The University Of Sheffield.

Understanding Students' and Teachers' Approaches to Tablet Use in Turkish Secondary Schools: *A Model Based Approach*

Tugba Mutlu

THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD)

The University of Sheffield School of Education

September 2016

Acknowledgements

This thesis owes its existence to several people among whom two people have made it possible the most. First, I would like to thank my supervisor Julia Davies, who has been more than a supervisor; whose expertise, understanding, patience, and continuous support became the main reassurance behind this work.

Secondly, words can't explain my gratitude to my husband and best friend Mustafa Doruk Mutlu for his continued and unfailing love and support. He has always been someone to talk to, someone to rely on, and someone to have fun with: a fearless adventurer, a brutally honest confidant, a wise mentor and a work pal. Our endless conversations, his relentless care and advice constantly encouraged me when the tasks seemed arduous and insurmountable.

I also owe much gratitude to my beloved family and parents-in-law for their patience and support no matter how far we have been physically. My brother Ömer Taha Açıköz deserves a special thanks for his help in preparing the figures for this thesis.

Last but not least, I could not have done without the friendship of Cristina Aliagas, Haslinda Hashim, Charlotte Benaim, Ayşe Elmalı, Mustafa Seyrek, Burak Başkan, Berkan Kurtoğlu and Joy Hatice Büber.

Thank you guys, this one is for all of you!

Abstract

Rapidly developing and widely used mobile technologies have been changing the way we live and learn. Such devices were banned from schools not long ago, and now, they are becoming part of everyday practice in schools. Governments around the world have been increasingly investing in learning technologies with the belief that teachers and students will eventually benefit from them (Diemer, Fernandez & Streepay, 2012; Pedró, 2010). However, these investments do not always result as desired. Turkey, where this research took place, is one of the countries that has invested in ICT through a program called the "Movement of Enhancing Opportunities and Improving Technology", known as the FATIH Project. With the Fatih project the government had aimed to revolutionise the education by 'upgrading' the classrooms with the latest technology smartboards and providing students and teachers with a personal tablet. It is one of the most expensive and extensive government supported ICT projects ever taken place (Tamim, Borokhovski, Pickup & Bernard, 2015), and it is important to understand the perceptions of the end users. In order to collect information on students' and teachers' attitudes towards tablets a qualitative study with teacher interviews, student focus group sessions and observations was conducted.

Moreover, lately 'technology acceptance models' have taken their places in education research with the claim that they could help to foresee the acceptance behaviour before developing or introducing a new technology by providing measurable variables; therefore, avoiding unexpected user rejection (Jan & Contreras, 2011). In this regard, this research aims to test the applicability of an existing model the 'Unified Theory of Acceptance and Use of Technology 2' (UTAUT2), which has been commonly used by educational researchers, and is suggested to be more suitable

to educational account. In that sense, this part of the research has a quantitative nature. Data were collected through questionnaires from secondary school students (n=266) and analysed in accordance with the qualitative data collected with this research and the previous literature.

It is believed that theoretical findings of this research will help researchers to understand if a model approach is suitable for education, if so, will help to develop a model that corresponds to the requirements of educational research. Additionally, the findings of this study will help the Turkish government in understanding the expectations and perceptions of the students and teachers regarding the tablet use in education.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1: INTRODUCTION

Rapidly developing and widely used mobile technologies, such as laptops, tablets and mobile phones, have been changing the way we live and learn. Such devices were banned from schools not long ago, and now, they are becoming part of everyday practices in schools (UNESCO, n.d., para.1). According to the Organization for Economic Cooperation and Development (OECD) (2010) report and Bernard (2013 as cited in Salcito, 2013), the director of Worldwide Education Programs at Microsoft, technology based innovations have been receiving support from countries for the last three decades, and almost every government around the world is considering a national PC program or a large-scale device deployment program due its long-term potential to improve education systems.

Some governments have spent large amounts of money trying to upgrade schools with the latest technologies and infrastructure, and still are continuing to invest, with the belief that teachers and schools will eventually benefit from them (Diemer, Fernandez & Streepay, 2012; Pedró, 2010). According to the US Department of Education Office of Educational Technology (2011) report, Austria, Canada, Chile, Israel, Japan, New Zealand, Singapore and South Korea have run pilot programs with mobile devices. One of such countries is Turkey, where government initiated a countrywide ICT program, the Movement to Increase Opportunities and Technology, otherwise known as the Fatih Project, in which every student and teacher is planned to receive a personal tablet for their learning and teaching activities. However, efficacy of these investments has been a controversial topic. Robert Kozma argued in *The Economist* debate series (Cottrell, 2007) that if combined and coordinated with effective teacher training, education-unique applications and supportive school contexts, technology can help to enhance education environments. Whereas

Bennett, Maton & Carrington (2011) claimed four years later, that technology had not made a significant impact on education and had not been widely adopted in schools. Since 2011, technology-wise lots of things have changed, more specifically technology has become mobile, yet today, in 2016, education world from researchers to teachers are still discussing the same topic. In fact, Traxler (2016a) claims that technologies have not made the impact that was dreamt of because they have "spent quite some time barking up the wrong tree, looking backwards and inwards" (para. 19) thus not becoming more than just a storage space.

Even though debate on the effectiveness of technology in schools does not seem to be coming to a conclusion in the near future, with new technologies being introduced every day, technology acceptance stays one of the hottest topics in information systems and organization fields (Hu, Chau, Sheng & Yan Tam, 1999; Hess, Joshi & McNab, 2010; Miltgen, Popovic & Oliveira, 2013), and it has gained popularity in educational contexts. Theories for technology acceptance have become interdisciplinary in nature as they have been adopted to various different contexts. With on-going attempts to integrate technology into education, education research has claimed its share from technology acceptance theories, and the literature is growing with such theories and models. The main motive behind these theories is to predict students' and teachers' potential attitudes towards a specific technology and/or understand the common determinants of their acceptance/rejection. Answering these questions, is argued, could help avoiding rejection from the users thus help attain the desired results from technology investments (Bennett, Maton & Carrington, 2011), and save investors from spending time and money on projects that could end up with undesired results.

In addition, research in the field of technology is a continuous process as technology evolves quicker than theory, and often before we grasp its potentials for education, technology moves to a new level. Therefore, there is always a need for more research on technology, especially in education, which, unfortunately, has been destined to chase technology behind. In this regard, as one of the latest trends in education, use of tablets for educational purposes is a topic that needs and is worth covering.

Taken all together, in the light of above information, this research was designed to explore the motives behind the secondary school students' and teachers' behaviours in using digital tablets for learning and teaching practices in Turkey. More specifically, this is a mixed methods research where the quantitative part adopts an adapted version of the 'Unified Theory of Acceptance and Use of Technology 2' (UTAUT2) as the framework to evaluate the applicability of the theory into education, and the qualitative approach is used to explore the students' and teachers' perceptions and uses of tablets while also providing a reference point against which the quantitative data is compared.

This was a piece of real world research, concerned with "real human beings, in real places, acting in real contexts and producing real outcomes" (Forte, 20002, para.4). Throughout this thesis, I tell the stories of real people from my perspective. As Robson and McCartan (2016) indicate, real world research "explain(s) to us why the world is in the shape that it is" (p.3). In this regard, I explored the experiences, opinions and beliefs of the students and teachers in Turkish secondary schools after tablets were introduced to classrooms, and tried to bring explanations to the underlying question of "What happens when the tablets are introduced to

classrooms?" In order to do that, I pragmatically collected data in a way I believe helped me to answer my research questions in the best way possible. As real life could not always be anticipated, this trait had manifested itself in this research in several different situations. Therefore, it had been an iterative process where I constantly learned from my experiences and actions, readjusted my plans and moved on accordingly. As with any research, there are gaps and limitations of this study, or other possible ways to designing and going about it, but, in the end, I collected the data which helped me to draw trustworthy conclusions.

The research questions that I aim to answer with this project are:

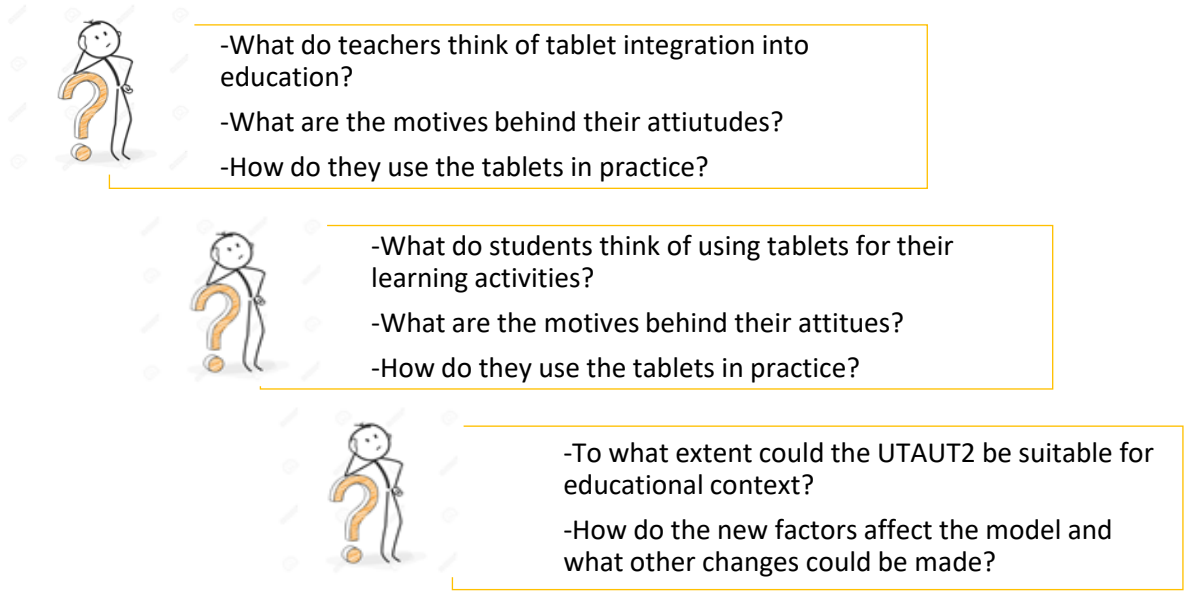


Figure 1: Research Questions

I should note that even though these are meant to be separate questions on their own, they also feed each other to produce a more comprehensive approach to tablet use in schools, and the use of a technology acceptance framework in education.

1.1. Background and the Context of the Study

Turkey is a transcontinental country located between the Europe and Asia where it has borders to the Black, Mediterranean and Aegean Sea. Turkey, with the population around 80 million people, is the of home of several ethic groups; Turks being the major group (around 80%) followed by Kurds (around 20%) and other minorities such as Arabs, Turkmens, Circassians and Greeks (The World Factbook, 2016). It is predominately a Muslim country yet contrary to the common belief it is not an Arabic speaking country.

Turkey is a member of the UN and the NATO. It is governed by a republican parliamentary democracy where "the chief of state is the president, and the head of government is the prime minister" (globalEdge, n.d., para.1).

The Turkish education system consists of 12 years of compulsory free education which is divided into three levels: Primary school, Middle school and Secondary school (Fulbright, n.d.). It is called the 4+4+4 system in which students get 4 years of education in each level. According to the Turkish Statistical Institute's (TUIK) latest data there are currently around 15 million registered students in all levels with almost equally distributed numbers of students at each level (TUIK, n.d.).

The Fatih Project which is the site of this research first started in the secondary schools with an aim to cover other levels over time. It is not just a tablet deployment programme, but rather a package that aims to transform the classrooms in the country into 'smart classes'. More detailed information about the project is provided in the Literature Review. However, it is considered as

one of the most significant educational investments in the history of the country, and the largest educational tablet initiative of its kind around the world (Trucano, 2013). Thus, being the largest scale ICT project with the latest digital technologies, the Fatih project provided a unique field for this research.

1.2. Why A Model-Based Approach to Technology Acceptance in Education?

More often than not, the technology acceptance process does not run smoothly. In order to avoid unexpected rejection and achieve a continuous success in technology use, behaviours of users should be investigated. Therefore, all aspects of new technology implementation should be analysed before transition. It is claimed that a technology acceptance model could be helpful in order to investigate the different aspects of technology acceptance (Alroaia, Hemati & Shahabi, 2011). Likewise, Jan & Contreras (2011) argue that a technology acceptance model can help to foresee the acceptance behaviour before developing or introducing a new technology by providing measurable variables.

In order to understand the motivations of technology acceptance, several theories and models have been developed mainly for information systems and organization contexts on consumers' and users' behavioural intention to use a specific technology and actual use of technology (Admiraal, Lockhorst, Smit, Weijers, 2013). Even though none of these theories were developed specifically for educational contexts, they have been used to predict and understand different actors' intentions and acceptance behaviour in schools. As every theory, method or approach,

technology acceptance models have their limitations, yet they have increasingly been a part of education research, which as a researcher, made me wonder about the effectiveness and applicability of these models. Hu, Clark & Ma (2003) point out that, educational institutions have very different goals than business organizations; therefore, testing a model in another domain could potentially provide different results. And in order to understand whether such an approach would be useful we should understand how existing models explain the intentions of the target user, and how the existing variables in these models conform to the previous research results (Blackwell, Lauricella, Wartella, Robb & Schomburg, 2013). And following Röcker (2010) and Beier, Spiekermann & Rothensee's (2006 as cited in Röcker, 2010) in their claim that technology acceptance is not only affected by the factors included in existing models, there might be new factors that could play important roles in the acceptance decision, I adopted and adapted an existing framework, the Unified Theory of Acceptance and Use of Technology2 (UTAUT2) as a part of this research. Therefore, this work is organised as follows:

Chapter 1 briefly introduces the research to the reader whereby I explain the rationale behind the study along with the aims and context.

Chapter 2 hosts the literature review where I provide the related literature about m-learning; its historical evolution with regards to digital technologies and pedagogies, and definitions in the literature. I provide a brief overview of discussions on today's learners and teachers, then I move on to the most commonly used mobile devices in education and their affordances as presented in the literature with the focus on tablets. Following that I explain some of the large scale technology initiatives around the world and finish of by presenting the theories and models that

have been commonly used in technology acceptance literature which were reportedly used in developing the UTAUT2. Finally, I provide the literature on the educational uses of the UTAUT2.

Chapter 3 is where I present the proposed version of the UTAUT2 for this study, the hypotheses which were used in the analysis of the UTAUT2 and explain the constructs and concepts in the model.

Chapter 4 explains the Methodology that I followed in conducting this research: the design, my positionality as the researcher, methods I used during data collection, participant selection, transcription and translation of the data, the analysis process in relation to my experiences during this stage, and finally the ethical considerations followed in carrying out this research.

In Chapter 5 I talk about the Analysis and Findings of this research from both qualitative and quantitative standpoints, discuss the findings, and I finally merge the findings of both approaches to make sense of the findings.

Chapter 6 is the final part of this thesis where I conclude this work by providing answers to my research questions, explain the implications and limitations, and finalise with my reflexivity on this research.

1.3. Chapter Summary

This chapter provided preliminary information to help familiarise the reader with the aim of this research and explain what is to come next in the thesis. In the next chapter, I provide the related literature on mobile learning, tablets and technology acceptance theories.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

This chapter presents an overview of the literature which created the basis for this current study. I view this section as the 'backbone' or the 'scaffolding' of the entire work as it explains the landscape of this research to the reader. In short, it is helpful for me and for the reader to put this research into a perspective before moving on to the later parts.

The review is shaped around two main sections: first mobile learning and mobile devices, and second technology adoption theories. The first part includes historical information and definitions of mobile learning and mobile devices, the current state of learners, educational uses of mobile devices with emphasis on tablets, educational affordances of tablets, and tablet initiatives around the world with a special section on the case of Turkey. The second part is centred around the commonly used theories in technology adoption literature with information on each theory.

This review, therefore, is a summary to explain the landscape of this research. There were some parts of this literature review which I conducted and wrote before I carried out my study but during the course of my study I realized that due to the rapidly progressing nature of technology there was more I needed to read and update in my work, which are reflected in this chapter.

2.2. A Historical Overview of Mobile Learning (M-Learning)

The roots of mobile learning could be traced back to a couple of hundred years ago to Gutenberg's printing press when books first became available to common people and as one of the first mobile agents of learning (Miller & Doering, 2014). Even though it might seem irrelevant to the current state of education, especially mobile learning, there is no doubt that every development in history has played a role in preparing the ground for the next milestone. Therefore, events like this have aided m-learning to arrive in its current state. That said, the focus of this paper is on the developments started with the advances in digital technology.

Crompton (2013) suggests approaching mobile learning from its two aspects separately: *mobile* and *learning*. Thus, in line with Crompton, I first reflect on the historical evolution of technology before moving to developments in learning, and finally tie the technological developments to learning.

2.2.1. A Brief History of ICT with Emphasis to Mobile Technologies

In order to explain m-learning, it is crucial to first explain Information and Communication Technology (ICT) and the key stages of its development. ICT is an umbrella term for "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" (Blurton, 1999). These technologies include computers, laptops and tablets, the Internet, radio, television, satellite systems and so on. Because the use of ICTs has penetrated into almost all aspects of our lives in their wide variety, ICT is arguably one of the most powerful forces which has been driving change in societies. It is no surprise that education

is one of the domains to incorporate these technologies, albeit that it has arguably been slow to do so.

ICT use in education has a long history, but integration of technology into schools as we know it today perhaps had started with computers. Use of computers initially started in colleges in the USA with what were called the 'mainframes'. These were huge and powerful machines used to process data until smaller computers came to existence. When in the 1970s Apple started to donate its smaller and more portable product, the Apple 1, to schools, some schools accepted the new version while others continued with the mainframes. In the 80s, IBM developed the first PC (Personal Computer) and the "drill and practice" era had started (Murdock, n.d.). The idea behind drill and practice was to "promote the acquisition of knowledge or skill through repetitive practice" (McCambridge, n.d), and computer programs were developed to be used on the new personal computers. However, this practice was abandoned in the late 80s and early 90s, after the development of multimedia computers with advanced sounds and graphics (Leinonen, 2005). 90s and 2000s have seen rapid improvement in computing. Computers have evolved to be more powerful yet smaller, lighter and eventually mobile.

The evolution of mobile technologies and computers, however, were not separate phenomena: they happened concurrently. While companies were working on their new computers, mobile devices were being developed on the side. The first idea of a tablet computer was born in the late 60s when Alan Kay envisioned a portable device - the Dynabook - for children's use. Even though it remained just an idea, and it was never actually built, Dynabook created the vibe for a fully mobile device. Kay conceptualized his vision as:

> Imagine having your own self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook. Suppose it had enough power to outrace your senses of sight and hearing, enough capacity to store for later retrieval thousands of page-equivalents of reference materials, poems, letters, recipes, records, drawings, animations, musical scores, waveforms, dynamic simulations, and anything else you would like to remember and change (Kay & Goldberg, 1977/2001, p. 167).

Although Kay had described today's mobile devices with almost all the functionalities decades ago, it was not until 1989, when GRIDPad became the first commercially available tablet that these ideas were realised.

Another invention that has left a mark in the history of ICTs was the invention of the first mobile phone in the 70s, which only became available in 1983. From that point, there have been several attempts to develop fully mobile, portable and powerful devices as we see today. PDAs and more customizable mobile phones were developed in the 80s while the 90s witnessed a rapid increase in Internet use (Crompton, 2013). The late 90s and early 2000s were the years of Smartphones while Microsoft's tablet PC and Amazon's Kindle enjoyed the 2000s. After the 2000s, mobile devices became sought after, especially Smartphone use have reached a sky-high rate. However, it was not until 2010, when Apple introduced the iPad, the term 'tablet' became a new category of its own. The iPad became a game changer as the specifications provided were specially developed for a tablet rather than adjusting existing computer structures. iPad's success forced others to create competing products, creating a new market with high demands. The latest statistics show that tablet demand has already surpassed the demand for PCs and laptops while Smartphones are sold to more than the total of tablets and computers all together (Gartner, 2015). However, it was not only the advancing mobile devices which has brought the use of ICT to its current state and made mobile learning possible. The Internet and the World Wide Web (WWW)

have complemented these powerful devices. Just like technology as hardware, the Web has also evolved. The changes in the Web have had direct effects on the use of computing technologies as it moved from being only a readable document to a space where everybody can create and share. The original Web, Web 1.0, is defined as 'read-only' web which was "static" and "mono-directional" (Aghaei, Nematbakhsh & Farsani, 2012, p.2). This version of the web is usually associated with the traditional teaching methods where the classroom interaction is unidirectional. A teacher, like the web, is a source of information, and the students, like the users of web, are the receivers. Web 1.0 had offered opportunities for learning from external sources but it was lack in interaction. Web 2.0 has filled this gap as it is considered the 'read-write' web where the interaction is bi-directional and consumers are often the creators of the content. Blogs, wikis, mashups and tags are the common services that became available with Web 2.0 (Aghaei et al., 2012).

