. doi:10.1080/00220671.2010.499139

Bang, H.J., Suárez-Orozco, C., Pakes, J., O'Connor, E., 2009. The importance of homework in determining immigrant students' grades in schools in the USA context. Educ. Res. 51, 1–25. doi:10.1080/00131880802704624

Bell, J., 2010. Doing your research project: a guide for first-time researchers in education, health and social science, 5. ed. ed, Open UP study skills. McGraw-Hill, Open Univ. Press, Maidenhead.

Bembenutty, H., 2011. The last word: An interview with Harris Cooper—Research, policies, tips, and current perspectives on homework. J. Adv. Acad. 22, 340–350. doi:10.1177/1932202X1102200207

Bembenutty, H., 2009. Self-Regulation of Homework Completion. Psychol. J. 6, 138–153.

Bennett, S., Kalish, N., 2006. The case against homework: how homework is hurting our children and what we can do about it, 1st ed. ed. Crown Publishers, New York.

Castro, M., Expósito-Casas, E., López-Martín, E., Lizasoain, L., Navarro-Asencio, E., Gaviria, J.L., 2015. Parental involvement on student academic achievement: A meta-analysis. Educ. Res. Rev. 14, 33–46. doi:10.1016/j.edurev.2015.01.002

Chua, S.L., Chen, D.-T., Wong, A.F.L., 1999. Computer anxiety and its correlates: a meta-analysis. Comput. Hum. Behav. 15, 609–623. doi:10.1016/S0747-5632(99)00039-4

Chui, W.-Y., Lee, S.-K., Tsang, C.-K., 2016. Father involvement in Hong Kong: By multitrait-multimethod model and item response theory (IRT). Personal. Individ. Differ. 98, 333–344. doi:10.1016/j.paid.2016.04.065

Cohen, L., Manion, L., Morrison, K., 2007. Research methods in education, 6th ed. ed. Routledge, London ; New York.

Comen, E., Sauter, Michael, Stebbins, Samuel, 2016. The Cost of a Computer the Year You Were Born. 247wallst.com.

Cooper, H., Lindsay, J.J., Nye, B., 2000. Homework in the Home: How Student, Family, and Parenting-Style Differences Relate to the Homework Process. Contemp. Educ. Psychol. 25, 464–487. doi:10.1006/ceps.1999.1036

Cooper, H., Robinson, J.C., Patall, E.A., 2006. Does homework improve academic achievement? A synthesis of research, 1987–2003. Rev. Educ. Res. 76, 1–62.

Cooper, H.M., 1989. Homework, Research on teaching monograph series. Longman, New York.

Cosden, M., Morrison, G., Albanese, A.L., Macias, S., 2001. When homework is not home work: After-school programs for homework assistance. Educ. Psychol. 36, 211–221.

Cosden, M., Morrison, G., Gutierrez, L., Brown, M., 2004. The effects of homework programs and after-school activities on school success. Theory Pract. 43, 220–226.

CSO, 2017. Information Society Statistics - Households 2016 - Central Statistics Office [WWW Document]. URL http://www.cso.ie/en/releasesandpublications/er/isshh/informationsocietystatistics-households2016/ (accessed 7.28.17).

David Nield, 2016. 15 memorable milestones in tablet history [WWW Document]. TechRadar. URL http://www.techradar.com/news/mobile-computing/10-memorable-milestones-in-tablet-history-924916 (accessed 7.29.17).

Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1989. User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Manag. Sci. 35, 982–1003.

Davis Jr, F.D., 1986. A technology acceptance model for empirically testing new end-user information systems: Theory and results. Massachusetts Institute of Technology.

Davis-Kean, P.E., 2005. The Influence of Parent Education and Family Income on Child Achievement: The Indirect Role of Parental Expectations and the Home Environment. J. Fam. Psychol. 19, 294–304. doi:10.1037/0893-3200.19.2.294

Daw, J., 2012. Parental income and the fruits of labor: Variability in homework efficacy in secondary school. Res. Soc. Stratif. Mobil. 30, 246–264. doi:10.1016/j.rssm.2012.01.004

Department Of Education And Skills, 2015. Digital Strategy for Schools 2015-2020. Department OF Education And Skills.