Davies and Merchant (2009) explain the shift from Web 1.0 to Web 2.0 as:

> If Web 1.0 could be conceived of as an enormous encyclopedia, containing information to locate and consult (authored by specific, known and carefully selected experts), then Web 2.0 is exemplified by Wikipedia, a growing repository of user-generated material, dependent on the collaborative endeavour of shared expertise, contribution and regular updating (by many self- selected and anonymous authors) (p.3).

The development of the Web still continues and even though there is quite a disagreement around what the new, developed version should be called, the literature and the Internet is overwhelmed with the expected 'Web 3.0' or even 'Web 4.0' which are called the 'semantic' and 'symbiotic' webs, respectively. However, Tim O'Reilly, the unintentional name father of Web 2.0, disagrees with the idea of Web 3.0 and he argues that there is no Web 3.0, it is only the

Web when he said "Let's just call the Semantic Web the Semantic Web, and not muddy the water by trying to call it Web 3.0" (2007, para. 19).

Whilst previous versions are classified as the 'web of documents', Web 3.0 is expected to be the 'web of data' (Aghaei et al., 2012). Tim Berners-Lee, in his 2009 TED talk "The next web", explains his version of the new web as the millions of linked data sets around the world, which could eventually create more meaningful data for everyone to use.

Table 1 below provides an overview of the differences between so-called Web 1.0, 2.0 and 3.0 in terms of their practical implications rather than their technical aspects.

Table 1: Web Comparison

Web 1.0	Web 2.0	Web 3.0
Reading	Reading/Writing	Portable Personal Web
Companies	Communities	Individuals
Owning Content	Sharing Content	Consolidating Dynamic Content
Home Pages	Blogs	Lifestream
Directories	Tagging	User Engagement

Adapted from (Aghaei, et al.,2012 and Flat World Business, 2016)

As I briefly stated above, the Web complements mobile devices and makes them actually 'mobile' not only in the sense that the devices could be carried around but also the learner or teacher, and even the learning could be mobile. Thus, any changes in the technology and the Web have direct effects on the way people use ICTs and learn from them.

In the next section explain the shifts in pedagogy in conjunction with their relations to technology.

2.2.2. Pedagogical Changes in Learning

Education has strong bilateral ties with social changes: a shift in one, affects the other. In other words "…pedagogical choice is often driven by social behaviour, expectations and values" (Crompton, 2013, p.83). In this respect, pedagogy is expected to change over time in response to the changes in society, and technology has been one of the driving factors of change.

> Every era of technology has, to some extent, formed education in its own image. That is not to argue for the technological determinism of education, but rather that there is a mutually productive convergence between main technological influences on a culture and the contemporary educational theories and practices (Sharples, 2005, p. 147)

As Sharples argues, the introduction of technologies, among other agents, has potentially caused disruption in traditional pedagogies that have potentially promoted learner-centred approaches which put the learner 'at the heart of the education system' (Leadbeater, 2008). The ultimate purpose of learner-centred pedagogies are to acknowledge the learners as responsible individuals who should be in charge of their own learning with directions from their teachers rather than being passive receivers of knowledge. In that sense, technology, it is argued, offered something for everyone. And as technology has evolved and became more prevalent, pedagogies or theories of learning have also evolved into a more learner-centred state, argues Crompton (2013). Further, Traxler (2010) claims that these changes happening in the pedagogical sense are parts of an "epistemological revolution" or "digital epistemologies" (Lankshear & Knobel, 2010) which

revolutionises "what we know and how we know it" through mobile technologies, therefore "what we learn and how we can learn it" (p.153) is also defined by these technologies.

Whilst I agree with Sharples, Crompton and Traxler on their point that technology and pedagogy are not mutually exclusive, I am sceptical about the belief that advances in technology have caused an equally strong reaction in education. As Ventilla expresses;

> What's tough about education is things are so complex and connected that sometimes, you can make a change that makes sense on its own, but when it's introduced to the complex setting of a school, the net effect is negative (para. 20, as cited in Lapowsky, 2015)

In line with Ventilla, things are not that simple in schools. As I show in the data section, even though theory suggests a transformation in pedagogy for the better this is a moot point in practice since opportunities that new technologies offer to disrupt traditional pedagogies have not always been taken up. On the contrary, the presence of technology in classrooms have mainly been used to 'replicate' or 'reproduce' the traditional practices which Davies and Merchant (2009) refer to as the "polished performances of conventional practices" (p.2). Thus, I agree with Davies and Merchant on their point, despite the early promises of new technologies transforming pedagogy, we have not seen this happen yet. In other words, we "are using 21st century technology with 19th century pedagogy with teaching styles and classroom management techniques that haven't changed much" (Magid, 2015, para. 1). That being the case, "*Schools are doing Education 1.0; talking about doing Education 2.0; when they should be planning Education 3.0" (*Gerstein, 2013, para.1).

2.3. Unpacking Mobile Learning

After providing short accounts for the technological and pedagogical aspects of m-learning, here I talk about their connection as "the essence of m-learning is not in the learning or in the technology, but in the marriage between the two entities" (Crompton, 2013, p.96). Mobile technologies have made m-learning possible not only mobilizing the devices but also the teacher, learner and content, yet, m-learning is not about technology.

> Mobile learning - as we understand it - is not about delivering content to mobile devices but, instead, about the processes of coming to know and being able to operate successfully in, and across, new and ever-changing contexts and learning spaces. And, it is about understanding and knowing how to utilize our everyday life-worlds as learning spaces. Therefore, in case it needs to be stated explicitly, for us mobile learning is not primarily about technology (Pachler, Bachmair & Cook, 2010, p.6).

As easy as it might be to say that m-learning is not about technology, providing a definition to it has been a topic of discussion itself among researchers. Literature has a number of definitions, taking different approaches to mobile learning based on the attributes of it. Kukulska-Hulme (2009) suggests that this problem of not being able to propose a common definition to m-learning stems from the fast growing nature of the field as well as the confusion around what is meant by 'mobile'. This confusion around 'mobility' creates problems in any definition available for mobile learning (Hockly, 2013). Traxler (2009) joins the discussion and argues that the concept of m-learning is still immature and unclear, mainly due to rapid changes in the mobile technology industry which hinders meaningful longitudinal studies, and the issues in school cultures which prevents proper use of mobile devices (JISC-Joint Information Systems Committee, 2015). Traxler (2009) further highlights that the definitions available in the literature mainly conceptualize m-learning either in terms of "devices and technologies", or in terms of the "mobility of learners" and "mobility of learning", while some others offer definitions in terms of

"learners' experience of learning with mobile devices" (p.10). In this sense, there exist several definitions which address the same concept from different aspects some of which I provide here to lay out the field.

Earlier Traxler (2005) defined m-learning as "any educational provision where the sole or dominant technologies are handheld or palmtop devices" (p.262). Winters (2006) argues that m-learning as a type of learning which is mediated by a mobile device while Peters (2007) defines it as delivery of learning materials through mobile, portable devices, such as mobile phones, laptops and tablets. However, later Traxler himself criticized such definitions for being too "techno-centric" and "imprecise" (2010, p.129). O'Malley et al. (2003), on the other hand, offer a definition from the learners' perspectives as "Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies" (p.6). Wang, Wiesemes and Gibbons (2012) also provide what seems like a simple definition "learning through mobile devices" (p. 570) which they then extend based on Sharples, Taylor & Vavoula (2007)'s work and suggest that this simple definition of m-learning in fact refers to a wider concept: first, mobility means freedom of space, content and context; making it possible to move 'within, beyond and between'. Secondly, the use of portable devices provides extended learning spaces beyond formal environments, creating opportunities for informal learning. Thirdly, m-learning provides collaborative and bidirectional information flow through online communities.

Sharples et al. (2007) themselves offer five main criteria to theorize m-learning as: 'diverging from traditional theories of classroom learning', 'accounting for learners' mobility', 'embracing

both formal and informal learning', 'postulating learning as a social and constructive process', and 'recognizing learning as a technology mediated personal and situated activity'. Based on these criteria, Sharples et al. define m-learning as "the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies" (p.4). This has been one of the widely accepted definitions in the literature as it includes the four main constructs of m-learning: mobile devices, pedagogy, context and social interaction (Crompton, 2013). However, Crompton finds this rather 'confusing' and 'ambiguous' and offer a slightly different version as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (p. 83) where 'context' encloses both formal and informal learning environments that happens inside or outside physical learning spaces.

There are many other definitions available in the literature and all of them offer different approaches to m-learning. Even though I agree with some of them, I find others pleonastic, or insufficient in understanding m-learning. Therefore, throughout this work, I follow El-Hussain & Cronje (2010)'s (also see Pegrum, 2014) concept of m-learning which suggests three components to theorize mobile learning which I visualise in the Figure 2 below.

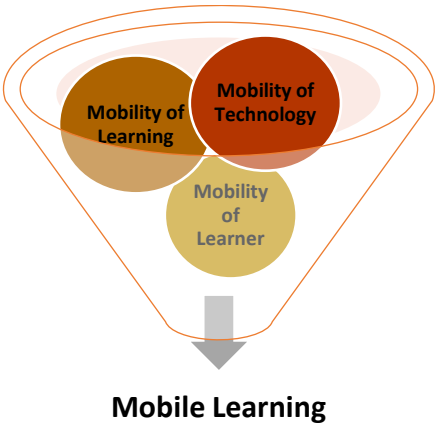


Figure 2: Three concepts of Mobile Learning

Therefore, these three concepts are accepted approaches for this research. Here, I briefly unfold these concepts in order to clarify my interpretation of mobile learning.

Mobility of technology, simply put, refers to the devices which one could easily carry around, such as Smartphones, digital cameras, tablets, laptops and so on.

Mobility of learning, in broad terms, refers to the delivery of the learning experience, i.e. content, feedback, instant access to various sources and so on to learners by means of Wi-Fi or mobile cellular services (El-Hussain & Cronje, 2010). Vavoula and Sharples (2002) suggest that

> learning is mobile in terms of space, i.e. it happens at the workplace, at home, and at places of leisure; it is mobile between different areas of life, i.e. it may relate to work demands, self-improvement, or leisure; and it is mobile with respect to time, i.e. it happens at different times during the day, on working days or on weekends (p.152).

Thus, learning could become free from space, time and events. I consider content as any pre-defined formal learning materials, readily available online materials or anything produced by online social interactions. In short, the main sentiment behind the mobility of learning is 'anytime and everywhere' learning. As Davies (2008) remarks "Learning bounded by classroom walls, limited to peer collaboration in the same location and regulated by "opening and closing hours" could be an outdated concept" (p.38) which could be updated by mobilizing and freeing the learning from boundaries.

The ability to access the content through their personal mobile devices creates freedom of context for learners and enables them to access information wherever they are situated. Thus, mobility of learners is in fact enabled by the mobility of technology and learning content: when

the technology and content is mobile, learners do not have to be in a fixed place at a set time which also enables spontaneous, informal learning. As Traxler (2010, p.151) argues;

> Interacting with a desktop computer takes place in a bubble, in dedicated times and places where the user or learner has their back to the rest of the world for a substantial and probably premeditated episode. Interacting with mobile technologies is different and woven into all the times and places of users' and learners' lives.

Thus, as mentioned earlier, mobile learning is not about 'mobility' or 'learning' itself, but rather a combination of both, which has now created a new category for itself in society (Traxler, 2007).

2.4. Learners in the Digital Age

> *The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn*—Alvin Toffer

The landscape of education has become more complex (JISC, 2015), and just like technology and learning experiences, learners have evolved over time. As Prensky (2001) states, learners today are not the learners for whom our educational systems were designed as they are now born into a different world where they meet technologies at early ages.

Different authors have named this 'new generation' in their work with different names. Tapscott and Williams (2008) used the term "net generation" while Veen and Vrakking (2006) had previously called them "home-zappiens". Levin and Arafeh (2002) referred as the "net savvy" youth whereas Palfrey and Gasser (2008) claimed that they are "born digital", living "digital childhoods" (Vandwater et al., 2007), raised by "media families" (Rideout & Hammel, 2006),

and “grew up bathed in bits” (Tapscott & Williams, 2008). Several others classified the young as “generation M” - media generation, “generation V” - virtual generation, and “generation C” – connected, creative. (Veen & Vrakking, 2006; Rideout, Roberts & Foehr, 2005) while Pedro´ (2007) specified them as the “New Millennium Learners”. Perhaps, the most famous term that has been used for the generation which has had better access to technology compared to earlier generations is Prensky’s “digital natives” - people born after 1980.

Whilst some of these definitions and classifications have some degrees of relevance to the landscape that today’s youth live in, I argue that categorizing learners as ‘digital natives’ or ‘net generation’ and so on is an overgeneralized approach (Traxler, 2010) which arises from the perceptual ‘generation divide’ between the young and adults (Selwyn, 2009; Crook, 2012). Several researchers have argued otherwise and debated that these divisions were created based on ‘claims’ rather than ‘evidence’ (Davies & Merchant, 2009; Selwyn, 2009; Bennet & Maton, 2010). Moreover, if we look at the dates that these terms were first coined, it has been quite a while, and now many of the parents are from the generation of so-called ‘digital natives’ themselves (Livingstone, 2016). Thus we should “avoid the excesses of the digital native debate and instead concentrate on enhancing our understandings of the realities of technology use in contemporary society” (Selwyn, 2009, p. 375, also see Bennet & Maton, 2010).

As I mentioned above, the notion of ‘being born to a different world’ than our education systems were designed for creates a disparity between learners’ expectations and needs, and the learning experience formal education institutions provide at present. This difference stems from the idea that the rapid evolution of mobile devices has provided the means to access information

independent of time and space (Jeng, Wu, Huang, Tan & Yang, 2010) whereas, traditionally, education institutions control the learning. They are used to act as the gatekeeper to learning and they have enjoyed the liberty of deciding what to learn, when to learn and how to learn on behalf of their students. However, with ubiquitous mobile technologies, learners now have their personal devices which allow them to "create, own, transform, discuss, discard, share, store and broadcast ideas, opinions, images and information, and to create and transform identities and communities" (Traxler, 2016b, p.1) wherever they are, whenever they want and at their own pace. In other words, students now have the advantage to control their own learning to a degree. This 'clash of powers' over the control of learning has created a gap between today's learners and the institutions.

That said, it is not to say that learners are fully aware of the potential at their fingertips. Sharpe, Beetham, Benfield, DeCicco and Lessner (2009) emphasize that:

> However, …despite using technology extensively in their social and leisure lives, most learners do not have clear ideas of how courses could be using technology in educational and innovative ways. In the main they still rely to a great extent on their institutions, course pedagogies and tutors for guidance and direction (p.7)

Similarly, Margaryan, Littlejohn and Vojt (2011) reported from their study that students overall use the technology extensively for e-mails, social media and so on, and their use of technology is more sophisticated than that of lecturers' in some cases, however, their understanding in terms of using technology to support their learning is limited.

However, as educators, I argue, with their quick adaptability to new technologies, learners could benefit from the potential mobile learning has to offer if correct pedagogy and guidance provided. Just as we were taught how to hand write beautifully almost like calligraphy, made to memorise the multiplication table, or taught how to read the periodic table, all of which did not happen overnight but required guidance, patience and time, we could and should teach the learners of the digital age how to go beyond being the consumers of the technology and social media.

2.5. Teachers in the Digital Age

Many of our schools are good schools, if only this were 1965 - Louise Stoll & Dean Fink

While it is now commonly agreed that the learners have changed, thus they need different, updated learning experiences, the role of teachers is expected to change accordingly (European Parliament, 2015), which we have yet to see. As Amin (2016) argues "With a simple click to access countless information and resources, the role of teachers as authoritative single provider of knowledge and skills has been challenged by readily available information technology" (p.41). However, that is not to say that education does not need teachers anymore. Timor (2014) argues that the roles and responsibilities of teachers have become even more complex and important with the increasing advances and ownership of technology. The European Parliament report (2015) asserts that simply providing the latest technologies does not mean positive change in education, and Carr (2010) highlights that the constant access to the Internet brings the possibility for distraction; thus give a way to 'grass-hopper-minds'. The report concludes that

without the support and guidance from teachers some students may not benefit from technology and not gain the desired skills. Amin (2016) explains the roles of teachers in the digital age as:

> The role of teachers has changed and continues to change from being an instructor to becoming a constructor, facilitator, coach, and creator of learning environments. Today teachers are required to be facilitators helping learners to make judgements about the quality and validity of new sources and knowledge, be open-minded and critical independent professionals, be active co-operators, collaborators, and mediators between learners and what they need to know, and providers to scaffold understanding. (p.41)

That being the case, teachers' roles need to be redefined (Johnson & McElroy, n.d.), and teachers should be provided with the right education and training (Resta & Carroll, n.d.). As the United States former secretary of education states in his 2009 speech, "*teacher preparation programs need revolutionary change – not evolutionary tinkering*" (Resta & Carroll, n.d.).

Unfortunately, while the need for new roles for teachers have been discussed and voiced in research and speeches, it has not collected the attention it deserves from the government and policy makers. The need to include teachers into any change in order to achieve success has been heavily discussed in the literature, and I shall show similar results in this research too. As the European Parliament report suggests teachers could influence their students, therefore, if the aim is to revolutionise the education, teacher education should be brought to today's requirements, and teachers should be equipped with the skills even before sent to schools.

2.6. Mobile Devices in Education

> *I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely the use of textbooks*—Thomas Edison, 1922

As mentioned before, technology has always been a part of education from the invention of the very first computers to today's versatile mobile devices. Some of these technologies have enjoyed their long stay while others were only passing trends. Mobile devices look like they are here to stay, and with the advances in technology, personal mobile devices have reached a mature state (Traxler, 2008) which are now almost as reliable as desktop computers. Traxler (ibid, p.6), however, argues that technology has always been "parasitic" in education; it was never intended for education but appropriated into educational contexts (Crook, 2012). Regardless, an increasing number of institutions and governments have invested in some sort of mobile technology in the hopes of supporting or improving education.

Mobile devices have collected a lot of attention from educators and researchers due to their portability, light weight, orientation flexibility, expediency, context sensitivity, potential to provide instant access to online resources, ability to create personalized and interactive learning experiences, and relatively low cost (Song, 2011; Klopfer, Squire & Jenkins, 2002; Goundar, 2011). With all these features and functions mobile devices could adapt to different needs and requirements which are demanded by today's learners. Chen, Kao & Sheu (2003) state that mobile devices have the capability to satisfy the "urgency of learning need" and provide "initiative of knowledge acquisition, mobility of learning setting, interactivity of the learning process, situating of instructional activity, and integration of instructional content" (p.348).

Efficiency of mobile technologies as educational tools, however, is and has been under scrutiny. The potential opportunities and challenges offered by the mobile devices have divided the research community. As early as 2006, Cobcroft, Towers, Smith and Bruns argued that mobile learning could in fact help improve the quality of education and provide more personalised learning activities. And in 2011, Traxler, as one of the main proponents of mobile learning wrote extensively about how and where mobile learning was making a difference in our lives. He listed some of these as: contingent learning, situated and authentic learning, context aware learning, personalised and game based learning and so on. Sharples and Pea (2014) remark an opinion in the same direction with Traxler and claim that mobile devices are "enhancing [the] personal form of learning by connecting across time and space" (p.501). Savill-Smith, Attewell and Stead (2006) also suggest that mobile learning could provide diversity in learning activities and thus support the learning experience, while Elias (2011) and Crescente & Lee (2011) argued that mobile learning has the potential to provide richer learning experiences and help improve the literacy and numerical skills. There are several other research reporting positive outcomes from mobile technology initiatives (see Sharples, Londsdale, Meek, Rudman & Vavoula, 2007; Valdivia & Nussbaum, 2007; McFarlane, Triggs & Yee, 2008; Gray, 2011; Wallace, 2011)

On the other hand, the sceptical have criticised the unquestioned and unproblematised favouring of mobile device use in education, and have objected to the 'booster discourses' (Wright & Parchoma, 2011) and the 'sense of inevitability' (Hammond, 2013) created by the supporters. Player-Koro (2013, p.27) posited that to the contrary of the 'naïve faith' in potentials that new technologies could offer, ICT "has not changed education as much as anticipated by policy-makers and in research or solved its problems" (also see Reynolds, Trehorne & Tripp, 2003;

Soloway & Pryor, 1996). Supporting Player-Koro, Selwyn and Facer (2014) state "Despite the diversity and complexity of technologies in use, 'the digital' is now an expected but largely unremarkable feature of the educational landscape" (p.2). Surprisingly, Traxler, contrary to his earlier support for m-learning, in his Digifest 2016 speech asserted

> Mobile learning was e-learning's' dream come true. It offered the potential for completely personalised learning to be truly anytime, anywhere. Instead, we've ended up with mobile access to virtual learning environments that are being used as repositories (2016a, para. 1).

While the literature offers conflicting ideas and opinions on the effectiveness of mobile learning, in fact the ICT for that matter, there are others who take a more cautious stance and approach to ICT with a grain of salt. Hammond (2013), for example, argues that the impact of the ICT may not have been prevalent but its contribution is not trivial either; thus, its effects should be interpreted realistically.

In spite of the criticisms and varying, non-conclusive results from research, mobile devices are in demand by the education institutions, and there seems to be many more initiatives to come. In 2011, the Horizon Report flagged mobile devices as one of the emerging technologies with the "likelihood of entry into the mainstream for institutions within the next twelve months" (Johnson, Smith, Willis, Levine & Haywood, 2011, p.5). Likewise, in 2015, Tamin, Borokhovski, Pickup & Bernard published an extensive report examining the large-scale government supported tablet initiatives around the world and found that eleven countries have already implemented country wide initiatives, while tens of others have taken action at different scales which are explained later in this chapter. These reports indicate the extent that mobile devices have prevailed in education.

Just like the initiatives' scopes, the choice of mobile devices varies, and commonly preferred mobile devices in education differ in size, functionalities and prices (Georgiev, Georgieva & Smrikarov, 2004). Georgiev et.al (ibid) list the mobile devices that are commonly used for educational purposes as 'laptops, Personal Digital Assistants (PDAs), and mobile phones'. Considering the advances in technology in the last twelve years after their paper was published, one could see that tablets are missing from the list. Turner (n.d.) extends this list by adding the iPod, Kindle and gaming devices, such as xBox 360. Even though the list could be extended further, in this work, I only include the devices that are most commonly preferred in schools and appear in the literature. These devices are: laptops, PDAs, mobile phones and tablets. The focus of this research is on tablets, but here in order to demonstrate aspects of mobility I provide short accounts of three other mobile devices.

2.6.1. Laptops

A laptop is a fully functioning portable (smaller and lighter) computer equipped with a flip-up monitor, built-in keyboard and a battery (National Centre for Technology in Education, 2008b). Laptops have been commonly used in everyday life, as well as in education, due to their flexibility to carry around, increasing affordability and performance (Granberg and Witte, 2005). The reason for laptops' popularity in research is the high numbers of ownership rates, especially among university students. Research suggests that laptops help provide effective note-taking, improved organization and information storage, increased access to academic and supplemental resources, ability to work with subject-specific software, increased productivity and success, and increased peer collaboration (Kay & Lauricella, 2011; Kay, 2012). On the other hand, research

also shows that laptops do not always provide positive outcomes. Reasons for the potential negative outcomes are overall common for all mobile devices, such as surfing the web, engaging social media, or gaming during class, but laptops have a specific drawback due to their bigger screen sizes and upright screen position which lead not only the user but also neighboring students to become distracted (Kay & Lauricella, 2011; Fried, 2008). Even though the ownership rate is still high for laptops, students now prefer smaller devices (Dahlstrom, Boor, Grunwald & Vockler, 2011), and tablets are the focus of attention for institutions (Tamin et al., 2015).

2.6.2. Personal Digital Assistants (PDA)

A PDA is a small, portable, handheld device to keep things organized with storage and retrieval capabilities. Even though the later models include further functions such as Internet access, Bluetooth, music player and gaming, PDAs usually have four basic main functions: Contacts, Calendar, To-do list and Note taking (National Centre for Technology in Education, 2008a). PDAs started to appear in classrooms because they were readily available, inexpensive and enabled educators to perform simple tasks like accessing emails, managing calendars and synchronizing data with other computers (Ray, 2002). However, PDAs have now been made redundant by mobile phones as they have all the functions (and more) that a PDA had. Because it appears frequently in relatively older literature, I found it useful to provide a short account on PDAs. My literature search didn't turn any recent publications – latest ones were around 2011, and even the older literature on PDAs shows that these devices were mainly preferred for medical and nursing education. Although PDAs were capable of various tasks and could be used as instructional tools, as their functionalities suggest, they could mainly be categorized as

productivity tools. Data entry, data storage and information management were the main benefits of these devices (Luanrattana, Win & Fulcher, 2007). Whereas, technology incompatibility, data synchronization, data security are among the shortcomings of PDAs (ibid).

2.6.3. Mobile Phones

A mobile (or cell) phone, in a broad sense, is a portable hand held device that allows its users to make and receive voice calls, text and multimedia messages. Some newer models also offer computing capabilities and Internet connection are called Smartphones. Smartphones can store and retrieve information, send and receive emails, play games, watch and create media among many other action possibilities (National Centre for Technology in Education, 2008c). Even though mobile phones have been around for a while, their use in education is still in its infancy, and Smartphones are relatively newer. The main advantages that mobile phones offer are portability and ownership by most teenagers (National Centre for Technology in Education, 2008c; Thomas & McGee, 2012), while Smartphones could offer almost any functionality one can find on a computer. Livingston (2009) emphasizes the potential mobile phones could offer to education almost as a 'missed opportunity':

> The past decade has witnessed two revolutions in communication technology. The first — the Internet revolution — has changed everything in higher education. The second — the mobile phone revolution — has changed nothing. We're vaguely aware that our students have mobile phones (and annoyed when they forget to turn them off in class), but it hasn't occurred to us that the fact they have these devices might have anything to do with our effort to provide them with educational experiences and services (para. 2)

In line with Livingstone, UNESCO 2012 report on mobile learning suggests policy change in schools to allow mobile phone usage in formal education environments. Interestingly, as long

ago as 2009, Livingston emphasized the need to look at mobile phones from educational perspective and yet it is still being said in recent research. Merchant (2012) acknowledges the worthiness of looking into mobile phone use in education, but he and Crook (2012) indicate that everyday uses of mobile phones may not readily be appropriated to education.

There are other challenges to involving mobile phone use in education. Research suggest that small screens and the fact that learners have to scroll up and down could reduce the effectiveness of these devices (Özdemir, 2010). Also, the potential disruptive effects of mobile phone usage to classroom discipline are seen as a challenge (Kuznekoff, Munz & Titsworth, 2015; Froese et.al, 2012).

2.6.4. Tablets

A tablet is a fully equipped mobile computer usually operated by a touch of fingers or stylus instead of a keyboard and mouse, although many now have optional or integrated screenview keyboards. Twining et al. (2005) define a tablet as a smaller and lighter device with the all range of abilities of a personal computer. While this is a sufficient definition, it is, however, not complete. The boundary between mobile devices such as laptops, tablets and mobile phones have become fuzzy (Tamim et al., 2015; Trucano, 2013, 2015) as there are laptops that could be converted into tablets, whereas a tablet could act like a laptop with an integrated keyboard while Smartphones have become bigger in screen size and more powerful in their capabilities. Thus, to make things clear, throughout this research, a tablet is considered as a “device with a touch screen interface, screen sizes ranging from 5 inches to 12 inches, colour displays, Wi-Fi or 3G

internet connectivity, and advanced mobile operating system such as Apple iOS, Google Android, Windows 7 or BlackBerry" (Perrin, 2011). Nye (2010) outlines the features of tablets as mobility, lightweight, ability to run common programs, ability to adapt different screen orientations (landscape or portrait), ability to write or draw on the screen, and ability to be networked.

Since their arrival, tablets have become one of the latest technological trends in everyday life and in classrooms (Savas, 2014). However, despite their popularity, there is not much research on tablets and their impact on teaching and the learning process (Park, Parsons, Ryu, 2010; Diemer et al., 2012, Savas 2014). According to Heinrich (2012), not only the number of research on tablets educational use and impact is rare, but also the existing studies are problematic in terms of their credibility, scope, breadth and focus.

A limited number of studies suggest that tablets could be useful in providing more flexible ways for presentation with instant editing and revising options (Xiang et al., 2009), serving a digital replacement for the traditional white/black boards and pen-pencils (Anderson et al., 2004; Casas, Ochoa, Puente, 2009; Kam et al., 2005), freeing students from physical borders (Siozos et al., 2009), facilitating collective and collaborative learning activities (Alvarez, Brown, Nussbaum, 2011; Looi, Chen, 2010; Steimle, Brdiczka, Muhlhäuser, 2008) while also having potentials to enhance learning (Kim & Frick, 2011) by increasing student motivation (Furió, Juan, Seguí & Vivó, 2015; Burden, 2012). Nye (2010) suggests that tablets can improve interaction in classrooms and help teachers to reach information quickly and keep track of student progress effectively. Wahl (2003, as cited in Ozok, Benson, Chakraborty & Narcio, 2008) indicates that

new tablets can bridge the gap between pen-paper and digital technologies. Even though some other devices, such as PDAs or Smartphones, offer similar features with those of tablets, tablets' uniqueness in providing applications for different purposes, their larger, more intuitive and responsible screens (Guerrero, Ochoa & Pino, 2006), and longer battery life (Haßler, Major & Hennessy, 2015) distinguish them from other mobile devices. All the features and specification of tablets, as research suggests, translates into school context as; easy to handle ergonomic design for students, lightweight nature with required textbooks and extra materials with no need to carry heavy books anymore, shorter boot up time with instant connectivity to engage in activities, easy content upgrade if needed, flexible use in classroom activities between teacher and student, and long enough battery life for a day in school (Warschauer, 2011; GSMA-Global System Mobile Association, 2012).

While the potential tablets offer for education has been celebrated by some, and debate and discussions on the topic is ample, there is not much conclusive research to show that these potential has been taken up in schools (Falloon, 2014), and the majority of the existing research is either self-reported and anecdotal, or they are small scale and were conducted in specific institutions (Heinrich, 2012). Nguyen, Barton and Nguyen (2014) conducted a systematic review of literature on iPad use in higher education settings and concluded that even though the iPad seem to enhance the learning experience this does not necessarily reflect on the students' learning outcomes. Dhir, Gahwaji & Nyman (2013) also conducted a literature review on iPad and analyzed the results from empirical research and case studies. They reported there is not positive effect of using the iPad on learning outcomes. Falloon (2014), in his study, challenged the common belief that use of tablets motivates the students.

There are different types of tablets suitable for various kinds of practices. Gubacs-Collins & Juniu (2009) defines two types of tablets as the notebook model and slates. Slates are the tablets commonly used today; they don't have a keyboard or mouse. Notebook tablets are slate tablets attached to a keyboard, which are 180 degrees rotatable to lie against the back of the keyboard. They can easily be transformed into a laptop or tablet. Slate style tablets are the most commonly used ones today, and due to their light weight, mobility and lower prices, they are considered to be the most suitable type for educational purposes. The most well-known slate tablet is undoubtedly Apple's iPad which is believed to be the 'ideal tool' for education (Dhir et al., 2013).

Contrary to the belief that the iPad has the potential to be the best tablet for education yet, the tablets provided within the scope of Fatih Project, which is the focus of this study, are Android devices produced by several different companies. The Turkish Ministry of National Education had several reasons behind this decision and the most obvious one is cost. However, the restricted nature of the iPad was also another reason for their choice which is explained in detail in the coming sections.

Table 2 below shows the overall differences between tablets, PDAs, laptops and mobile phones. I originally adopted the table from Gubacs-Collins & Juniu (2009) and updated it a while ago, however, this is now the third version and it is likely to need to be updated next year. The information in the table is intended to represent the latest state of these devices, so, for example, when mobile phones are considered, it should be noted that the information in the table is for

Smartphones, or when PDAs are in questions, the information is from the latest literature and news as PDAs are not commonly in use any more.

Table 2: Comparison Table for Most Commonly Used Mobile Devices

Features	PDA	Laptop	Tablet	Mobile Phone
Screen	Small (Hard to read and write long documents)	Larger	Larger	Small to Medium
Weight	Lightweight	Heavier	Lightweight	Lightweight
Size	Small and easy to carry in a pocket	Large, but can be carried in a case	Medium, but easy to carry in a case	Small and easy to carry in a pocket
Media Functions	Pictures MP3 Video Integrated camera(depend on the model)	Pictures MP3 Video DVD Other Software Integrated camera	Pictures MP3 Video DVD (external) Other Software Integrated front and back camera	Pictures MP3 Video Other Software Integrated front and back camera
Resolution	Low resolution	High resolution	High resolution	High resolution
Battery Life	Longer Battery Life (Some use AAA batteries, which easily last for a month)	Shorter Battery Life (Normally lasts 5 or 6 hours at the most)	Decent Battery Life (Varies between 6 to 10 hours)	Short Battery Life (Most models needs charging at least once a day)
Connectivity	Wi-Fi	Wi-Fi Cable connection	Wi-Fi Network connection through a Sim card	Wi-Fi Network connection through a Sim card
Data Entry	Typing on the screen using integrated or external keyboard Data entry is more difficult and slower Voice Recording	Typing using keyboard Fast data entry Voice Recording	Typing on the screen using a finger, stylus, and digital or integrated keyboard Fast data entry Data entry is more intuitive Voice Recording	Typing on the screen using a finger or stylus Relatively fast data entry Voice Recording
Average Cost	Cheap A great amount of freeware	Affordable but expensive models exist Expensive software	Affordable A great amount of free apps	Affordable A great amount of free apps

Electronic Presentation	Slideshow presentation and screen projection using extra gadgets Small projection size	Slideshow presentation as any laptop computer Large projection size	Slideshow presentation as any laptop computer and screen projections using extra gadgets Large projection size	Can view Slideshow presentation
Processor	Easier to start	Longer to boot up	Short boot up time	Short boot up time
Memory	Smaller hard drive and RAM External memory cards	Larger hard drive and RAM External memory cards	Larger hard drive and RAM External memory cards	Recent models have relatively larger hard drives and RAM External memory cards
CD/DVD-RW	None	Internal	External	None
Virus	Lower threat of virus attacks	More susceptible to virus threats	Lower threat of virus attacks	Lower threat of virus attacks
Teaching and Learning Features	Dynamic documents Interactive textbook Drawing Digital note-taking Connectivity	Dynamic documents Interactive textbook Lecture capture Digital note-taking Connectivity	Dynamic documents Interactive textbook Lecture capture Drawing Digital note-taking Connectivity Interactive applications Adaptive learning applications Collaboration Individuality Context sensitivity	Dynamic documents Lecture capture Drawing Digital note-taking Connectivity Interactive applications Adaptive learning applications Collaboration Individuality Context sensitivity

Adapted from Gubacs-Collins & Juniu (2009), and updated July 2016

Even though the research to date has yielded conflicting results, considering the benefits that tablets could provide over other mobile devices, and the promising research results, tablets, coupled with the correct pedagogy, could enable presenting classroom materials in new ways. As George Couros beautifully expresses:

> Technology will never replace great teachers, but technology in the hands of a great teacher can be transformational (2014)

And if this transformation could ever be achieved, tablets seem to be a good point to start from. However, despite the growing body of research, there is still a need for more research in order to understand advantages or disadvantages of tablets in educational settings in comparison to its ancestors (Alvarez, Brown & Nussbaum, 2011). Therefore, this study will contribute to literature on educational use of tablets.

2.7. Affordance Theory, Its Applications in ICT and Affordances of Mobile Devices

Rapidly growing selections of mobile technologies and increasing demand for these new devices has created a need to investigate their educational affordances. The term 'affordance' was first introduced by Gibson (1977) and it has attracted a lot of attention from researchers across several disciplines as well as in ICT. Gibson (1979) defines an affordance as:

> … what it (the environment) offers the animal, what it provides or furnishes, either for good or ill. … I mean by it (affordance) something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment (p.127).

Gibson was a psychologist specialising in the field of visual perception which he promoted as ecological psychology. He first introduced the term "affordance" in his work "The Theory of Affordances" and explored the concept in depth in his book "The Ecological Approach to Visual Perception". Because his focus was ecological issues, his definition of an affordance is shaped around the relation between animals and the environment. Researchers have used this idea of affordance as a metaphor in other fields.

In Gibson's affordance concept there are three central properties: existence of an affordance is relative to the action capabilities of an actor; an affordance exists independent from the actor's ability to perceive it; an affordance either exists or does not exist and it does not change relative to the needs and goals of the actor (McGrenere & Ho, 2000).

Later Norman (1988) in his book 'The Psychology of Everyday Things' redefined affordance for the Human Computer Interaction (HCI) domain and assigned a different meaning to it by including "perception" in his definition. Thus, Norman encapsulated subjective interpretation and mental activity, which were dismissed in Gibson's concept explicitly, by moving from Gibson's objective "real affordances" to "perceived affordances" (Wright & Parchoma, 2011). According to Norman;

> …the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used. A chair affords ("is for") support, and, therefore, affords sitting (p.9).

Norman's definition has been recognised in some fields mainly in design, especially in Human Computer Interaction (HCI). McGrenere & Ho (2000, p.3) compare this similar yet different concept of affordances as;

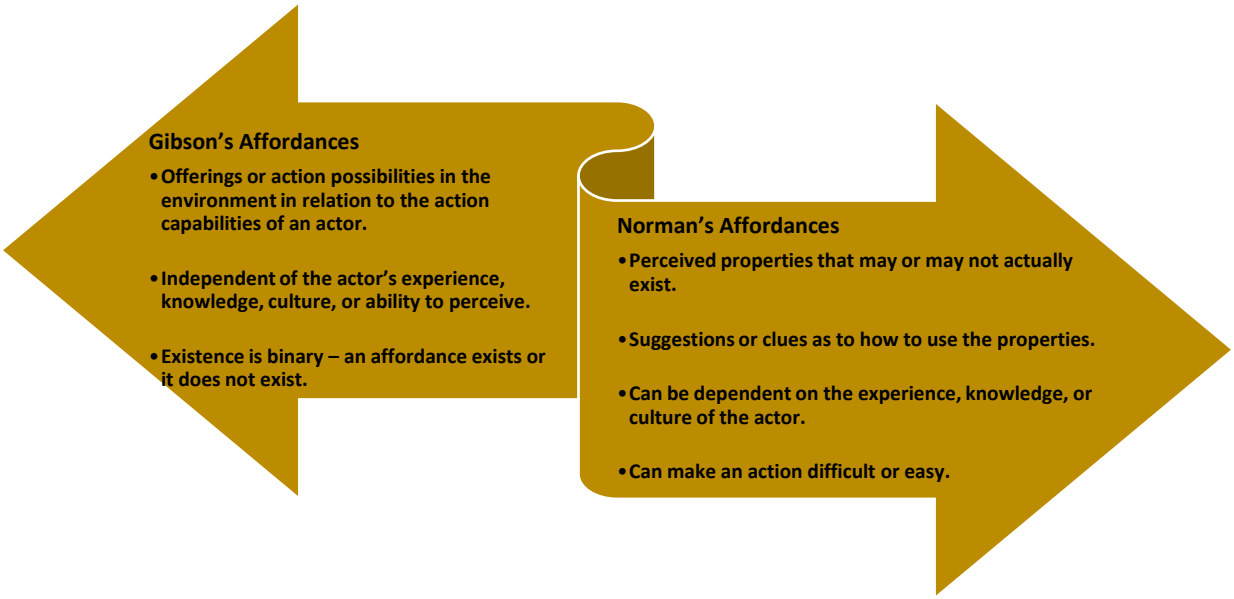


Figure 3: Comparison of Gibson's and Norman's Affordances

Due to its different uses in different disciplines, the concept of affordance shows variance in the literature. "Despite its avowed centrality there remains considerable uncertainty about exactly what is meant by affordance" (Stoffregen, 2003, p.115). McGrenere & Ho (2000) argue that the concept of affordance is not well understood, and Wright & Parchoma (2011) criticize that the term "affordance" is adopted and used uncritically. Nevertheless, the idea of affordance has been increasingly used and researched in education, specifically in investigating and describing the possible educational affordances of mobile devices. Boyle & Cook (2004) and Oliver (2005) criticise Gibson's concept of affordance for being positivist, materialist, unsocial and non-constructivist, while claiming that he ignores the values educationalists would value, such as perception. And the same accounts critique Norman's concept being as problematic as that of Gibson. The discussions do not seem to come to a conclusion in the near future, and it is not my

intention to dive deep into it. However, I find the concept a useful one in the context of ICT. Thus, without going any further into discussion, I approach the concept from an ICT perspective. Hammond (2010) defines an affordance as "a relation between an organism and an object with the object perceived in relation to the needs of the organism" (p.1). Therefore, it is not only the properties of an object that makes an affordance possible, but it is the relationship between the object and an actor who has specific needs, perception, background and so on, all of which help the actor to perceive affordances. Because affordances are perceived based on the needs of an actor, affordances of an item might be variant for every actor. Therefore, the concept of affordance with regards to ICT could be interpreted as the 'possible learning/teaching actions directed by the needs of the learner, and could be taken using a specific technology'. Affordances of ICTs are bidirectional relationships between the "capabilities of a technology" and the "abilities of the learner" (Hammond, 2010; Song & Fox, 2008), and the very same technology might afford different learning actions to different learners depending on their needs (Hammond, 2010). Thus, affordances of tablets could be defined as the relationship between a tablet and a student where the properties of the tables are perceived in relation to the needs of the student (Hammond, 2010; Song & Fox, 2008).