Department Of Education and Skills, 2015. Digital Strategy for Schools 2015-2020 [WWW Document]. URL https://www.education.ie/en/Publications/Policy-Reports/Digital-Strategy-for-Schools-2015-2020.pdf (accessed 5.23.17).

DeSimone, J., 2006. Academic Performance and Part-time Employment among High School Seniors. BE J. Econ. Anal. Policy Top. Econ. Anal. Policy 6, 1–34.

Doctoroff, G.L., Arnold, D.H., 2017. Doing homework together: The relation between parenting strategies, child engagement, and achievement. J. Appl. Dev. Psychol. 48, 103–113. doi:10.1016/j.appdev.2017.01.001

Dudley-Marling, C., 2003. How school troubles come home: The impact of homework on families of struggling learners. Curr. Issues Educ. 6.

Dumont, H., Trautwein, U., Lüdtke, O., Neumann, M., Niggli, A., Schnyder, I., 2012. Does parental homework involvement mediate the relationship between family background and educational outcomes? Contemp. Educ. Psychol. 37, 55–69. doi:10.1016/j.cedpsych.2011.09.004

Durndell, A., Haag, Z., 2002. Computer self efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. Comput. Hum. Behav. 18, 521–535.

Ellahi, A., Khalil, M.S., Akram, F., others, 2011. Computer users at risk: Health disorders associated with prolonged computer use. J. Bus. Manag. Econ. 2, 171–182.

Epstein, J.L., 1986. Parents' reactions to teacher practices of parent involvement. Elem. Sch. J. 86, 277–294.

Epstein, J.L., Van Voorhis, F.L., 2001. More Than Minutes: Teachers' Roles in Designing Homework. Educ. Psychol. 36, 181–193.

Eren, O., Henderson, D.J., 2011. Are we wasting our children's time by giving them more homework? Econ. Educ. Rev. 30, 950–961. doi:10.1016/j.econedurev.2011.03.011

Ertmer, P.A., Ottenbreit-Leftwich, A.T., Sadik, O., Sendurur, E., Sendurur, P., 2012. Teacher beliefs and technology integration practices: A critical relationship. Comput. Educ. 59, 423–435. doi:10.1016/j.compedu.2012.02.001

Falloon, G., 2015. What's the difference? Learning collaboratively using iPads in conventional classrooms. Comput. Educ. 84, 62–77. doi:10.1016/j.compedu.2015.01.010

Falloon, G., Khoo, E., 2014. Exploring young students' talk in iPad-supported collaborative learning environments. Comput. Educ. 77, 13–28. doi:10.1016/j.compedu.2014.04.008

Fan, X., Chen, M., 2001. Parental involvement and students' academic achievement: A meta-analysis. Educ. Psychol. Rev. 13, 1–22.

Fishbein, M., Ajzen, I., 1975. Belief, attitude, intention, and behavior: an introduction to theory and research, Addison-Wesley series in social psychology. Addison-Wesley Pub. Co, Reading, Mass.

Fleming, M.J., Wood, R., Debra, J., 2001. Effects of violent versus nonviolent video games on children's arousal, aggressive mood, and positive mood. J. Appl. Soc. Psychol. 31, 2047–2071.

Gasparini, A., Culén, A., 2012. Acceptance factors: an iPad in Classroom Ecology, in: E-Learning and e-Technologies in Education (ICEEE), 2012 International Conference On. IEEE, pp. 140–145.

Gowrisankaran, S., Sheedy, J.E., 2015. Computer vision syndrome: A review. Work 52, 303–314. doi:10.3233/WOR-152162

Grolnick, W.S., 2015. Mothers' motivation for involvement in their children's schooling: mechanisms and outcomes. Motiv. Emot. 39, 63–73. doi:10.1007/s11031-014-9423-4

Heinrich, P., 2012. The iPad as a tool for education: A study of the introduction of iPads at Longfield Academy, Kent. Nottm. NAACE ICT Assoc.

Henderson, A.T., Mapp, K.L., 2002. A New Wave of Evidence: The Impact of School, Family, and Community Connections on Student Achievement. Annual Synthesis 2002. Natl. Cent. Fam. Community Connect. Sch.

Hickman, L., Neubert, S., Reich, K., 2009. John Dewey Between Pragmatism and Constructivism. Fordham Univ Press.

Hu, W., 2011. Math that moves: Schools embrace the iPad. N. Y. Times 4.

Hutchison, A., Beschorner, B., Schmidt-Crawford, D., 2012. Exploring the Use of the iPad for Literacy Learning. Read. Teach. 66, 15–23. doi:10.1002/TRTR.01090

Jethwani, M., Mincy, R., Klempin, S., 2014. I would like them to get where I never got to: Nonresident fathers' presence in the educational lives of their children. Child. Youth Serv. Rev. 40, 51–60. doi:10.1016/j.childyouth.2014.02.009

Joe Roberts, 2016. Laptop vs Tablet: Which one is best for you? | Trusted Reviews [WWW Document]. URL http://www.trustedreviews.com/opinion/tablet-vs-laptop-2946540 (accessed 8.2.17).

John Kennedy, 2016. Pivotal moments in the 25-year history of the internet in Ireland [WWW Document]. Siliconrepublic. URL https://www.siliconrepublic.com/comms/25th-anniversary-internet-ireland (accessed 7.29.17).

Kalenkoski, C.M., Pabilonia, S.W., 2012. Time to work or time to play: The effect of student employment on homework, sleep, and screen time. Labour Econ. 19, 211–221. doi:10.1016/j.labeco.2011.10.002

Katz, I., Kaplan, A., Buzukashvily, T., 2011. The role of parents' motivation in students' autonomous motivation for doing homework. Learn. Individ. Differ. 21, 376–386. doi:10.1016/j.lindif.2011.04.001

Kim, K., Ryu, E., Chon, M.-Y., Yeun, E.-J., Choi, S.-Y., Seo, J.-S., Nam, B.-W., 2006. Internet addiction in Korean adolescents and its relation to depression and suicidal

ideation: A questionnaire survey. Int. J. Nurs. Stud. 43, 185–192. doi:10.1016/j.ijnurstu.2005.02.005

Kim, S. won, Hill, N.E., 2015. Including Fathers in the Picture: A Meta-Analysis of Parental Involvement and Students' Academic Achievement. J. Educ. Psychol. 107, 919–934.

Kralovec, E., Buell, J., 2005. High-Stakes Testing, Homework, and Gaming the System. Humanist 65, 17–18.

Kralovec, E., Buell, J., 2000a. The end of homework: how homework disrupts families, overburdens children, and limits learning. Beacon Press, Boston, Mass.

Kralovec, E., Buell, J., 2000b. Is homework healthy? Excerpt End Homework Homework Disrupts Fam. Overburdens Child. Limits Learn. 60, 68–71.

Kubey, R., Larson, R., 1990. The Use and Experience of the New Video Media Among Children and Young Adolescents. Commun. Res. 17, 107–130. doi:10.1177/009365090017001006

Kucirkova, N., Messer, D., Sheehy, K., Fernández Panadero, C., 2014. Children's engagement with educational iPad apps: Insights from a Spanish classroom. Comput. Educ. 71, 175–184. doi:10.1016/j.compedu.2013.10.003

Lamb, M.E. (Ed.), 2010. The role of the father in child development, 5th ed. ed. Wiley, Hoboken, N.J.

Leahy, D., Dolan, D., 2014. The Introduction of Computers in Irish Schools. Reflect. Hist. Comput. Educ. 164.

Lee, K.M., Peng, W., 2006. What do we know about social and psychological effects of computer games? A comprehensive review of the current literature. Play. Video Games Motiv. Responses Consequences 327–345.

Mackenzie, N., Knipe, S., 2006. Research dilemmas: Paradigms, methods and methodology. Issues Educ. Res. 16, 193–205.

Marzano, R.J., Pickering, D.J., 2007. Special topic: The case for and against homework. Educ. Leadersh. 64, 74–79.

McBride, B.A., Schoppe-Sullivan, S.J., Ho, M.-H., 2005. The mediating role of fathers' school involvement on student achievement. J. Appl. Dev. Psychol. 26, 201–216. doi:10.1016/j.appdev.2004.12.007

Mueller, P.A., Oppenheimer, D.M., 2014. The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking. Psychol. Sci. 25, 1159–1168. doi:10.1177/0956797614524581

Murray, O.T., Olcese, N.R., 2011. Teaching and learning with iPads, ready or not? TechTrends 55, 42–48.