There have been several research studies to identify educational affordances of mobile technologies.

Figure **4** below is a quick snapshot of educational affordances of mobile technologies which have been identified by research and Table 3 is a summary of these studies. Information in Table 3 was gathered from a small-scale literature review of the most cited papers on educational affordances of mobile technologies. Since tablets are one of the latest generation mobile devices,

information provided in the table is useful to identify possible affordances of a tablet. Kress (2010) argues that understanding the affordances of ICTs will help us to enlighten the processes and skills they offer and the ones that they do not; therefore, providing a more solid ground in understanding their adoption or rejection in schools. Gaver (1991) suggests that "considering affordances explicitly in design may help suggest ways to improve the usability of new artifacts" (p.83) where 'usability' is one of the main finding of this research as explained in the following chapters. That is, by identifying the possibilities a tablet offers for educational purposes, we can design more effective and efficient pedagogies as well as devices themselves, which in turn help to avoid or minimise resistance to or rejection of a technology.

Figure 4: Educational affordances of mobile technologies as identified in the literature

Table 3: Educational affordances of mobile technologies as identified in the literature

Research	Affordances
Klopfer, Squire & Jenkins (2002) investigated the use of handheld devices for computer simulations, and defined five properties that may produce unique educational affordances.	1. **Portability:** Ability to take the device anywhere 2. **Social Interactivity:** Exchanging data, and collaboration with others 3. **Context Sensitivity:** Gathering data just in time and place 4. **Connectivity:** Exchanging photos, ideas and files 5. **Individuality:** Customised personal platform
Conole & Dyke (2004) looked into the effects of ICT affordances in facilitating educational practice, and created a taxonomy of ICT affordances.	1. **Accessibility:** Easy access to large amount of information 2. **Speed of change:** Rapid changing information through communication technologies 3. **Diversity:** Access to diverse communities and experiences 4. **Communication and collaboration:** Information flow through dialog and communication in online environments 5. **Reflection:** Participation in discussions longer than face-to-face discussions, accessing archived materials, potential to reflection and critique 6. **Multimodal and non-linear:** ICT enables experiencing non-linear pathways for learning 7. **Risk, fragility and uncertainty:** ICT may involve rejection, misuse, abuse, system errors etc. 8. **Immediacy:** Speed of information exchange has intensified the work load with requests from other users 9. **Monopolization:** Dominance of particular products 10. **Surveillance:** Concerns due to monitoring and tracking applications' misuse
Patten, Arnedillo-Sanchez and Tangey (2006) categorized the educational applications of handheld devices to understand which ones take advantage of the unique features of these devices, and developed a functional framework which incorporates functionality and pedagogy.	1. **Administration** – provides information storage and retrieval 2. **Referential** – 'office style' tools, such as dictionaries, translators and e-books 3. **Interactive** – provides user engagement through a response and feedback approach 4. **Microworld** – teaching through samples of real world applications 5. **Data collection** – data recording 6. **Location aware** – provides interaction with the environment 7. **Collaborative** – creates collaborative learning environments
Clough, Jones, McAndrew & Scanlon (2007) investigated adults' informal learning activities by using handheld devices. They adopted Patten et al (2006)'s framework and created a framework for informal mobile learning.	1. **Referential Activities:** Use of referential applications such as e-books, dictionaries etc. 2. **Location aware Activities:** Activities that enable interaction with the environment. 3. **Reflective Activities:** Reflecting upon local and global materials by using mobile device storage or web. 4. **Data collection Activities:** Use of mobile devices for data

	recording 5. **Constructive Activities:** Learners can create or construct knowledge individually or in contact with others. 6. **Administrative Activities:** Use of applications like Contacts, Calendar etc.
Churchill and Churchill (2008) examined a technical education teacher's exploration of a PDA, and defined five educational affordances.	1. **Multimedia-access tool**: Access to variety of multimedia resources 2. **Connectivity tool**: Ability to connect others, facilitators and experts, built collaborative understanding 3. **Capture tool:** Applications to capture videos or photos 4. **Representational tool**: Use of devices to demonstrate thinking and knowledge by creating presentations or mind maps 5. **Analytical tool**: Employing the devices to manipulate data or variables, such as graphic calculators.
Cheung & Hew (2009) reviewed the research methodologies used in studies on mobile handheld devices in K-12 and higher education settings and categorized the uses of handheld devices.	1. **Multimedia access tool:** Accessing multimedia resources such as e-books, web pages and databases. 2. **Communication tool:** Using handheld devices to communicate information. 3. **Capture tool:** Use of devices to capture data and media. 4. **Representational tool:** Use of devices to represent thinking, ideas, experiences and knowledge. 5. **Analytical tool:** Employment of devices to manipulate data or variables, such as graphic calculators. 6. **Assessment tool:** Employment of devices for students to answer exam questions, tests or quizzes. 7. **Task managing tool:** Employment of devices as personal information managers such as calendars, contacts, documenting or recording students' grades, attendance, homework etc.
Liaw, Hatala & Huang (2010) reported the results from their study on m-learning and categorized the educational affordances of mobile devices into five applications.	1. **Educational content and knowledge delivery application:** Use of handheld devices as a means to receive and send educational information. 2. **Adaptive learning application:** Design and use of adaptive learning environments on handheld devices. 3. **Interactive application:** Creating mobile learning systems to increase interaction and communication between students and teachers. 4. **Individual application:** This application provides information and services depending on users' location and needs. 5. **Collaborative application:** With the help of devices' interaction and communication features, this application encourages knowledge sharing and construction.
Melhuish & Falloon (2010) identified five main affordances of mobile devices based on the available literature. These	1. **Portability:** Enables learning in the 3rd places without any time and place restriction 2. **Affordable and Ubiquitous Access:** Provides greater equity and inclusion with digital devices in the hands of more users

affordances are results of a theoretical think-piece rather than an empirical research.	3. **Situated, just-in-time learning:** Blurred boundaries between formal and informal learning 4. **Connection and Convergence**: Increased social interactivity and connectivity 5. **Individualised and Personalised Experiences:** Provides tailored learning experiences depending on the learners' need
Churchill, Fox & King (2012) created categories based on their study on the apps downloaded by teachers to their iPads and use of these apps.	1. **Productivity tools:** Word-processing, document annotation, multi-media creation tools. 2. **Teaching tools:** Tools that support teaching such as Moodle, Prezi Viewer, Clicker Scholl etc. 3. **Notes tools:** Tools for note taking, typing, drawing or audio recording. 4. **Communication tools:** Tools that provides communication, such as social networking apps, email etc. 5. **Drives:** Tools that allow connectivity to the cloud, network or a computer, such as Dropbox, Google Drive etc. 6. **Blogging tools:** Apps that allow convenient blogging. 7. **Content accessing tools:** Tools like e-books, multi-media materials and video accessing tools, such as YouTube, iTunes, iBook etc.
Cochrane, Narayan & OldFiled (2013) explored the impact of previous m-learning projects on the pedagogical approaches. They defined four pedagogical affordances of iPads.	1. **Media Creation and Editing:** Enables the creation of learner-centred contents through available media creation tools. 2. **Augmented Reality:** Through the use of camera and GPS capabilities, iPads enables mapping, geotagging, navigation, therefore supporting situated learning. 3. **Productivity:** With tools like sketchpad, eBooks, presentation applications, musical creativity apps, iPads enable learners to produce their own learning materials. 4. **Collaboration:** Through cloud computing, blogging, mind mapping, polling etc., iPads enable learners to collaborate on knowledge creation.

Some of the studies cited in the table used PDAs for their research which are no longer in use. However, because a tablet embodies almost all functionalities of a PDA, there might be points where they share common affordances. For this reason, PDA literature is also included in the table.

As much as there are similarities with PDAs, tablets are essentially new devices for educational computing with capabilities to not only consume information but also produce it (Walters & Baum, 2011). Therefore, I argue, notwithstanding critiques of the concept, it is important to identify the affordances of a tablet. Based on the information in Table 3, I have contributed Table 4 below which shows the educational affordances of tablets. There may be others to be added to the list, or affordances might show slight differences depending on the brand or the operating system as well as the user's perception. This table covers the affordances which are mentioned in research frequently, some are not too popular but I consider to be important, such as game-based learning, and the ones unfolded during the field work.

Table 4: Educational Affordances of Tablets

Educational Affordances of Tablets	
Portability and Mobility	Relatively small size and lightweight makes it possible to move from place to place, making it easy for students to carry to school, or carry around in the classroom for group activities while still being connected. Portability and mobility offer the possibility to overcome the physicality of school (Kress, 2010).
Connectivity	A tablet's ability to connect to internet thorough Wi-Fi or 3G enables students to reach other sources.
Productivity	Through the available applications a tablet separates itself from other mobile devices for being not only a consumption tool but also a production tool. It enables students to produce their own work, such as note taking, presentations and multimedia production.
Interaction and Collaboration	A tablet has a potential to increase interaction and collaboration between classmates, or others in distance. Its ability to reach and share information just in time enables students to share ideas, experiences and information interactively and contribute each other's work.
Individuality	A tablet also supports individual learning activities both in class and outside the class.
Personalized and Adaptive Learning	Through the increasing number of learning platforms and apps compatible with tablets, students can personalize their learning while the platforms or apps store student information and adapt the materials to be presented adaptively.
Student-centred learning	Through the versatile apps and actions, students can produce their own learning materials, teach each other via collaboration or reach any information while away from school.
Data Storage and Retrieval	A tablet can store relatively large amount of data, and provides easy access to them.
Location and Context awareness	A tablet can sense and react based on the environment. Students can identify and share their locations, geotagging information, videos or photos about the place, while receiving any information specific to that place, such as digital museum guides.
Instant Feedback	Many educational apps are capable to give instant feedback, while students also can get online feedback from peers.
Game based learning	With their advanced graphics, processor and memory, tablets can handle majority of the games available on the market. Teaching and learning thorough games have become popular, and tablets' mobility and connectivity features could enable students to be connected while on the move and have fun while learning.

Information in Table 4 is a helpful guide to see what tablets are capable of and which of these capabilities are taken advantage of in schools and which ones never exploited. As mentioned before, exploring tablets' affordances can help design more effective and efficient curriculums and pedagogies, therefore minimizing the risk of resistance or rejection. Thus, these affordances can play an important role in understanding students' and teachers' approaches to using them for educational activities as technology acceptance and rejection heavily depend on the users' expectations and at what level the tablets satisfy these expectations.

In this section, I tried to bring an explanation to the much-debated concept of an 'affordance' from an ICT point of view, and define possible educational affordances of tablets. Many researchers offer a word of caution in using the word 'affordance' due to its polysemic nature, however, if a definition is offered as I attempted here, the concept of affordance could be useful in understanding the possibilities a specific technology offers.

2.8. Tablet Initiatives around the World

As mentioned earlier, lately tablets have collected a lot of attention from researchers, educators, institutions and governments. Dozens of countries have jumped on the bandwagon and implemented projects with varied scopes. Trucano (2013) explains this as "just the latest manifestation of a long-observed trend that refuses to die: that of simply wanting to buy the latest popular gadget for use in schools" (para. 15) while Tamin et.al. (2015) provide common discourses for implementing tablets from their literature review as "improve student learning with anytime anywhere access"; "support social inclusion"; "induce paradigm shift in

education"; "promote independent learning"; "offer individualised and personalised education"; "narrow the digital divide"; "increase knowledge beyond books"; and "enable future citizens through connectivity and independence" (p.23).

Whatever the reason might be behind these projects, these initiatives all start with excitement and promises, while, unfortunately, the majority of them couldn't be sustained. Some of the projects have been terminated or the devices were retracted due to various reasons such as cost or internal problems (see Thailand's One Tablet Per Child), some are still continuing ploughing through their way (see the Fatih Project of Turkey). Due to the large number of initiatives exist around the world, it is hard to cover them all, therefore, for the purpose of this thesis, I will provide brief accounts of several initiatives which are mainly run by the local or national governments, and then, in the next section, provide more detailed information on the Fatih project where this research took place.

In a relatively recent Commonwealth of Learning (COL) report Tamim et.al (2015) identified 60 countries that have run educational ICT projects at different scales but their focus was on the large-scale government supported tablet initiatives which gave results for 11 countries. These 11 countries are listed in the Table 5 below. The report notes that:

> A growing number of countries are embarking on large-scale, government-supported initiatives to distribute tablet devices to students in the K–12 schooling sector. Unfortunately, there is a misconception that by simply putting this technology in the hands of students, educational access issues will be resolved and educational transformation will occur…An extensive literature search and data extracted from identified documents showed that 11 countries have launched government-led tablet initiatives. The review concluded that the majority of these initiatives have been driven by the tablet hype rather than by educational frameworks or research-based evidence (p. 2) …none of the identified initiatives was supported by a rationale or evidence for why

> tablets in general would help achieve the articulated objectives, let alone be supported by the reasons for selecting a particular brand or type of tablet (p.23)

The report and ultimately the table is a useful summary of some of the large-scale initiatives around the world, and the details of the projects. However, the scope or direction of the projects could change quickly, therefore, the information in the table might not reflect the final situation those projects are in, such as, the final amount has been spent or the types of device.

Table 5: Large-scale Government Supported Tablet Initiatives

	Level Of Application	Body In Charge	Scope Of The Programme	Type Of Device	Grade Level	Educational Specifications	Financial Model	Cost (Usd)
Antigua & Barbuda	National	Ministry of Telecommunications, Science and Technology	3,000 tablets	Samsung Galaxy tablets with 4G LTE connectivity	Grades 4–5	Not specified	Largely funded by Digicel	$9 million
Australia	Provincial: Queensland & New South Wales	Queensland Department of Education, Training and Employment New South Wales Department of Education and Communities	Over 14,000 devices	iPads and Windows 8 tablets from Acer: Iconia W701 with 3G mobile broadband	Across grades (K–12)	Not specified	Partly funded by the National Secondary School Computer Fund government initiative Also: Bring Your	Own Device Over $12.9 million
Brazil	National	Ministry of Education	Over 460,000 devices	iPads	Grades 6–9	Not specified	Government funded tenders for local companies.	Over $75 million
India	National & Provincial	Ministry of Human Resource Development	35,819 public provincial schools and 100,000 university students nationally	My Class Buddy (A 700 E and A722G E); Aakash 2 tablet (UK, DataWind Inc)	Grade 8; contest winners at provincial level; university students	Smart School Solution	Public–private (Amtrak commercial enterprise) partnership provincially; government subsidised (half price) nationally	Total is not specified; $40–$110 per device

Iran	National: initial stage is for Tehran schools	Ministry of Education	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified
Jamaica	National	Ministry of Science, Technology, Energy and Mining and Ministry of Education	24,000 students and 1,200 teachers; 25,000 tablets	Not specified	All levels of education	Not specified	Paid from the government Universal Service Fund	$1.4 billion
Kazakhstan	National	Not specified	44 schools; 83,000 tablets	Not specified	Not specified	Access to relevant digital content	Not specified	Not specified
Pakistan	Provincial: Punjab State	Provincial Ministry of Education	55,000 public sector schools; 1.2 million students	Not specified	Grades 8–10	Access to relevant digital content	Not specified	Total not specified; $50 per device
Russia	National	Ministry of Education	Over 1,000 classroom	Plastic Logic (a portable e-book/ tablet hybrid)	Grade 1–6	Not specified	Government via Rusnano state corporation	Total not specified; $420 per device
Turkey	National	Ministry of Education with support from Ministry of Transport, Maritime Affairs and Communications	570,000 classrooms in 42,000 schools of 81 provinces; over 10 million students	PC tablets	Across grades (K–12)	Access to and management of relevant digital content	In-service training of teachers; government issued tenders for suppliers	$1.4 billion
United Arab Emirates (UAE)	National	UAE Prime Minister	200,000 devices	iPads; high-speed 4G networks	All levels of education	Not specified	Government funded	Over $272 million

Source: Tamim et.al. (2015

Also, as useful as it could be, the COL report has its shortcomings. The information and findings of the report were mainly based on the media reports and mentions about the initiatives rather than academic sources, and language was a barrier to examine the actual government documents (Tamim et.al., 2015). Therefore, the table is only to provide a snapshot of the countries that have embarked on this journey rather than drawing any conclusions from it based on the paper it was published which may not be reliable due to the methodological restrictions of the report (Trucano, 2015).

The majority of the projects in the COL report ended with disappointment. The reasons behind unsuccessful or failed initiatives vary as explained in the examples below, but there are common mistakes to learn from each project.

In 2012, Thailand launched an educational tablet project which promised to be the first and biggest tablet procurement and distribution initiative of its kind (Viriyapong & Harfield, 2013). The project did not live long due to political disorder inside the country which concluded with a military coup in 2014 (Chiangrai Times, 2015).

In another attempt to provide educational tablets the Los Angeles Unified School District (LAUSD) aimed to deliver tablets to every student and teacher in the district under the Common Core Technology Project (CCTP). The project, which started in 2013, was one of the most ambitious ICT initiatives in the history of the USA as the LAUSD is the second largest school system in the country. In the scope of the project, the district delivered ‘protected’ iPads which blocks access to social networks, and loaded with relevant course documents. The project

continued less than two years until when in 2015 the LAUSD halted the project and the FBI was involved in an allegedly bid rigging case. However, Gliksman (2014) criticizes the fact that the project was suspended due the allegations whereas the main problem was with the planning and implementation of the entire process. He highlights that "Poor infrastructure, overzealous filtering, incomplete apps, and inadequate training are not the ingredients of an educational revolution" (para. 6) which, he argues, were the main problems of the CCTP.

India, in 2011, embarked on the Aakash project, which aimed to get educational tablets produced at a low price and distribute to the students in the system. In early 2011, the government and a Canadian company signed a contract and later same year the first batch of tablets were delivered. According to Rabkin's (2012) report a third of the tablets did not even boot up while the rest had other issues. Again, due to internal conflict and resignation of the responsible people, India is hoped to have learnt from their failure. Nonetheless, it might seem like a failure due to internal problems but it was, again, a bad planned project like many others.

Even though not included in the COL report, another country that has chosen to provide tablets is Malta. In 2014, Malta launched the pilot phase of its 'One Tablet Per Child' project in order to examine the impacts of tablets before going nationwide (education.gov.mt, 2014). My search on the final situation of the pilot did not provide much result, but in a news report Malta's Union of Teachers' president, Kevin Bonello, said that every country is different, so something may work for a country while it doesn't for another (Caruana, 2015). He added that the participating teachers had reported positive results so far.