Noorhidawati, A., Ghalebandi, S.G., Siti Hajar, R., 2015. How do young children engage with mobile apps? Cognitive, psychomotor, and affective perspective. Comput. Educ. 87, 385–395. doi:10.1016/j.compedu.2015.07.005

Normandeau, S., Goindin, C., 1996. Maternal and Paternal Tutoring Strategies with Their School-Age Children during a Problem-Solving Activity.

Pantic, I., Damjanovic, A., Todorovic, J., Topalovic, D., Bojovic-Jovic, D., Ristic, S., Pantic, S., 2012. Association between online social networking and depression in high school students: behavioral physiology viewpoint. Psychiatr. Danub. 24, 90–93.

Patall, E.A., Cooper, H., Robinson, J.C., 2008. Parent Involvement in Homework: A Research Synthesis. Rev. Educ. Res. 78, 1039–1101.

Pegrum, M., Howitt, C., Striepe, M., 2013. Learning to take the tablet: How pre-service teachers use iPads to facilitate their learning. Australas. J. Educ. Technol. 29, 464–479.

Perriel, Y., 2015. Parental Involvement and Academic Achievements: A Case Study. Soc. Econ. Stud. 64, 75–88.

Pino-Pasternak, D., 2014. Applying an observational lens to identify parental behaviours associated with children's homework motivation. Br. J. Educ. Psychol. 84, 352–375. doi:10.1111/bjep.12043

Pomerantz, E.M., Moorman, E.A., Litwack, S.D., 2007. The How, Whom, and Why of Parents' Involvement in Children's Academic Lives: More Is Not Always Better. Rev. Educ. Res. 77, 373–410. doi:10.3102/003465430305567

Ramdass, D., Zimmerman, B.J., 2011. Developing self-regulation skills: The important role of homework. J. Adv. Acad. 22, 194–218.

Reid, D., Ostashewski, N., 2011. iPads in the classroom–new technologies, old issues: Are they worth the effort, in: World Conference on Educational Multimedia, Hypermedia and Telecommunications. AACE, pp. 1689–1694.

Robin, B.R., 2008. Digital Storytelling: A Powerful Technology Tool for the 21st Century Classroom. Theory Pract. 47, 220–228. doi:10.1080/00405840802153916

Rønning, M., 2011. Who benefits from homework assignments? Econ. Educ. Rev. 30, 55–64. doi:10.1016/j.econedurev.2010.07.001

Rosenfield, M., 2011. Computer vision syndrome: a review of ocular causes and potential treatments: Computer vision syndrome. Ophthalmic Physiol. Opt. 31, 502–515. doi:10.1111/j.1475-1313.2011.00834.x

Russell, W.D., Newton, M., 2008. Short-term psychological effects of interactive video game technology exercise on mood and attention. J. Educ. Technol. Soc. 11.

Samuel Kornstein, 2016. The Rise of Mobile Phones: 20 Years of Global Adoption [WWW Document]. URL http://blog.cartesian.com/the-rise-of-mobile-phones-20-years-of-global-adoption (accessed 7.28.17).

Saunders, M.N.K., Lewis, P., Thornhill, A., 2009. Research methods for business students, 5th ed. ed. Prentice Hall, New York.

Silinskas, G., Kiuru, N., Tolvanen, A., Niemi, P., Lerkkanen, M.-K., Nurmi, J.-E., 2013a. Maternal teaching of reading and children's reading skills in Grade 1: Patterns and predictors of positive and negative associations. Learn. Individ. Differ. 27, 54–66. doi:10.1016/j.lindif.2013.06.011

Silinskas, G., Leppänen, U., Aunola, K., Parrila, R., Nurmi, J.-E., 2010. Predictors of mothers' and fathers' teaching of reading and mathematics during kindergarten and Grade 1. Learn. Instr. 20, 61–71. doi:10.1016/j.learninstruc.2009.01.002

Silinskas, G., Niemi, P., Lerkkanen, M.-K., Nurmi, J.-E., 2013b. Children's poor academic performance evokes parental homework assistance—but does it help? Int. J. Behav. Dev. 37, 44–56. doi:10.1177/0165025412456146

Smith, J.A., Osborn, M., 2015. Interpretative Phenomenological Analysis. Qual. Psychol. Pract. Guide Res. Methods 25.