As Bonello reported, every country is different, and so are their experiences with tablet initiatives. However, how different each country or their educational systems might be, apart from the extreme cases such as Thailand's internal problems, the mistakes or the reasons of failure behind the initiatives are quite common. And often, even though the political aspects of the failure occupy the agenda, the initiatives either fail due to poor planning or rejection form the students and/or users, an issue this research is an attempt to shed light on. Turcano's (2013) advice is one should be heard:

> As in other parts of life, in education the answer you get is usually a function of the question you ask. In the process of attempting to formulate their questions related to the purchases and implementations of huge numbers of new laptops or tablets (or whatever tomorrow's device of choice may be) to help support teaching and learning, hopefully more education policymakers and politicians will take the time and effort to try to learn from the experiences of their counterparts in other countries who have already been down similar paths. While studying lessons, both positive and negative, from some of the countries listed here may not provide them with all of the answers they seek, doing so just might help some of them re-think and re-frame some of the questions they are asking.

In keeping with Trucano, there are lessons to be learnt from each case whether it is successful or not. And following the examples from other countries which is likely to grow in number in the near future, next I explain the case of Turkey with the Fatih project which is claimed to be the largest educational tablet initiative of its kind after the Thailand's decision to cancel its project (Trucano, 2013).

2.8.1. The Fatih Project

In 2010, The Turkish Ministry of National Education has launched a countrywide ICT program called the "Movement of Enhancing Opportunities and Improving Technology", known as the

‘Fatih Project’. The aim of the project is to create ‘Smart Classes’ all around the country by placing LCD Smart Boards in the classrooms and providing tablets to every student and teacher. The Fatih Project aims to enable equal opportunities in education, improve learning-teaching processes and prepare the young brains for the future. During the preparation of my confirmation review paper in 2014, estimated numbers of devices to be distributed was provided in the official government website which are not available any more. It was, back then, estimated that throughout the project, 42.000 schools and 57.000 classes would be equipped with the required infrastructure and the latest technologies including laptops, overhead projectors, smartboards, multipurpose printers, wired and wireless Internet connection (www.fatihprojesi.meb.gov.tr, 2012).

Even though the project was launched in 2012, the first tablets were distrusted by the Turkish Ministry of National Education in 2013. There have been several different companies with whom the Ministry signed a contract as the providers. The tendency has always been to make a deal with two or three providers, at least one of whom would be a domestic company. Among these companies there have been Samsung, General Mobile, Vestel and lately Arçelik is speculated. Initially the number of companies who wanted to make a bid for the project was higher but some of them were either found to be unfit or very expensive. One of the initial requirements for the providers was to provide a device which works on the Android Operation System. This was where Apple and Windows were eliminated. Even though iPads were considered at first there were said to be other reasons behind the choice for Android. First it is being an open ecosystem which allows developers to easily develop new applications or programs; secondly there are more companies that produce Android devices rather than the monopoly of Apple on the iPad;

thirdly iPads do not have a USB port; and finally Android devices are compatible with other hardware while compatibility is a general problem with any Apple products. Thus, the decision was made to buy Android devices initially from Samsung, General Mobile and Vestel.

The tablets provided are identical to their commercial counterparts, only that some of the features have been disabled by the provider with the order of the Ministry, such as downloading games or accessing social networks which unfortunately seems to be common practice for similar initiatives around the world such as the LA's Common Core Technology Project.

According to the current education system in Turkey, compulsory education is 12 years divided as 4+4+4 which corresponds to; elementary school, middle school and secondary school. The tablet phase of the pilot project was started with the 9^{th} graders, who started secondary school in September 2013. In the second phase of tablet distribution, more students were provided tablets in February 2014.

The project was aimed to be complete in 5 years, which was 2015, however it is still on-going. According to news reports, government officials had announced that since the tablet distribution stage started in 2013, the projected completion date is the end of 2018. Commentators argue this is to be a good sign that the project has not been a total failure and the Ministry is still working to make it right (Nebil, 2016). Also, the original plan was reported to distribute 10 to 14 million tablets. This number has not been reached but the same sources report that negotiations are on-going with three companies to provide new set of tablets with better, up to date specifications.

The Fatih Project has become a very important step in Turkey's education history, and around the world with its size. I believe that it is specifically important to understand how less developed or developing countries deal with the transitioning process due to insufficient infrastructure and conventional opinions of the public about education. Even though it is often the developing countries that undertake large-scale initiatives, as Göğüş, Nistor and Lerche (2012) point out; most of the research on technology acceptance has been conducted in technologically advanced, infrastructure-ready countries. Therefore, further research on developing countries could provide assistance for the countries that are planning to implement such programs.

2.9. Educational Technology Acceptance

Weiser (1999) argues, "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" (p. 1). Looking at the current state of mobile devices, one could argue that we might have found the technologies to which Weiser was referring. However, not every new technology is as easily accepted as others, and often it is the user acceptance rather than the sophistication of technology that helps penetrate into people's lives. In other words, user acceptance is crucial for a new technology to be successful (Davis, 1993), and understanding why and how people accept or reject a new technology has been a challenging question across fields such as business, information systems, and education (Swanson, 1974 as cited in Davis, Bagozzi & Warshaw, 1989; Venkatesh, Thong & Xu, 2012; Straub, 2009), and the answer has yet to be found.

Besides, an even more challenging question is to understand the factors that make a piece of technology accepted in one context while it is rejected in another.

Educational institutions have been adopting the latest technologies to increase the effectiveness and the quality of education. However, most initiatives end up with disappointment due to low adoption by students, teachers or even school principals. Even though new technology integration usually requires higher-level decisions, the success is determined by individuals' adoption behaviours (Straub, 2009). As Fichman (1992, p.203) emphasizes

> The relative lack of attention to individual adoption of technologies is unfortunate because, while the organization as a whole makes the initial adoption decision for such technologies, the actions of individual adopters (e.g., how enthusiastically they embrace the innovation) can be expected to have a large impact on the implementation process.

Therefore, investigating technology acceptance at the individual level is important (Sultan & Chan, 2000). That is, students' and teachers' behaviour towards a new technology is crucial in order for mobile computing initiatives to be successful (El-gayar, Moran & Hawkes, 2011). However, even though the literature is very rich in technology acceptance research and mobile devices have been increasingly used in education, there is not enough research on understanding students' and teachers' technology acceptance (El-Gayar et al., 2011), especially on tablets. Therefore, the proposed study intends to contribute to the educational 'technology acceptance' literature.

Teo (2011) defines technology acceptance as "a user's willingness to employ technology for the tasks it is designed to support" (p.1). In other words, technology is accepted when it becomes a

natural, unobtrusive part of the school environment, and students and teachers even the administration is acculturated to the changes.

Technology acceptance literature mainly deals with models developed to predict certain human behaviours, which according to Hammond (2013) are practices of positivist nature. In fact, majority of the existing models in the literature were developed for either business and information science domains, or some for psychology. Although it has now become somehow a common practice, it is unusual to use a Management / IS model to evaluate educational processes. Reliability or applicability of these models should be scrutinized as the concepts of education and business are different. In business research, people are often considered as 'numbers' or 'data points' in the standardized measurement methods whereas in education every individual, their needs, expectations and experiences count. Further, the technology acceptance models, overall, consider 'acceptance' as the users' 'attitude toward technology' (Nistor, Göğüş & Lerche, 2013) while working on the assumption that user behaviour is shaped by intention which is shaped by individual reactions as framed by Venkatesh, Morris, Davis and Davis (2003):

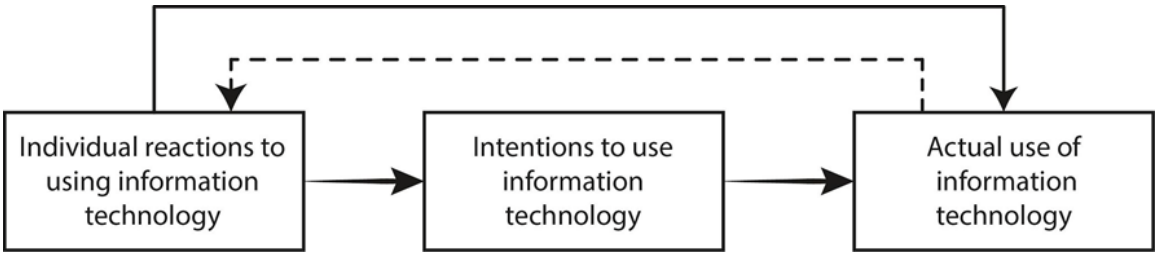


Figure 5: Basic Concept Underlying Technology Acceptance Models

This basic concept is backed by some of the well-known and highly cited researchers of human behaviours and technology adoption literature. For example, Ajzen and Fishbein (1980) claim "From our point of view, intention is the immediate determinant of behavior, and when an appropriate measure of intention is obtained it will provide the most accurate prediction of behaviour" (p.41), or Venkatesh et al., (2003) "The role of intention as a predictor of behaviour is critical and has been well established in IS (Information Systems) and the reference disciplines…" (p.427). On the other hand, there are others such as Bagozzi (2007), criticizes this approach of linearity among *reactions→ intentions→actions*. He argues that the actual use or the actions of the users are assumed to be the final goal whereas actions often could be means to other actions rather than the end. Moreover, he argues that there are more steps between intentions and actions; as the time passes between the two there might be changes to intentions or unexpected obstacles between intentions and execution of the intended behaviour; or intentions could simply be incomplete or ill-formed which needs adjusting, all of which happens in a more complex psychological order rather than the stated linear version. Moreover, measurement or prediction of the behaviour happens through self-reported information which assumes that human beliefs and attitudes are stable (Hammond, 2013), and humans are rational decision makers. Further, Aarts, Paulussen and Schaalma (1997) indicates that, these models overall assume that people make decisions consciously, that is, people perform behaviours because they deliberately and consciously decided to do so, and this could either be affected by the information obtained from the environment (both physical and social), by the stored information from the previous experiences, or by observing the important others.

Bearing all potential shortcomings of adopting a technology acceptance model, and the fact that education has a different approach to understanding human behaviours, as an educational researcher I still find it a useful practice to see whether a technology acceptance model is applicable in education. Thus, this research adapted a technology acceptance model-the Unified Theory of Acceptance and Use of Technology 2 - in order to test in schools and triangulate against the qualitative data. The main reason for this selection was that UTAUT and UTAUT2 have been suggested to be useful in various contexts (Arbaugh et al., 2009; Shin, 2009), and UTAUT2 was new at the time of the proposal for this dissertation that made it interesting to see how it applies to a new context.

All things considered, testing a new model in a new environment with the latest technologies in education was a motive for this research which eventually contributes to technology acceptance literature in the field of education.

In the following section, I briefly describe commonly used technology acceptance theories and models which provided the base for the UTAUT2.

2.10. Technology Adoption Models and Theories

Technology acceptance literature is very rich in theories and models, however it is not possible to talk about them in this work, thus, here I provide short accounts of the most commonly researched theories and models to prepare the ground for the later sections where I present the hypotheses which were tested in this work. These eight theories are reported to underpin the

UTAUT and thus UTAUT2 (Venkatesh, Morris, Davis & Davis, 2003), therefore I found it useful to briefly introduce these base theories which are also useful in understanding the landscape of the technology acceptance literature.

Here I should note that the language used within the models is very specific and for the purpose of this section, I adopt the language of the models and I provide explanations where needed.

2.10.1. The Theory of Reasoned Action (TRA):

The Theory of Reasoned Action was developed for social psychology by Fishbein and Ajzen (1975) in order to explain the relationship between attitudes and behaviour. The model has its foundations on the assumption that intentions to perform a specific behaviour precedes the actual behaviour. In their later work Ajzen and Fishbein's (1980) explains this as "From our point of view, intention is the immediate determinant of wilful behavior, and when an appropriate measure of intention is obtained it will provide the most accurate prediction of behaviour" (p.41). Since intentions have a central location in the theory, Fishbein and Ajzen (1975) theorized that human intentions are formed by a "personal (attitudinal)" and a "social (normative)" factor. That is, in the simplest way:

Behavioural Intentions = Attitude + Subjective norms ("Theory of reasoned action", 2006)

Fishbein and Ajzen (1975) define attitude as "an individual's positive or negative feelings (evaluative affect) about performing the target behavior" (p.216) while subjective norm is "the person's perception that most people who are important to him think he should or should not

perform the behaviour in question" (p.302). Here, an intention is an individual's plan or likelihood to behave in a certain way under certain situations. However, the behaviour does not have to be executed (Lezin, n.d.). For instance, if a person is thinking about quitting smoking then this is her *intention* whether she quits in the end or not. In order to understand or predict whether this person would actually quit, the theory first looks at the person's *attitude* towards quitting and the *norms* or opinions of people around her, whether they think she should quit or not (ibid).

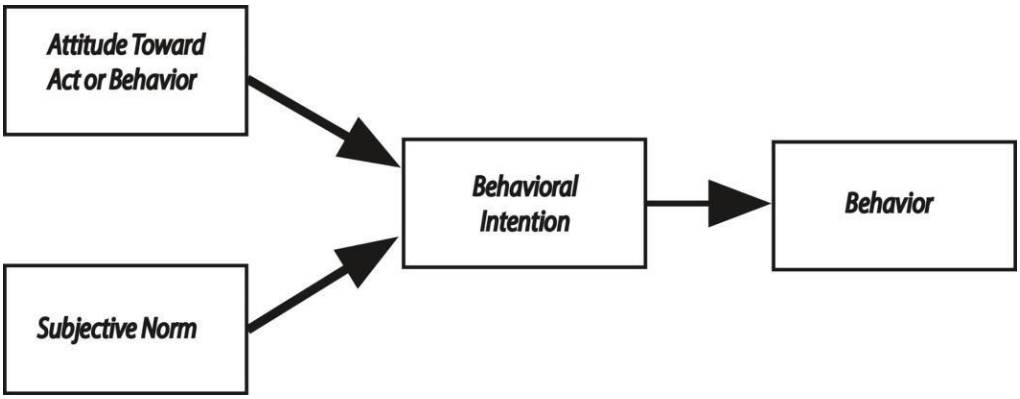


Figure 6: The Theory of Reasoned Action (TRA)

The theory also claims that any other factor that could possibly affect the individual's behaviour does so indirectly by influencing the attitude and social norms.

The model has been used in a wide variety of contexts, such as to predict whether people would use coupons to save money, or teenagers' would wilfully have early sexual relationship.

When it comes to technology acceptance, the model has been used to predict user's behaviour when introduced with a new technology. According to TRA, intentions could explain whether an individual would accept or reject a technology (El-Gayar et al., 2011).

However, TRA has been criticized for assuming that people are rational decision makers who constantly evaluate their beliefs (Sharma & Chandel, 2013) while Bagozzi (2007) argues that the fact that the theory recognizes only two direct reasons for human behaviour does not match the reality where these two reasons could actually be the functions of many other beliefs and evaluations.

In spite of the criticism, TRA, especially in Information Systems literature, is considered one of the most profound and influential models in predicting human behaviour (Vankatesh, Morris, Davis, Davis, 2003).

2.10.2. The Theory of Planned Behaviour (TPB):

The Theory of Planned Behaviour (TPB) was developed as the extension of the Theory of Reasoned Action by adding a third factor *perceived behavioural control* (El-Gayar et al., 2011). TPB, as TRA, recognizes people's intentions to perform or not to perform a behaviour as the central factor. According to TPB, intentions are determined by three independent factors: the attitude toward the behaviour, subjective norm, and the perceived behavioural control which represents an individual's perceived competence or ability to perform a specific behaviour.

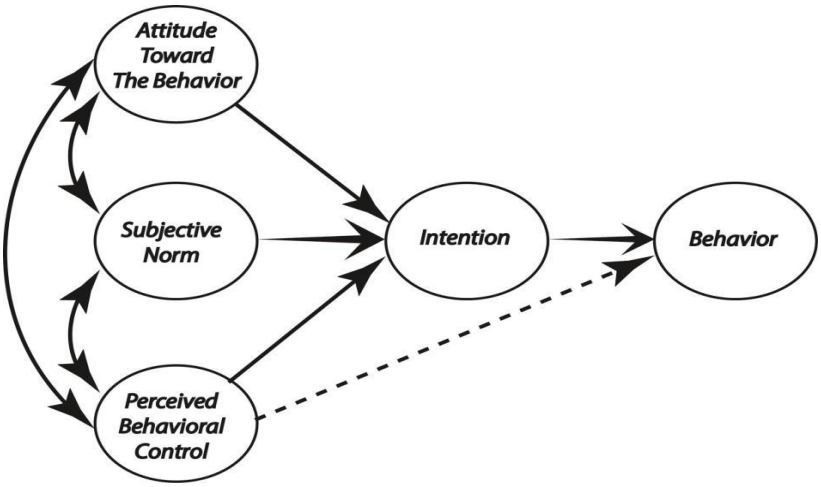


Figure 7: The Theory of Planned Behaviour (TPB)

TPB has the same underlying assumptions about behaviour as it is predecessor. The only difference between two theories or models is the inclusion of the perceived behavioural control which aims to take into account non-volitional behaviours in predicting intentions. So the model suggests that, again, people are rational, sensible decision makers who consider the available information and the implications of their actions (Ajzen, 1985). However, Ajzen claims, some behaviours could be performed or not performed due to the factors beyond the person's power. If this is the case, then the intentions are decided by the perceived behavioural control rather than the person's attitude or the social norm (in a sense, social pressure).

Ajzen also claims that if the intentions fail to predict whether or not a person would behave in a certain way, this could possibly mean that the person's intentions changed over time, after it was assessed. Or, measure of intentions could successfully predict the actual behaviour and the person might attempt to behave in the expected way and yet the behaviour does not take place, then it is highly likely that other factors beyond the person's control involved in the process and prevented the person from performing his/her intended behaviour.

TPB has been criticized for the same reasons as the TRA, yet it is one of the most widely accepted models especially in technology acceptance literature. It suggests that people tend to accept/adopt a new technology if they have positive attitudes towards the technology, and if it is also valued by his/her social circle. If the person believes that he/she is capable of using the technology than this might also directly affect their behaviours. On the other hand, a person might have a positive attitude and social support, but if he/she believes that he/she in not capable of using that technology, or there are other factors preventing him/her from using it, the person might display low intentions toward using it even though he/she has a positive attitude.

2.10.3. The Technology Acceptance Model (TAM):

TAM was proposed by Davis in 1985 and adapted from the Theory of Reasoned Action. The model was developed for the Information Technology (IT) area in order to explain the determinants of users' information technology acceptance (Marques, Villate & Carvalho, 2011). According to TAM, people's intentions to use technology can be explained by their *perceived usefulness* and *perceived ease of use* (Davis, Bagozzi & Warshaw, 1989) rather than attitudes and social norms. Perceived usefulness refers to the belief that using a specific technology helps people perform a job better. On the other hand, perceived ease of use refers to the belief that using a new technology is free of effort (Davis, 1989). Thus, people are more likely to adopt a technology if they believe that it helps them to perform their job better while being easy to use.

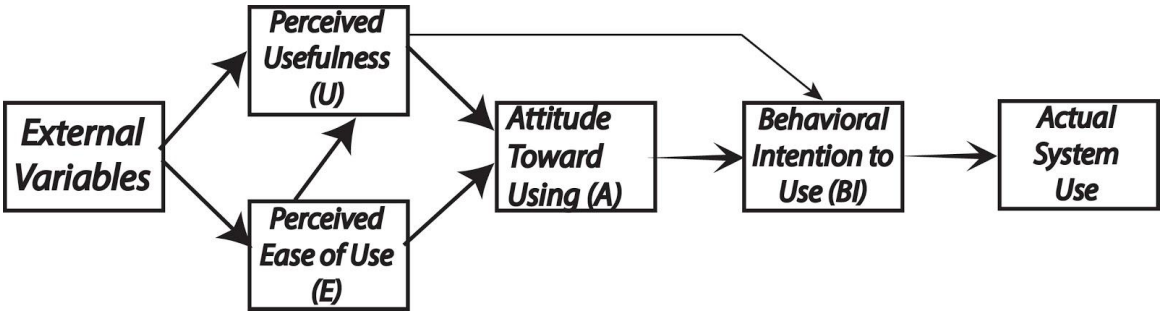


Figure 8: The Technology Acceptance Model (TAM)

Compared to alternative models like the TRA and TPB, TAM has been used in more studies. Because TAM uses a few numbers of factors to measure system use, its simplicity and specificity have appealed to researchers making it the most commonly used model (Taylor & Todd, 1995). It is also claimed to have better predictive power by a large number of empirical studies in explaining usage intentions and behaviour (Venkatesh & Davis, 2000).

Previous research suggests that while the Theory of Planned Behaviour and Theory of Reasoned Action focus on understanding 'behaviours', Technology Acceptance Model and any other models based on TAM emphasize technology acceptance; technology being a material commodity. TAM is also criticized for not including the social and personal control factors which may provide a better understanding of user behaviour (Taylor & Todd, 1995). Davis (1989) claims that social factors have no substantial effect on behaviours, therefore, not included in the model whereas Taylor & Todd (1995) indicate in their research that social factors have direct associations to behaviours.

Later, there have been extensions to the original TAM; however, it is not in the scope of this research because it was the original TAM that was used in the development process of the UTAUT2 and this research only focuses on the UTAUT2 and it is applications.

2.10.4. Motivation Model (MM):

According to the Motivation Model, human behaviours are determined by intrinsic and extrinsic motivations (Marques et al., 2011). Intrinsic motivation refers to performing an activity for self-satisfaction without expecting any reward whereas extrinsic motivation is defined as performing an activity for a reward or favourable outcome (Ryan & Deci, 2000). Effects of intrinsic and extrinsic motivations have been studied and tested in several contexts from education to IT (Benabou & Tirole, 2003). After a study, Deci (1972) concluded that in order to develop intrinsic motivation in children, employees, students, etc., one should focus on developing intrinsically interesting situations rather than providing extrinsic rewards.

MM has been used to understand motivations behind human behaviour, however, it has not been as popular in technology acceptance research as the previous theories.

2.10.5. Combined TAM and TPB Model (C-TAM-TPB):

Taylor and Todd (1995) combined the premises of the TPB with TAM (Marques et al., 2011) and created a hybrid theory in an attempt to provide better predictions for technology acceptance. The idea behind this theory was to simply take advantage of stronger explanatory power of the

TAM while also including the social and personal factors (subjective norm and perceived behavioural control) from the TPB.

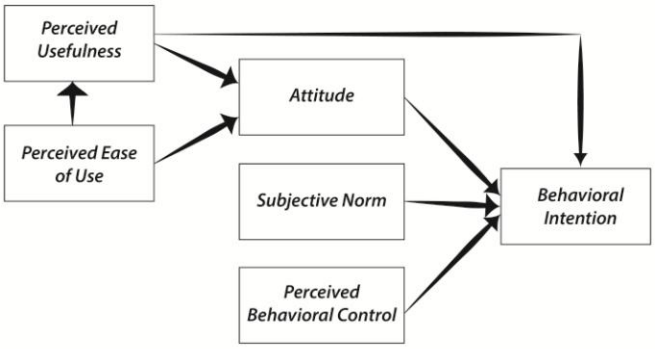


Figure 9: Combined TAM and TPB Model (C-TAM-TPB)

Due to the larger number of factors, the model is more complex compared to its predecessors, which in turn is expected to provide a better and complete understanding of system use (Taylor & Todd, 1995). However, even though it seemed like a more superior model than it is parts, the combined version of the two models has not been as popular in research as two models separately.

2.10.6. Model of PC Utilization (MPCU):

Model of PC Utilization was developed from the Theory of Interpersonal Behavior (Triandis, 1971) by Thompson, Higgins and Howell (1991) specifically for IS context in order to predict PC Utilization. According to Triandis (1971) as cited in Thompson, Higgins and Howell (1991),

behaviour is formed by attitudes: what people would like to do, social norms: what they think they should do, habits: what they have usually done and by the awaited consequences of their behaviour. Therefore, the MPCU suggests that: "…the utilization of a PC by a knowledge worker in an optional use environment would be influenced by the individual's feelings (affect) toward using PCs, social norms in the work place concerning PC use, habits associated with computer usage, the individual's expected consequences of using a PC, and facilitating conditions in the environment conducive to PC use." (Thompson, Higgins & Howell, 1991, p.126).

This theory was specifically intended to predict individual technology acceptance and usage behaviour.

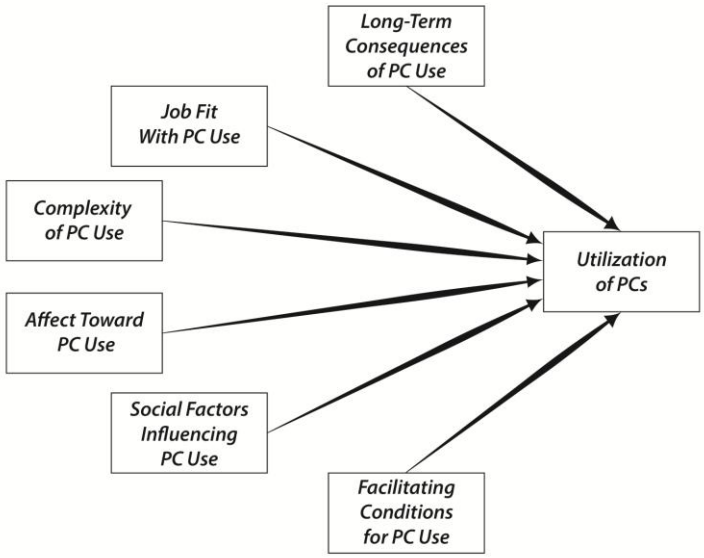


Figure 10: Model of PC Utilization (MPCU)

2.10.7. Innovation Diffusion Theory (IDT):

IDT was developed by Rogers in 1962 to understand and explain the processes new ideas, technology, or practices spread or not spread (adoption/rejection) among people, how and why, as well as the rate it happens (Marques et al., 2011).

Innovation can be an idea, practice or an object which is new to an individual or social system while diffusion is "the process in which an innovation is communicated thorough certain channels over time among the members of a social system" (Rogers, 2003, p.5). Therefore, the main factors of innovation diffusion are: *innovation*, *communication channel*, *time*, and *social system* (Rogers, 2003).

A communication channel is an agent / tool which is used to transmit messages between individuals (Yates, 2001). Rogers (2007) claims that, because users generally make their decisions based on the decisions of important ones, interpersonal channels have a greater effect on creating or altering individuals' attitudes toward an innovation, whereas mass media channels are more efficient for introducing an innovation due to reachability of a larger number of people at once.

Yates (2001) indicates that time is one of the major strengths of this model. The innovation decision process consists of five steps, starting from the point where an individual first meets the knowledge of an innovation to the point the innovation is adopted. The steps are: 1) knowledge, 2) persuasion, 3) decision, 4) implementation, 5) confirmation. Individuals or any decision

makers go through these steps over time in order to reduce uncertainties about outcomes of an innovation which either results in adoption or rejection (Rogers, 2007).

Rogers (2003) defines a social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal” (p.23). In fact, a social system is a society to whom an innovation is presented (Yates, 2001), and the diffusion of the innovation is highly affected by the social structure of a society (Sahin, 2006). Rogers categorize social systems into five groups based on the speed an innovation is adopted: innovators, early adopters, early majority, late majority and laggards.

IDT has been one of the most resounded theories in technology adoption, and it has been claimed to be suitable to investigate technology adoption in education settings (Medlin, 2001). However, IDT has been criticized because of its nature which assumes that every technology is a static artefact and usually introduced into homogenous populations (Lyytinen & Damsgraad, 2001)

2.10.8. Social Cognitive Theory (SCT):

According to the SCT humans obtain and maintain certain behavioural patterns through the reciprocal interaction between behaviour, cognitive and other personal factors and environment (Wood & Bandura, 1989). These three factors influence each other bidirectionally.

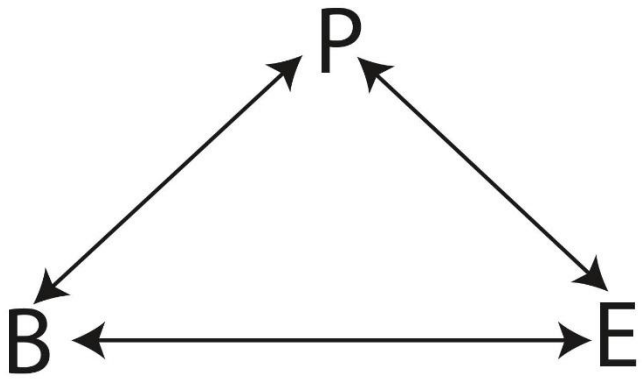


Figure 11: Social Cognitive Theory (SCT)

*****Relationships among Behaviour (B), Cognitive and other Personal Factors (P), and the Environment (E).

That is, an individual's functions are dynamic products of a continuous interaction between the person, behaviour and the environment.

Environment includes the factors that influence an individual's behaviour both socially and physically. Social environment refers to family members, friends and colleagues whereas physical environment refers to the physical factors around the person such as the size or temperature of a room (University of Twente, n.d.).

In these relationships, reciprocity does not mean that any two factors have equal strength or they occur simultaneously, reciprocal influence happens over time (Wood & Bandura, 1989). None of these factors are the result of any other two, that is, behaviour is not just the result of the person and environment, and the environment is not the result of behaviour and the person. (Glanz, Rimer & Lewis, 2002). In fact, environment is the source of models for behaviours. Therefore, the environment affects an individual's cognitive perception which in turn affects his/her technology use behaviour (Li, 2010).

SCT has been criticized for putting too much importance on the situations in guiding the behaviour rather than unconscious motives and inner motivations such as emotions, thus shadowing the effects of personality, and places the emphasis on cognitive factors while ignoring the biological/hormonal factors (Davis, n.d.). However, Jones (1989, p.26) joins the argument by arguing that "the fact that behaviour varies from situation to situation may not necessarily mean that behaviour is controlled by situations but rather that the person is construing the situations differently and thus the same set of stimuli may provoke different responses from different people or from the same person at different times", thus disagrees with Davis.

The SCT has been applied to education contexts in order to understand classroom motivation, learning and achievement (Pajares, 1996; Schunk & Zimmerman, 1994). Schunk & Zimmerman (1997) concluded that the SCT serves as a conceptual and empirical basis to develop learning processes.

2.10.9. The Unified Theory of Acceptance and Use of Technology (UTAUT):

The Unified Theory of Acceptance and Use of Technology was developed from the integration of aforementioned eight models (Ifenthaler & Schweinbenz, 2013) by Venkatesh et al. (2003) in order to create a model that provides a unified view of user acceptance. According to UTAUT, direct determinants of user acceptance and usage behaviour are *performance expectancy* (perceived usefulness), *effort expectancy* (perceived ease of use), *social influence* and *facilitating conditions*. In UTAUT, there are also four key moderators; gender, age, voluntariness and

experience, which do not directly affect the usage behaviour but have indirect effects on the direct determinants (Venkatesh et al., 2003).

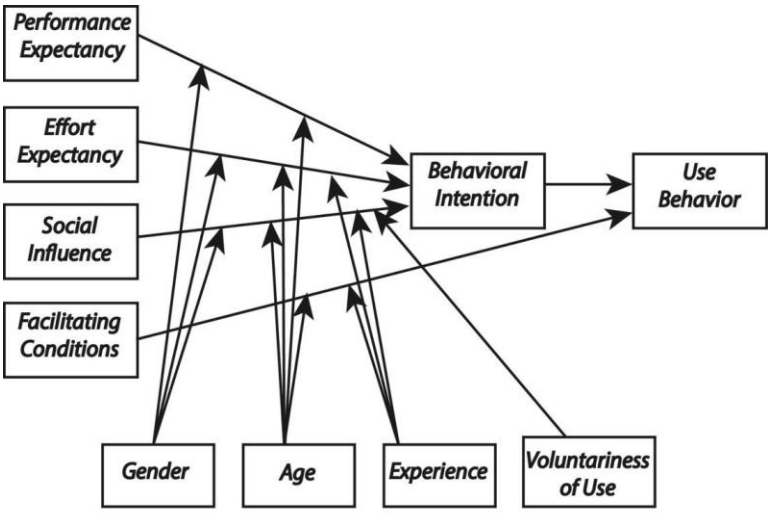


Figure 12: The Unified Theory of Acceptance and Use of Technology (UTAUT)

Performance expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p.447) while effort expectancy is "the degree of ease associated with the use of the system" (p.450). Social influence is "the degree to which an individual perceives that important others believe he or she should use the new system" (p.451), and facilitating conditions are "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (p.453).

UTAUT has been used to explain the determinants of intention and behaviour over time, and has been suggested to be successful in predicting the intention with result that outperform all other models that explain the user intention and behaviour (Lin, Zimmer & Lee, 2013). Also, the UTAUT is claimed to be a robust and reliable model that makes it suitable for various contexts (Nistor et.al., 2013).

Even though the UTAUT has showed a strong theoretical basis in several domains in explaining people's technology adoption and use behaviour, its application in educational context is rare (Blackwell et al., 2013; Ifenthaler & Schweinbenz, 2013), but lately the number of research adopting this model is increasing.

As with other theories and models, the UTAUT is not without a criticism. Bagozzi (2007) states that the current situation that technology adoption/acceptance/rejection research in is chaotic and "knowledge is becoming increasingly fragmented with little coherent integration". He argues that even though there have been attempts to combine the best parts of each theory to create a unified theory / model, this idea has not been successful. For him, UTAUT is one of the such models: "UTAUT is a well-meaning and thoughtful presentation. But in the end we are left with a model with 41 independent variables for predicting intentions and at least eight independent variables for predicting behaviour" (p.245). On the other hand, Van Raaij and Schepers (2008) found that the grouping and labelling of items are problematic because the model "combines items on the fit between the technology and the individual's work style, the availability of assistance, and the availability of required resources" (p.841), thus putting various distinct and unrelated items together to create a single psychometric construct. They also claim that the prediction power of the model is strong under certain conditions.

2.10.10. The Unified Theory of Acceptance and Use of Technology2 (UTAUT2):

Relatively recently an 'improved' version of UTAUT, called UTAUT2, was developed by adding three new determinants; *hedonic motivation, price value* and *habit* to the original model and eliminating one of the moderators *voluntariness of use* (Venkatesh, Thong & Xu, 2012).

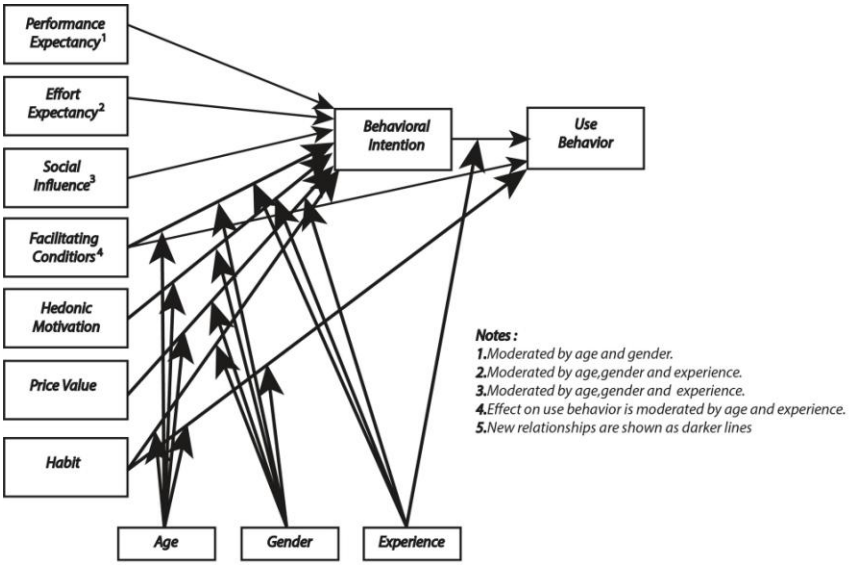


Figure 13: The Unified Theory of Acceptance and Use of Technology2 (UTAUT2)

Hedonic motivation is conceptualized as perceived enjoyment and defined as "as the fun or pleasure derived from using a technology" (Venkatesh et.al., 2012, p.161). Price value is the cost of the technology to the user or consumer, while habit is defined as some sort of 'automaticity' (Kim, Malhotra & Narasimhan, 2005) or "the extent to which people tend to perform behaviors automatically because of learning" (Venkatesh et.al., 2012, p.161).

Venkatesh et.al. (2012) claim that by integrating new constructs into the theory, they created a more robust and predictive theory which is tailored to consumer context. At the time of the

proposal for this thesis, UTAUT2 was the latest theory in the technology adoption literature and was barely tested in educational context. I should note that, it is use in education is still not too common, but because it is claimed to be created by putting together the core constructs of the previous nine models I presented in this section, thus being more explanatory in explaining adoption behaviour, I found it interesting to see how such a model would apply to educational context, or whether use of a model suitable for education at all.

2.11. Investigating Intentions with The UTAUT2

Technology acceptance literature has been growing with the increasing number of research studies, most of them adopting a model in order to predict users' technology acceptance. There are various numbers of models developed for different contexts. The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) is one of the latest models in the literature. Lin, Zimmer and Lee (2013) emphasize that before the UTAUT, all other models overlooked the effects of individual differences, such as age, gender, personality etc., assuming that every single individual would present the same patterns of psychological, attitudinal and behavioural effects. UTAUT2 model embraces three individual factors as moderating variables: gender, age and experience. These moderating variables, also called as moderators, have shown to affect the main determinants of technology acceptance. According to Straub (2009), the UTAUT is more suitable to educational contexts than other commonly used models. Because it takes individual differences into account, it can provide a better understanding about students' and teachers' attitudes towards using technology. Therefore, the UTAUT2 can be expected to fit in education as well as its ancestor. On the contrary, despite its high success in other contexts, Raman & Don

(2013), from their study, concluded that the UTAUT2 may not be as suitable for educational settings in its current form, and some other variables should be considered to include in the model.

Venkatesh et al. (2012) suggest that, in order to validate the UTAUT2 model, more research should be conducted in less technologically advanced countries, with different age groups and different technologies in order to identify any other factors that may not be included in this model. Likewise, Johns (2006) and Alvesson & Kärreman (2007) note that new contexts can cause important changes in theories by transforming relationships, changing the direction or magnitude of relationships, or even creating new relationships. Since the UTAUT2 is a relatively newly developed model (2012), there has not been enough research carried out to investigate and reach a conclusion of its explanation power, especially in education environments. To date, the use of the UTAUT2 is still limited in education research while the UTAUT has been employed in numerous studies. The findings of the UTAUT has been ridden with contradictions (Thomas, Singh & Gaffar, 2013; Attuquayefia & Addo, 2014), yet its use continuously increases. Thus, in light of the information given above, the UTAUT2, as the reported superior of the UTAUT, is the theoretical framework for this research to see how a model based theory could fit into educational context.

As the literature review suggests, both tablets and the UTAUT2 model are new to educational context, and this research is intended to gain an understanding of their effects and usability in educational contexts.

2.12. Chapter Summary

In this chapter, I presented and discussed the available literature in relation to this research. I outlined the existing concepts of m-learning and provided my explanations for my take on it. Moreover, discussion on the state of today's learners, more specifically the concept of so-called 'digital natives' has been presented. I also explained the discussions around mobile devices and their uses in education, as well as commonly mentioned mobile devices in education literature with an emphasis on tablets, and finished off with the up-to-date comparison table for those mobile devices.

Later on, I talked about the Affordance theory, its roots and appropriation by education researchers. I explained the accepted definition of an affordance for this research along with the snapshot of the previous research in education as well as the proposed affordances that emerged from this project.

I provided an outline for the major ICT projects around the world with a special section on the Fatih project where I explained the details of the site of this research.

Finally, I provided some of the commonly used theories that try to explain human behaviour as well as the criticism around them. These theories were unified in order to create the framework of this research, the UTAUT2, thus I finish of by providing the information about the UTAUT2, and its use in investigating human intentions.

Continuing from where this chapter left, the next chapter covers the factors that creates the UTAUT2, explains these factors and introduces the hypotheses that were used in testing the UTAUT2.

CHAPTER 3: HYPOTHESES DEVELOPMENT AND PROPOSED MODEL

3.1. INTRODUCTION

In this section I explain the variables of the UTAUT2 model which were selected for testing and the variables that I added based on the previous studies in the technology acceptance literature which are Psychological Ownership and Self-efficacy. Also the hypotheses needed to test the model are presented in this section.