Sommerich, C.M., Ward, R., Sikdar, K., Payne, J., Herman, L., 2007. A survey of high school students with ubiquitous access to tablet PCs. Ergonomics 50, 706–727. doi:10.1080/00140130701194793

StatCounter, 2017. Tablet operating system market share Worldwide [WWW Document]. StatCounter Glob. Stats. URL http://gs.statcounter.com/os-market-share/tablet/worldwide (accessed 7.29.17).

Stillar, B., 2012. 21st Century Learning: How College Classroom Interaction will Change in the Decades Ahead. Int. J. Technol. Knowl. Soc. 8.

Straker, L.M., Coleman, J., Skoss, R., Maslen, B.A., Burgess-Limerick, R., Pollock, C.M., 2008. A comparison of posture and muscle activity during tablet computer, desktop computer and paper use by young children. Ergonomics 51, 540–555. doi:10.1080/00140130701711000

Subrahmanyam, K., Kraut, R.E., Greenfield, P.M., Gross, E.F., 2000. The impact of home computer use on children's activities and development. Future Child. 123–144.

Tan, E.T., Goldberg, W.A., 2009. Parental school involvement in relation to children's grades and adaptation to school. J. Appl. Dev. Psychol. 30, 442–453. doi:10.1016/j.appdev.2008.12.023

Tapscott, D., 2009. Grown up digital: how the net generation is changing your world. McGraw-Hill, New York.

Trautwein, U., Köller, O., Schmitz, B., Baumert, J., 2002. Do Homework Assignments Enhance Achievement? A Multilevel Analysis in 7th-Grade Mathematics. Contemp. Educ. Psychol. 27, 26–50. doi:10.1006/ceps.2001.1084

Trautwein, U., Lüdtke, O., 2009. Predicting homework motivation and homework effort in six school subjects: The role of person and family characteristics, classroom factors, and school track. Learn. Instr. 19, 243–258. doi:10.1016/j.learninstruc.2008.05.001

Trochim, W.M., Donnelly, J.P., 2001. Research methods knowledge base.

Vasavada, A.N., Nevins, D.D., Monda, S.M., Hughes, E., Lin, D.C., 2015. Gravitational demand on the neck musculature during tablet computer use. Ergonomics 58, 990–1004. doi:10.1080/00140139.2015.1005166

Vatterott, C., 2009. Rethinking homework: best practices that support diverse needs. ASCD, Alexandria, Va.

Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. Manag. Sci. 46, 186–204.

Walter Apai, 2009. Operating System Interface Design Between 1981-2009. Webdesigner Depot.

Ward, N.D., Finley, R.J., Keil, R.G., Clay, T.G., 2013. Benefits and limitations of iPads in the high school science classroom and a trophic cascade lesson plan. J. Geosci. Educ. 61, 378–384.

Williams, R., 2015. 7 in 10 of world's population using smartphones by 2020 [WWW Document]. URL http://www.telegraph.co.uk/technology/mobile-phones/11646593/7-in-10-of-worlds-population-using-smartphones-by-2020.html (accessed 7.28.17).

Wimalasundera, S., 2009. Computer vision syndrome. Galle Med. J. 11.

Xu, J., 2005. Purposes for Doing Homework Reported by Middle and High School Students. J. Educ. Res. 46.

Young, J.G., Trudeau, M., Odell, D., Marinelli, K., Dennerlein, J.T., 2012. Touch-screen tablet user configurations and case-supported tilt affect head and neck flexion angles. Work 41, 81–91.

Young, K.S., 2004. Internet Addiction: A New Clinical Phenomenon and Its Consequences. Am. Behav. Sci. 48, 402–415. doi:10.1177/0002764204270278

Zyad, H., 2016. Integrating Computers in the Classroom: Barriers and Teachers' Attitudes. Int. J. Instr. 9, 65–78. doi:10.12973/iji.2016.916a

Appendix 1: Ethical Approval

1.1 Ethical Application.

School of Computer Science and Statistics
Research Ethical Application Form

Part A

Project Title: How does iPad usage by K12 schools impact parent-child homework involvement in Ireland?