Before moving on to explaining the proposed model for this study, I first explain why I chose hypotheses testing. A hypothesis is a "concise, falsifiable statement that is subject to observational testing as a part of scientific investigation" ("Hypothesis and Hypothesis Testing", 2016). In other words, a hypothesis is an expectation or prediction from a research project which is going to be compared against the analysis results to decide whether the expectation is 'verified', 'confirmed' or 'supported'. Because most of the time research only covers a small sample of a big population, a hypothesis is never 'proven', unless it has been tested over and over in different contexts and survived long enough as the best explanation for a phenomenon that has been offered so far. In that case, it is not a hypothesis any more, it is a 'theory' (Tong, n.d.). Thus, a researcher could only aim to 'verify' or 'falsify' her/his predictions without arriving to an absolute conclusion. However, every verification or refutation is a valuable lead for further research.

Even though hypothesis testing is a common practice in scientific research, and has become frequent in social research and in education, it is not without criticism. Some argue that a hypothesis is tested against an observed phenomenon that is assumed to exist in a stable world, which does not exist. While stability of the world is under question, others argue that social measurement is inherently prune to bias because observation is not independent from the observer; therefore, a neutral observation of the world is not possible ("Hypothesis and Hypothesis Testing", 2016). Nester (1996) argues that, hypothesis testing is popular in spite of the criticism because it "appears to be objective and exact; is readily available and easily invoked in many commercial statistics packages; everyone else seems to use them; students, statisticians and scientists are taught to use it; and some journal editors and thesis supervisors demand it" (p.401).

Conversely, there are advocates of hypothesis testing who find this procedure a crucial part of statistical analysis. In fact, some argue that hypothesis testing is an important step for "making rational decisions about the reality of effects" (Stockburger, 1998). And the famous quote by Lehmann (1992, p.71) is commonly used in defence of this statistical approach:

> Nevertheless, despite their shortcomings… [hypothesis testing] continue to play a central role in both the theory and practice of statistics and can be expected to do so in the foreseeable future

In light of these different views from both camps, I fall in to the third category that Nester (1996) describes for including hypothesis testing in research. That is, I decided to do it because it is the common practice in the field. Hypotheses, in this research, are considered as propositions or mini-research questions which exist to answer a bigger question; something to look for in analysis rather than going over everything in the data; and a reference point to compare the

results with the results from other studies. They are, by no means, the focal point of this research, nor the only results that this study aimed to deduce.

Before presenting the hypotheses I believe it is useful to explain the 'proposed model' which was tested in this research and the changes I made to it in order to create more context suitable model.

Because the model was to be tested within a different context than the one it was designed for, I made several changes and adjustments which I believed would be more suitable for the context of this study. This process of altering the model is significant to make it compatible with the purposes of this current research and it is legitimate, justifiable action. As Venkatesh et al. (2012) explain in their paper a theory could be extended by leveraging a new context through identifying new constructs, adding new relationships or altering existing relationships in the model. This being the case, I extended the UTAUT2 by adding or deleting variables as appropriate, and adding new relationships in to the model.

First, the variable 'Price Value', which refers to the affordability of technology (Venkatesh et al., 2012), has been left out of the model because the students had received their tablets free of charge. However, it could be argued that if the students had to pay for their tablets they might have reacted to them differently. This is an argument which is not possible to test with the existing constructs in the model and it requires further research. Therefore, the price value did not apply to this particular situation.

The second change I made to the model was to leave out three moderating variables (age, gender and experience) for this study. A moderating variable is a third variable that affects the relationship between two variables. The model suggests that, for example, while 'Social Influence' affects the user's behaviour intentions, this effect is affected by the user's gender, age and experience.

Even though moderating effects could provide useful information in some cases, there were several reasons for my decision to remove these variables from the model. First, the moderating variables are needed in order to understand the real effects of the social factors in the model (Venkatesh et al., 2003; Al-Gahtani, Hubona & Wang, 2007) However, other research have found that regardless of the moderating variables, the effect of social factors could be seen (Jairak, Praneetpolgrang & Mekhabunchakij, 2009; Teo, 2011). This was not the sole reason for my decision to remove the variables but combined with other reasons which I am about the explain, this provided a basis for my decision. Secondly, some of these variables did not apply to this specific context. The variable 'age', for instance, was irrelevant as the students that were being studied were all in the same age group with an insignificant age variation that made the use of this variable redundant. The same applied to the variable 'experience'. Students who were part of this research had received their tablets almost around the same time; thus, experience wise, students did not differ from one another. When it comes to gender, however, I did not include it for several reasons. First and foremost, it did not serve the purpose of this research while complicating the analysis process. Finding out whether gender had any effects on any of the other variables would have been a valuable finding. However, the purpose of this research was only to see how the model would behave in an educational environment, since a moderating

variable is not a main component of the model, including it would have only provided another dimension to the information I would get from the model, but not affect the final conclusion. Secondly, statistically, analysing a model with moderating variables is a more complicated process which requires a good knowledge of the field and the skills to proceed and interpret the results. Therefore, I decided to carry on with the version with which I felt comfortable. On the other hand, I would have needed to analyse the qualitative data based on the students' genders, in which case, in order to ensure the gender balance, I would have faced another challenge in finding participants.

Thus, all things considered, I found leaving the moderating variables out from this research more appropriate to the purpose whilst also being less time and effort consuming.

Further, I added two new constructs to the original model: 'Psychological Ownership' and 'Self-Efficacy'. I explain these constructs in detail shortly, so here I only explain why I believe these changes were important. The decision to include the first construct was mainly due to the nature of the Fatih project which led me to review the literature and realise that there is a gap in technology acceptance research in this sense. That is, the majority of the tablet initiatives only let students 'borrow' the tablets for the school day and return it at the end of the day. Whereas, with the Fatih project, students keep their tablets until they graduate (policy is not clear whether they keep or return the devices after graduation) which allows them to 'own' their devices by personalising their use. After reading the literature I decided to add the variable 'Psychological Ownership'. Inclusion of 'Self-efficacy' as a variable in the model originated from the

discussions in the literature. Its importance on user acceptance is well accepted in the literature; thus, I found it to be useful addition to the model and the context.

Since these constructs were added to the original model, there were no available scales (questionnaires) to be used to measure the effects. Therefore, I adopted the Self-Efficacy scale from Venkatesh et al., (2003), and I developed the scale for Psychological Ownership based on Dyne and Pierce's (2004) widely accepted PO scale to be used in organizational settings and Pare`, Sicotte & Jacques's (2006) scale which they developed based on Dyne and Pierce's (2004) and amended to apply clinical settings. Since this is considered a new scale it required testing for validity and reliability which are explained in the relevant chapter (Chapter 5).

Finally, I removed the 'Use Behavior' which refers to the 'real' usage of a technology by the user. To me, including this variable was not meaningful if the main point of using a technology acceptance model is to 'predict' whether a specific technology would be accepted or not in that particular context. By using such a model, we could only ask users' intentions, not the real use behaviour because before they actually use a piece of technology, there is no way of knowing how it actually is used. Besides, Use Behaviour is measured by the frequency of usage which could only tell us how often students used their tablets, but without knowing the context of this use behaviour, the information this variable could provide would always be superficial, and affect all relationships in the entire model. Therefore, the proposed model for this research was only interested in the students' Behavioural Intentions to Use their tablets, and the real use behaviour was measured by qualitative methods.

In light of the presented explanations, the proposed research model for this research is presented in Figure 14 below.

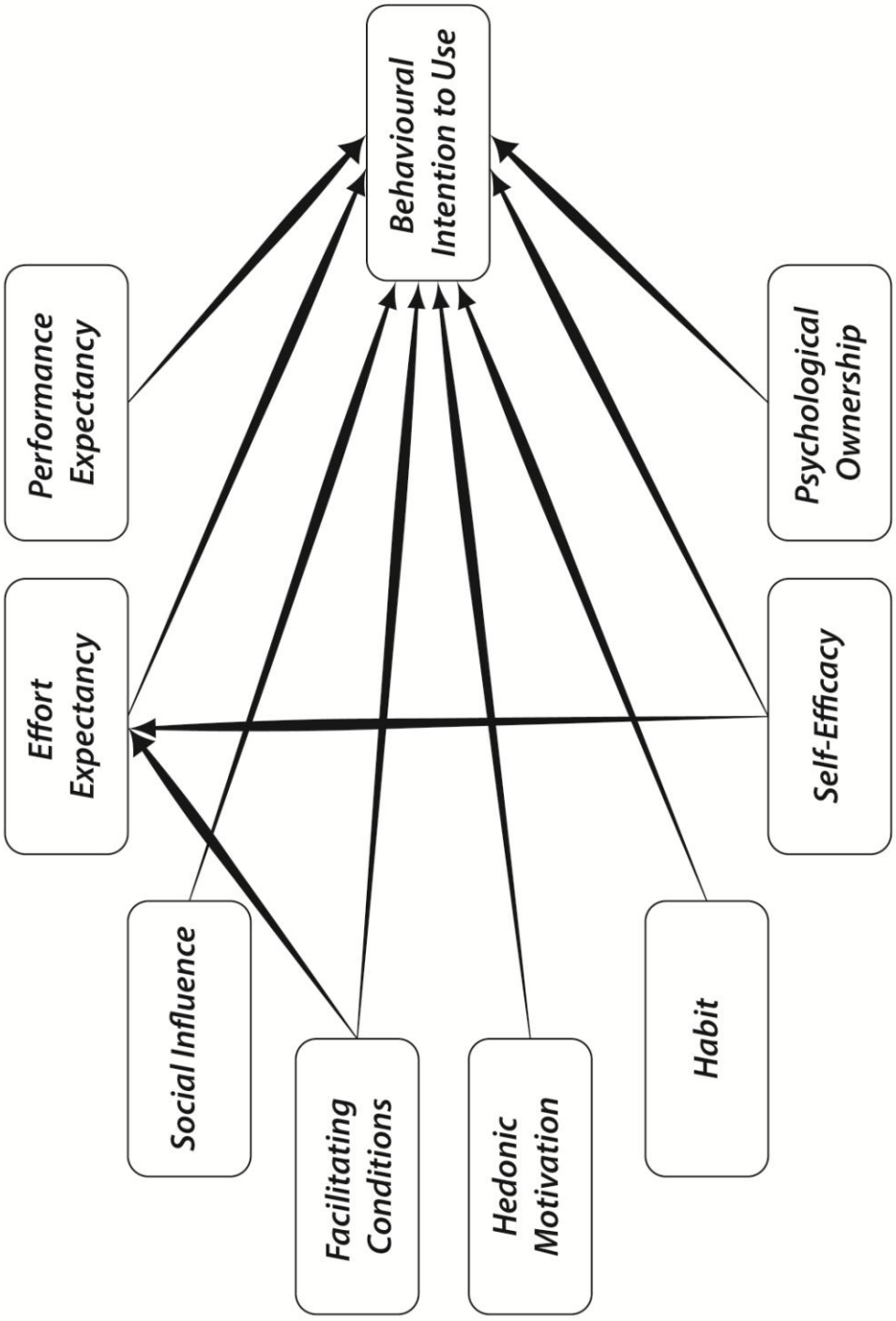


Figure 14: The Proposed Research Model

In the following part, I introduce the hypotheses that were tested during analysis. I should note that I did not develop these hypotheses apart from the hypotheses that was used with the new constructs (PO and SE), rather they were part of the theory and I kept them as they were to be able to compare with the existing findings.

3.1.1. Performance Expectancy (PE)

Performance expectancy refers to the degree to which a user believes that using a specific technology will improve the job performance (Venkatesh et al., 2003). That is, the more people believe that technology helps them perform better with their tasks, the higher their chances of developing positive intentions towards using that technology. Technology acceptance research suggests that Performance Expectancy is the strongest predictor of Behavioural Intention to Use technology (Agarwal & Prasad, 1998; Compeau & Higgins, 1995; Taylor & Todd, 1995; Davis et al., 1992; Venkatesh & Davis, 2000; Venkatesh et al., 2003), however, there are studies suggest otherwise (see Birch & Irvine, 2009; Attuquayefio & Addo, 2014). Thus, the expected outcome is;

H1: *Performance Expectancy (PE) will significantly and positively influence students' Behavioural Intention to Use (BIU) technology.*

3.1.2. Effort Expectancy (EE)

Effort Expectancy is defined as 'the degree of ease associated with the use of the system' (Venkatesh et al., 2003, p.450). In other words, it is the user's belief or perception that using a

technology is easy or free of effort. Previous research found that EE plays an important role in technology acceptance and therefore its effect on user intentions is expected to be positive.

***H2**: Effort expectancy will significantly and positively influence students' behavioural intention to use technology.*

3.1.3. Social Influence (SI)

Refers to "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003, p.451). Social influence has been found to be influential in technology acceptance. Research suggest that SI is more prevalent when the use of a technology is mandatory (Hartwick & Barki, 1994) which is argued to be due to the fact that people tend to care much about others' expectations when those others have the ability to punish or reward the individual (French & Raven, 1959; Venkatesh et al., 2003; Warshaw, 1980). Even though the use of tablets is part of the curriculum in schools in Turkey so the use is in a sense mandatory by policy, in practice, the situation is different. Therefore, even though I test the hypothesis suggested by Venkatesh et al. (2012), the results might not confirm this expectation.

***H3**: Social influence will significantly and positively influence students' Behavioural Intention to Use technology.*

3.1.4. Facilitating Condition (FC)

Facilitating conditions refers to the belief of a user that organizational and technical support exists (Venkatesh et al., 2003). Facilitating conditions have been argued to be effective

determinant of technology acceptance in different cases (Venkatesh et al., 2003) with a strong and direct effect on Behavioural Intention, and Effort Expectancy (Venkatesh et al., 2012). Even though the need for support has been investigated in different contexts and found to be important in technology acceptance, in education context, it is more prominent with teachers (Groves & Zemel, 2000; Williams, 2002; Teo 2012), but its effect is not expected to be limited to teachers. Therefore, the hypotheses are:

H4*: Facilitating conditions will significantly and positively influence students' Behavioural Intention to Use technology.*

H5*: Facilitating conditions will significantly and positively influence students' Effort Expectancy.*

3.1.5. Hedonic Motivation (HM)

Hedonic motivation is defined as "the fun or pleasure derived from using a technology" (Venkatesh et. al., 2012, p.161). Hedonic Motivation was usually conceptualised as perceived enjoyment in previous research (see Davis, Bagozzi & Warshaw, 1992; Thong, Hong, Tam, 2006), and has been shown to be effective on people's technology acceptance behaviour in several contexts (Davis et al., 1992, Brown & Venkatesh, 2005). However, HM has been associated with the 'novelty effect' where the user seems to be motivated using a new technology due to the initial curiosity, and argued that this effect could potentially wear off (McDonald & Hannafin, 2003). The time limit for novelty effect to die out might change depending on several factors, such as context or individuals, and it could well be present in this context. However, in order to ensure that the novelty effect was at the minimum possible level, the students who participated in this research were chosen amongst the group who received their

tablets with the first wave of tablet distribution, which means at least six months of tablet ownership.

Thus, the hypothesis is:

H6*: Hedonic Motivation will significantly and positively influence students' Behavioural Intention to Use technology.*

3.1.6. Habit (HT)

Habit, as commonly used in the IS literature, is conceptualised in two ways: 'prior behaviour' (Limayem, Hirt & Cheung, 2007) and 'automaticity' (Kim & Malhotra & Narasimhan, 2005). Both concepts are operationalised in the UTAUT2 and the accepted concept of habit is a "perceptual construct that reflects the results of prior experiences" (Venkatesh et al., 2012, p.161). In their research Limayam and colleagues showed that habit has a very strong and direct effect on technology use, even more than its effect on intention. In fact, they argue that intention to use technology is weakened by habit. That is, once certain behaviours are habitualised, people do not need to form conscious intentions any more to perform a behaviour; the execution of the behaviour happens in an automatic manner. That is, in this research context, students' intentions to use tablets are expected to decrease due to increased automaticity over time in their usage.

Therefore:

H7*: Habit will significantly and negatively influence students' behavioural intention to use technology.*

3.1.7. Psychological Ownership (PO)

Psychological ownership is the degree to which people feel that 'the target of the ownership (material or immaterial in nature) or a piece of it is "theirs"' (Pierce, Kostova & Dirks, 2001, p.299). Literature suggests that people can feel possession toward almost anything, such as their jobs, houses or other people (James, 1980 cited in Pare`, Sicotte & Jacques, 2006). And often, items that are possessed are perceived as the extension of the 'self' (Belk, 1988; Dittmar, 1992), which is well summarised by Dittmar's book title "To *have* is to *be*". Considering the strong relationship one could have with their belongings, Dirks, Cummings & Pierce (1996) suggest that psychological ownership can create a positive or negative stance toward change. "People who have low psychological ownership in a system (…) can bring a "technically best" system to its knees" (Lorenzi & Riley, 2000). Therefore, psychological ownership is expected to play an important role in technology acceptance generally, and in schools. Unlike some other programs in which students could only borrow the tablets from the school administrations on daily basis, with the Fatih Project, students own the tablets, so they can use it outside the school, and customize them to suit their studies. Therefore, I expect Psychological Ownership to show positive effects on students' intention.

H8*: Psychological Ownership will significantly and positively influence students' Behavioural Intention to Use technology.*

3.1.8. Self-Efficacy (SE)

Self-efficacy is defined as "an individual's assessment of their skill level in performing computer related tasks" (Stylianoul & Jackson, 2007, p.13). In other words, it is a person's feeling of

competency in using technology. Research shows that self-efficacy plays an important role in peoples' willingness to accept a new technology (Igbaria & Iivari, 1995); however, there is a need for more studies to investigate if there is a direct relationship between computer self-efficacy and technology acceptance (Aypay, Celik, Aypay & Sever, 2012). It is believed that the more an individual believes that she/he is competent in using technology, the higher the chances that pieces of technology will be accepted. Thus, Self-Efficacy is expected to positively affect Behavioural Intention. Also, feeling confident in using technology is believed to lead the individual perceive it easier to use; therefore, higher Self-Efficacy could cause higher Effort Expectancy. Thus:

H9*: Self-Efficacy will significantly and positively influence students' Behavioural Intention to Use technology.*

H10*: Self-Efficacy will significantly and positively influence students' Effort Expectancy.*

3.2. Chapter Summary

This chapter covered the hypotheses which were the main reference points in testing the UTAUT2, and I clarified why I needed to include them in my research. Then I submitted the changes I felt I needed to make in order to create a model which is more suitable for the context in which it was going to be used. In order to create a more solid understanding I provided the proposed model and explained the constructs along with the related literature which I conclude by presenting the hypotheses. This chapter demonstrated the a-priori information needed in order to make sense of the quantitative analysis chapter where I shall refer back to these constructs frequently.

CHAPTER 4: RESEARCH METHODOLOGY, PROCEDURES AND ETHICAL CONSIDERATIONS

4.1. INTRODUCTION

> Trying to produce a definitive definition of methodology as used in the social sciences, and to serve the purposes of all researchers, is rather like trying to catch water in a net. Different researchers offer slightly different definitions according to their own training, discipline and purposes (Clough & Nutbrown, 2012, p.36)

As Clough & Nutbrown suggest, the concept of methodology does not lend itself to a simple or one-fits-all definition. It is a broad concept that incorporates several stages of a given piece of research. Therefore, rather than trying to define 'methodology', I prefer to submit my understanding and interpretation of it. In this regard, the purpose of this chapter is to tell the 'story' of this research. Here, I talk about how I had come to conduct this research; which methods I had chosen and why; how I had made use of the chosen methods; how I had selected my participants; what went as planned and what did not; and so on. Thus, this chapter will walk the reader through the steps I took and the explanations and justifications for the decisions I made throughout each stage of this research.

4.2. Research Design

Research design refers to the plan, or strategy "to integrate the different components of the study in a coherent and logical way, thereby, ensuring (the researcher) will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of

data" (USCLibraries, 2016). The design chosen for a research project is affected by several factors such as the research problem and personal experiences of the researcher (Creswell, 2009). Creswell suggests that a good design should be informed by the "worldview assumptions the researcher brings to the study", "procedures of inquiry (strategies)", and the "methods" (p.3). Here, I explain the rationale behind my choice of design and in order to do that first I need to explain my positionality in this project and how it plays a pivotal role in the design of this current study.