Name of Lead Researcher (student in case of project work): Muireadach O Connor

Name of Supervisor: ....Nina Bresnihan

TCD E-mail: oconnomu@tcd.ie. Contact Tel No.: 085 745 6169

Course Name and Code (if applicable): MSc in Management of Information Systems, PTCS-MISY-1P

Estimated start date of survey/research: 02/04/2017

I confirm that I will (where relevant):

- Familiarize myself with the Data Protection Act and the College Good Research Practice guidelines http://www.tcd.ie/info_compliance/dp/legislation.php;
- Tell participants that any recordings, e.g. audio/video/photographs, will not be identifiable unless prior written permission has been given. I will obtain permission for specific reuse (in papers, talks, etc.)
- Provide participants with an information sheet (or web-page for web-based experiments) that describes the main procedures (a copy of the information sheet must be included with this application)
- Obtain informed consent for participation (a copy of the informed consent form must be included with this application)
- Should the research be observational, ask participants for their consent to be observed
- Tell participants that their participation is voluntary
- Tell participants that they may withdraw at any time and for any reason without penalty
- Give participants the option of omitting questions they do not wish to answer if a questionnaire is used
- Tell participants that their data will be treated with full confidentiality and that, if published, it will not be identified as theirs
- On request, debrief participants at the end of their participation (i.e. give them a brief explanation of the study)
- Verify that participants are 18 years or older and competent to supply consent.
- If the study involves participants viewing video displays then I will verify that they understand that if they or anyone in their family has a history of epilepsy then the participant is proceeding at their own risk
- Declare any potential conflict of interest to participants.
- Inform participants that in the extremely unlikely event that illicit activity is reported to me during the study I will be obliged to report it to appropriate authorities.
- Act in accordance with the information provided (i.e. if I tell participants I will not do something, then I will not do it).

Signed:  Date: 03/02/2017

Lead Researcher/student in case of project work

School of Computer Science and Statistics
Research Ethical Application Form

Details of the Research Project Proposal must be submitted as a separate document to include the following information:

1. Title of project
2. Purpose of project including academic rationale
3. Brief description of methods and measurements to be used
4. Participants - recruitment methods, number, age, gender, exclusion/inclusion criteria, including statistical justification for numbers of participants
5. Debriefing arrangements
6. A clear concise statement of the ethical considerations raised by the project and how you intend to deal with them
7. Cite any relevant legislation relevant to the project with the method of compliance e.g. Data Protection Act etc.

Part C

I confirm that the materials I have submitted provided a complete and accurate account of the research I propose to conduct in this context, including my assessment of the ethical ramifications.

Signed:  ..... Date: 03/02/2017
Lead Researcher/student in case of project work

There is an obligation on the lead researcher to bring to the attention of the SCSS Research Ethics Committee any issues with ethical implications not clearly covered above.

Part D

If external or other TCD Ethics Committee approval has been received, please complete below.

External/TCD ethical approval has been received and no further ethical approval is required from the School's Research Ethical Committee. I have attached a copy of the external ethical approval for the School's Research Unit.

Signed: ..... Date: .....
Lead Researcher/student in case of project work

Part B

Please answer the following questions.		***Yes/N***
Has this research application or any application of a similar nature connected to this research project been refused ethical approval by another review committee of the College (or at the institutions of any collaborators)?		No
Will your project involve photographing participants or electronic audio or video recordings?		Yes
Will your project deliberately involve misleading participants in any way?		No
Does this study contain commercially sensitive material?		No
Is there a risk of participants experiencing either physical or psychological distress or discomfort? If yes, give details on a separate sheet and state what you will tell them to do if they should experience any such problems (e.g. who they can contact for help).		No
Does your study involve any of the following?	Children (under 18 years of age)	No
	People with intellectual or communication difficulties	No
	Patients	No

Part E

If the research is proposed by an undergraduate or postgraduate student, please have the below section completed.

I confirm, as an academic supervisor of this proposed research that the documents at hand are complete (i.e. each item on the submission checklist is accounted for) and are in a form that is suitable for review by the SCSS Research Ethics Committ

Signed: ..... Date: ....
Supervisor

Completed application forms together with supporting documentation should be submitted electronically to research-ethics@scss.tcd.ie Please use TCD e-mail addresses only. When your application has been reviewed and approved by the Ethics committee hardcopies with original signatures should be submitted to the School of Computer Science & Statistics, Room F37, O'Reilly Institute, Trinity College, Dublin 2.

1.2 Ethical Approval Granted

rec-app-help@tchpc.tcd.ie 2 Mar

to oconnomu

The status of 'How does iPad usage by K12 schools impact parent-child homework involvement in Ireland?' has been updated by the Committee.

Title: 'How does iPad usage by K12 schools impact parent-child homework involvement in Ireland?'
Applicant Name: Muireadach O Connor
Submitted by: Muireadach O Connor
Academic Supervisor: Nina Bresnihan
Application Number: 20170211

Result of the REC Meeting: Approved

The Feedback from the Committee is as follows:
All issues have been addressed- This research may proceed.

The application can be viewed here:

https://webhost.tchpc.tcd.ie/research_ethics/?q=node/233

If amendments are required, please use the following link to edit the application and upload the changes:

https://webhost.tchpc.tcd.ie/research_ethics/?q=node/233/edit

Appendix 2: Semi Structured Interview Questions

These questions were used as a guideline for the interview, not all questions were asked every interview and not necessarily in this order. “iPad” was changed to “tablet” where the child didn’t use an iPad.

School choice

1) Did the fact that your child's school used/did not use iPads play any part in the decision to send them there and why?

2) What is your opinion on Irish primary and secondary schools adopting tablet computers in the classroom?

Quality of work/ outcomes

1) Is the tablet more suited to particular subjects (math/science/history/language), why is that?

2) Are you more confident of your child's academic success as a result of using an iPad in school? Why do you think that might be? Any impact on written performance? how could schools mitigate that if you think there would be?

3) Is there an argument that you can think of for the tablet to be used to augment rather than replace the traditional methods of finding information during homework assignments?

4) Do you think that using the tablet in school makes a difference with completing homework assignments which are hand written?

5) Do you think it would be beneficial for the child to be able to bring the tablet home to assist with homework, or to have access to one in the home (as well as school), if not why not

6) Does your child ever express concerns that they are finding it hard to complete homework without the aid of the tablet device which they have access to in the school - how could that avoided if it is impractical to bring home (two few devices, devices owned by the school etc.)

7) Should homework assignments be set to exclusively use the tablet or text book?

Perceived quality of classroom teaching

1) In your opinion is the future of education using tablet devices in particular or is there always going to be a place for blackboards and pen and paper? Why?

2) Are there any standout benefits that you can think of using an iPad in the classroom specifically over your own schooling that you can think of?

3) In your opinion what are the limitations of using an iPad in the classroom over more traditional methods of teaching such as you may have had in your student days?

4) How do you find the applications on the tablet within the context of homework assistance and in general that you have seen from an educational perspective?

5) Do you find it difficult to relate your child's educational experience with your own and is that good or bad in your opinion?

Perceptions around homework assistance.

1) Do you think it would be helpful if the school provided parents with training on assisting their child using an iPad (if your school didn't provide this) and what aspects of iPad usage in particular would be helpful to receive training in?

2) How much homework assistance would you estimate that you give your child on a daily basis, would you say that using a tablet changes the amount of assistance - is it a reason not to assist?

3) Would you say that assisting your child using the tablet is more difficult or easier, why?

4) Can you think of any benefits that you have seen when assisting your (iPad thought) child with homework? (child retention, quality of output, attention span)

5) Does the size of the screen effect giving assistance?, for example, if the child is using the tablet themselves and is asking for your help (survey comment about being able to read when in use)

6) Is it more difficult to assist with home homework when the child is taught through the tablet device at school, why?

7) Do you think the quality of assistance you can give is affected by using the tablet?

Relationships in the home.

1) Do you have any feelings about the amount of time children spend looking at computer screens, should limits be set? Why?

2) Do you feel that tablet usage in the school and the home changes your personal relationship with your child compared to how it would be if they were not used?

Anything else.

1) As a parent is there anything else you could add that might help the research in relation to your experience assisting your child with homework using an iPad or in general about being a parent of a child that uses an iPad in the classroom?