4.2.1. Positionality

"I am, as a researcher, a product of who I am as a person, and who I am as a person is a result of my race, class, gender, and sexuality. I am the researcher I am because I have experienced life in a certain manner" (Lucas, 2005, p.47). Thus, "where I am coming from as a researcher" (Sikes, 2004, p.19) defines what I want to study and how I want study it. As Wellington, Bathmaker, Hunt, McCulloch and Sikes (2005) emphasize:

> It is impossible to take the researcher out of any type of research or of any stage of the research process. The biography of researchers, how and where they are socially positioned, the consequent perspectives they hold and the assumptions which inform the sense they make of the world, have implications for their research interests, how they frame research questions, the paradigms, methodologies and methods they prefer, and the styles that they adopt when writing up their research (p. 21).

Therefore, my approach to my choices in and my inferences from this research cannot be considered separately from me: my personality, culture, experiences, previous knowledge, and beliefs. For that matter, I find it useful to explain the factors that have led me to carry out this research, and had an impact on it.

My positionality is a result of personal interests in and experiences with the technology. My initial introduction to computing technologies was around the age of 15-16 (between 1999-2000) and it was my own personal computer with Internet access at a time when only very limited number of people had Internet connection in Turkey. To demonstrate it clearly, The World Bank (2014) report indicates that only 2% to 4% of people had Internet connection at the time in Turkey whereas in the UK the rate was between 21% to 26% and in the USA 35% to 43%. I found the entire experience rewarding as I had started meeting new people all around the world, learning about new places and opportunities abroad about which I had no idea before. It was the time I found myself wanting to go abroad, learn another language and travel the world which all were new to me. My own experiences with technology have given me a very positive attitude towards it, and convinced me that, apart from many other possible benefits, it can support individuals into feeling less isolated, and support culturally disadvantaged individuals, especially females, into a life they were not aware of before. One can always argue about the possible adverse effects of technology, and it is not to say that there is none, however, I have come to believe that with responsible use, technology can become a very useful tool. According to Jackson (2013);

> Research can begin with initial thoughts of an area of interest. These thoughts become crystallized as further consideration is given to what is to be studied, the narrowing of the focus, the setting of aims and objectives for the research and the formulation of research questions (p.2).

Apart from my personal experiences, my background as a teacher and a degree in Information Sciences had played a part in my decision to conduct this project. Use of tablets in education was and still is, a new phenomenon and as one of the most expensive and extensive ICT implementation projects both in the history of the country and around the world (Tamim et al.,

2015), the Fatih project provided a good base to understand tablets' potential in education. In accordance with Jackson, an area of interest had become the area to research as I shaped the questions I wanted to answer which turned into this current study.

4.2.2. Research Strategy

This mixed methods study explored students' and teachers' attitudes towards using tablets for their learning and teaching activities. Because investigating a phenomenon in which people are involved is a complex, multi-layered practice, I found mixed-methods approach useful to investigate the answers for my research questions. There are several different approaches to and definitions of mixed-methods research but I follow the definition suggested by Johnson & Onwuegbuzie (2004) where they define mixed-methods research as:

> the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study (p. 17).

However, this definition, in fact any definition of mixed-methods approach, is open for a discussion. Despite its increasing popularity, mixed-methods research has been criticized mainly due to its non-polarized stance about "human nature, the world, the nature of knowledge claims and what it is possible to know" (Greene & Caracelli, 1997, p.8). On the other hand, proponents of mixed-methods approach argue that qualitative and quantitative methods could be used with any paradigm and a mixture of both strategies is perfectly sensible (Guba & Lincoln, 1994; 2005). With this in mind, becoming involved what has been called the '*paradigm wars*' is beyond the scope and aim of this research, and there are a great number of resources in the

literature that address this in detail. However, in order to explain my take on the issue for the purposes of this research, I found Howe (1992)'s approach very useful.

> Intuitively, human beings are neither wholly passive and determined nor wholly active and self-creating. Instead, they exhibit these two characteristics in varying degrees. The degree to which an individual is one or the other depends on a host of social factors, such as economic and political structures, and a host of individual factors, such as age and education… Although there is no ironclad regularity here… the general point holds that human nature is partially determined by how humans see themselves and partially determined by things of which they are unaware or which they have no control. Accordingly, insofar as interpretivism remains trapped within the first perspective and positivism within the second, neither view can give an adequate account of human nature (p.243-244).

As Howe argues, every paradigm, every approach, every method has its shortcomings, and as a researcher I choose to embrace and appreciate the benefits of all given approaches. As such, rather than "aligning (myself) with a particular set of methods" (Schwandt, 2000, p. 210) or labelling/defining myself as a qualitative or a quantitative researcher (ibid), I prefer to "adopt research stances as they are appropriate to (my) work" (Clough & Nutbrown, 2012, p. 21) and use methods which I believe would be the most suitable in a given situation. Coupled with these personal beliefs, my background also played an important role in designing this project. That is, I come from a Mathematical background, so that has been an area where I have felt comfortable, however, in preparing for this research, I realised that a qualitative approach would be really useful because I wanted to acquire an understanding of how the tablets were used in practice and what the people's perceptions were. That lent itself really well to a qualitative methodology. Nevertheless, a quantitative approach was more suitable for the model testing which had lead me to consider how mixed methods might act as a possible way of triangulating and authenticating findings. And I decided on a Convergent Parallel Mixed Methods Design (Creswell, 2014;

Bryman 2016) which refers to the collection of both qualitative and quantitative data where two sets are analyzed separately and then compared or triangulated against each other.

According to Creswell & Plano Clark (2011), mixed-methods research benefits from the strength of both qualitative and quantitative research, fills the gap where either of them falls short, and it provides more freedom to the researchers enabling them to use any tool in order to address a research problem. Denzin (1989) empowers the argument; "By combining multiple observers, theories, methods, and data sources, [researchers] can hope to overcome the intrinsic bias that comes from single-methods, single-observer, and single theory studies" (p. 307). Creswell & Plano Clark (2011) also concludes that the combination of quantitative and qualitative approaches produces a 'better understanding for the research problems than either approach alone' (p.5).

All things considered, I found it useful to draw on a mixed-methods approach 'instead of fighting over the superiority of quantitative versus qualitative approaches …" (Rocco, Bliss, Gallagher & Pérez-Prado, 2003, p.20).

4.2.3. Methods

In this part, I present the methods that I used to collect data with short discussions about their advantages and shortcomings. Every social science project is a story about people, a culture, an event or an environment. There are a number of different ways to tell these stories and communicate them to the reader. Every different method we use serves a purpose to enhance the

quality of our stories in a way that it ‘thickens’ and ‘deepens’ the meanings which we are trying to convey. Thus, here, I present these methods.

4.2.3.1. Questionnaire: Rating Scale

One of the two main data sources of this research was questionnaire. I employed questionnaire mainly because it was the only way to gather data for the model testing as it is the common practice in such cases. Second, it provided me with a quick and mass amount of information in a short time such as demographic data. Cohen, Manion & Morrison (2005) assert that questionnaires “…gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events” (p.169). Therefore, using a questionnaire served for the purpose of this research as it enabled me to look at the relationships among several determinants of technology acceptance in the UTAUT2 model. Questionnaires, like any other method, have their weaknesses and strengths. Walker (1985a cited in Wellington, 2015) summarizes the benefits and drawbacks of questionnaires as

> The questionnaire is like interviewing-by-numbers, and like painting-by-numbers, it suffers some of the same problems of mass production and lack of interpretative opportunity. On the other hand, it offers considerable advantages in administration - it presents an even stimulus, potentially to large numbers of people simultaneously, and provides the investigator with an easy (relatively easy) accumulation of data. (p.192)

Considering the limited time frame I was given by my sponsor (2 months), and the required data type for model testing it was only logical for me to employ questionnaires to receive large number of responses.

I chose the questionnaire as the first method of data collection for two main reasons. First, in order for the student focus group sessions to be meaningful I needed prior information which could help me to ask the right questions. The questionnaire consisted of two parts: General Technology Use and Technology Acceptance. The first part had open ended questions where students could write short answers which then I used as a base for my focus group preparation. Carrying out the questionnaire first was proven to be a good decision as the situation in schools was not what I had anticipated. The answers students had provided gave me an idea about the situation so I could amend my questions before the focus groups took place. Second, having seen the questionnaires, students had an idea about the research, therefore gave me the opportunity to talk to them and find volunteers for the focus group sessions.

For this research, apart from the open ended section, main data collection was done through a *rating scale* type of questionnaire which consist of existing set of questions and questions that I had developed based on the literature in order to test the proposed model. These sets required the use of a Likert type rating scales. Cohen, Manion & Morrison (2005) argue that:

> Rating scales are widely used in research, and rightly so, for they combine the opportunity for a flexible response with the ability to determine frequencies, correlations and other forms of quantitative analysis. They afford the researcher the freedom to fuse measurement with opinion, quantity and quality (p.253)

Given the possible benefits of Likert scales and the type of data I needed, I used a 7-point Likert Scale. Literature suggests that having more points gives the participants more options to discriminate among the possible answers while too many choices may reduce the effect (Nunnally & Bernstein, 1994).

In order to explain how the questionnaires were distributed and filled by the students, I believe short information about the school context would be useful. According to the curriculum, every classroom has a teacher assigned to them at the beginning of each academic year, and they meet weekly, only for one lesson duration of time, which is called the 'counselling session'. The purpose of these sessions is to raise any problems or concerns that students might have about anything in or out of the school. However, the sessions are usually perceived as 'leisure' times since students are allowed to do anything they want to, unless the teachers have an issue that they want to talk about. When I approached the teachers to gain permission to distribute the questionnaire, I was suggested to come during their 'counselling sessions' so they could stay on their schedule. Because the counselling sessions took place at the same time in a school, and students usually preferred going out to the garden, finding volunteers and reaching to enough number of participants wasn't an easy task which eventually required a couple of weeks visits to every school. Because I wanted to be present at least for a while when the students received the questionnaire, I had to move between classrooms, and sometimes between schools in a given day. Some questionnaires returned incomplete while others were empty, but majority of them were filled just enough to be coded in to SPSS.

As I mentioned above, I tried to find participants for the focus group sessions as I collected the questionnaires which would otherwise be very difficult and time consuming.

4.2.3.2. Focus Group Interviews

After questionnaires, focus group interviews were conducted with volunteered students in order to address the issues which could not be covered by the questionnaires. Focus groups are informal discussion groups, led by a moderator or facilitator, which involves several participants in order to discuss a selected specific topic (Bryman, 2012). I chose focus group interviews due to its strength and potential benefits for this research. First of all, focus groups allow researchers to collect more perspectives in a limited time (Peek, Fothergill, 2009). Second, they are more cost efficient compared to one-to-one interviews (Peek & Fothergill, 2009), as I visited several schools during the course of the study, it was more manageable to organize groups in terms of time and cost. Third, focus groups have ability to produce data thorough group interactions that is not possible otherwise (Morgan, 1997): "something that one person mentions can spur memories and opinions of others" (Lofland & Lofland, 1984, p.15 as cited in Peek & Fothergill, 2009). Fontana & Frey (1994, p.364) highlight that focus group interviews "provide another level of data gathering or a perspective on the research problem not available through individual interviews". And last, focus groups can produce a wide range data while concentrating on a specific topic (Krueger, 1988). However, outcomes of focus group discussions could be affected by the moderator, a member of the group with a dominant attitude, or the small or large number of participants in a group.

Considering all the potential benefits and convenience for the researcher, I took the advantage of focus groups in order to cover the areas that could not be touched via questionnaires.

Since I visited three secondary schools to distribute the questionnaire, I conducted a focus group with students from each school. The groups were formed with four to six participants depending on the number of voluntary students in a given school. As Peek and Fothergill (2009) concluded from their research, smaller groups are more manageable, and it is easier for all participants to have a chance to speak and actually have a discussion. Discussions took place in their schools, at a time they found most convenient. Duration of the sessions varied between 45 minutes to just over an hour depending on the mood of the group as some students tended to talk a lot while others didn't show much interest. Even though they were all volunteers, I realized the group from one of the schools, which was frequently visited by either independent researchers or government assigned researchers, seemed to be bored to talk about similar topics. It turned out that they accepted participation in order to skip the lesson. The discussion took shorter than the other two sessions, nevertheless I was able to collect some useful information. That said, in all three groups participating students were part of a friend circle; either classmates, or close friends from different classrooms. These students were not chosen on purpose, but they all decided to participate as a group. This initially seemed like a drawback as Krueger and Casey (2000) argue exiting relationships and hierarchies might hinder individuals' contribution to discussions. However, during the sessions I realized that students felt more comfortable around friends thus less intimidated by my existence and saying something that could cause a trouble later.

Sim (1998) highlights that during focus groups the moderator "has to generate interest in and discussion about a particular topic, without leading the group to reinforce existing expectations or confirm a prior hypothesis" (p. 347). As the moderator of 3 focus group discussions, I tried to ask questions which were as neutral as possible about student tablets' or any other technology

they use in their classrooms. Apart from one group of students which I mentioned seemed uninterested to talk about this topic, other two sessions went smoothly once we got over the first minutes of introduction. Once the discussions were heated, students talked constantly, and all I needed was to steer the direction of conversation. However, there were moments when the conversation moved out of context and students started talking about their personal lives, or asked me questions about my life, how I got funding to go abroad or whether I have travelled anywhere apart from the UK. In order to maintain the friendly atmosphere and keep their interest alive, I went with the flow, tried to answer their questions and came back to main topic.

Personally I found focus groups initially intimidating but once we broke the ice, discussions became natural, and I believe, the data I gathered was more honest as it was not as much filtered by the speaker as one-to-one interviews. Overall, focus group sessions were helpful to understand the dynamics of technology acceptance among the students, and also teachers from the students' eyes.

4.2.3.3. Teacher Interviews

In order to understand teachers' perceptions and attitudes on the issue, I conducted individual interviews with teachers. Teachers were not given questionnaires mainly because they were not included in the model testing. Including both teachers and students in the model would be a very time consuming process both in terms of analysis and data collection as reaching out to hundreds of teachers was not feasible at a short time. Therefore, instead of using questionnaires, I chose to

interview teachers, which provided a wider perspective on their perception of the tablets and the overall change in schools.

Wellington (2000, p.71) suggests, '...interviewing allows a researcher to investigate and prompt things that we cannot observe. We can probe an interviewee's thoughts, values, prejudices, perceptions, views, feelings and perspectives'. Besides, Oppenheim (1992) points out that, in some cases interviews could provide a higher response rate compared to questionnaires with information to a higher quality (Hoyle, Harris & Judd, 2002). On the other hand, interviews have the disadvantage of being the costliest method for collecting data (ibid), especially in terms of time it takes to set up and complete an interview. Also interviews are prone to be affected by the interviewer. Because it is a one-to-one process, the attitude, ethnicity, sex, or age of the interviewer could influence the discussion (ibid). Considering that every method has its disadvantages, I chose to conduct interviews with care.

I conducted interviews with 15 teachers. Teacher interviews took place at different times, independent from the student aspect of the fieldwork. Because their schedule was more complex than that of students, I interviewed teachers either by making appointments or just being there whenever I could to talk to someone who seemed available and agreed to talk. Unfortunately, at times it was hard to get teachers to interview and sometimes I had to cut the interview short where I could either reschedule it or had to give up on that person and find someone else. In some cases, teachers did not want me to record the interview so I had to rely on my notes. None of them agreed to sign the informed consent forms because they were concerned that a paper with their names and signatures on may cause trouble in the long term since the topic we were

discussing was about the project run by the government and their comments on the topic was not always on the positive side. Thus, we agreed on verbal consent to protect their anonymity, and the quality of data I could get which highly depended on teachers feeling comfortable and safe.

Teacher interviews were originally planned to be semi-structured style with a list of main topics I wanted to talk about. However, all my questions were based on the assumption that the tablets were being used in schools which to my surprise was not the case. Because I did not conduct a pilot study, I was not aware of the dynamics in schools, and designed this study in a way to understand how the tablets were being used, and what would be the potential benefits or challenges of having them in classrooms. To my surprise, it turned out that it was not the case, and tablets were not being used neither by the teachers nor by the students in the way I had anticipated. I was not expecting perfect adoption rate in such a short time, but because it was a project run by the government, I was anticipating some sort of use for the technology provided. This being the case, the first couple of interviews went as a process for me to familiarize myself with the context and understand what was really happening in the schools. Depending on the answers I received, I adjusted my questions into main themes for the rest of interviews, but often went with the flow of the conversations as every teacher had something interesting to say from their own perspectives.

4.2.3.4. Observations

As a part of my strategy, I observed several classrooms after interviewing teachers. The purpose of using this method was to collect information that might not be captured by other techniques

which heavily rely on participants' self-reported behaviours. Indeed, Hammond & Wellington (2013) underline that observation could be helpful to spot real situations that may not be addressed with questionnaires or interviews. I believe that by observing the real situation in a classroom, I was able to monitor the *actual behaviour* (to some degree) rather than *self-reported behaviour* (ibid) as people's discourses could easily be different from their actions.

The original proposal was to observe one or two classrooms continuously for a week but teachers didn't agree to that and I had to work with what was possible at that moment. Therefore, I arranged several classroom observations with different teachers in order to see how different teachers utilize the available technology and whether or how their practices differ from their discourses. In terms of the data I gathered, I believe observing different classrooms had not created a big shift from my original plan because every lesson was taught by a different teacher, and even if I had been given the permission to stay in the same classroom, I would still have observed different lessons taught by different teachers. It could, however, have provided an opportunity to observe the situation in a classroom continuously rather than having to move to a new environment for each observation. With that in mind, as a researcher, I tried to arrange times and opportunities with minimum disturbance to the people and the school environment.

Wellington and Szczerbinski (2007) note four stances that a researcher could take during observations as: complete participant, participant as observer, observer as participant and complete observer. Kawulich (2005) argues that the most commonly preferred and most ethical stance for a researcher to take is the 'observer as participant' due to its stress on 'observation' rather than 'participation', and the fact that observed group is aware of the observer. Adler and

Adler (1994) define this as “peripheral membership role” through which the observer could "observe and interact closely enough with members to establish an insider's identity without participating in those activities constituting the core of group membership" (p.380). As a researcher, I adopted this stance; observed the classrooms without explicitly participating. There were moments where I became or was made to become a part of the environment, usually with the interactions from the teachers. Nevertheless, my position as the ‘observer’ always remained explicit.

Merriam and Tisdell (2016) state that what to observe depend on the problem at hand and the questions that the researcher wants to answer. During the observations, I tried to look at the ways teachers use the technology, and students’ interaction with their tablets, as well as the overall classroom atmosphere. Nevertheless, "Where to begin looking depends on the research question, but where to focus or stop action cannot be determined ahead of time” (Merriam & Tisdell, 2016, p.140). In other words, observations could provide a new focus, and change the problem or the way the researcher approaches to it. The classrooms I observed provided a window to see what the reality looked like in the classrooms, so that I could compare and contrast the articulations with the actions.

4.2.3.5. Visual Methods

Visual methods are techniques used to gain insight into an area of research by creating or using existing images (Banks, 2001; Buchanan, 2008). Even though images have been used in social anthropology, sociology and psychology research for more than a century (Banks, 2007; Henny,

1986), they were mainly treated as illustrative, decorative and presentational tools rather than the actual data we analyse (Ball, Smith, 1992, Bank, 2001), and their value as bona fide data has long been debated. However, despite criticism, in the last three decades the use of images in research has appealed to researchers from other disciplines, and has gained methodological standing (Prosser & Loxley, 2008). "Because visually we can communicate knowledge, experiences and ideas in ways that we cannot using only written or spoken words…" (Pink, 2006, p.321), images are inseparable pieces in understanding the world in which we live (Stanczak, 2007), and they should be treated in a way that all other kinds of data are treated (Prosser & Schwartz, 1998; Goldstein, 2007). As Pink, Stanczak, Pauwels and many others assert, images provide just another way to communicate with the reader of our research, they are alternative to text, and can have a more powerful voice than text. However, as with any other method, visual methods have their own benefits and challenges in research which should be taken into account.

> The eye is the most important gateway to the mind. For most people the visual impression is the one which can be most easily interpreted, is the most lasting and relates most readily to other sensory experiences (Sumner, 1956, p.1)

Visual methods are just another way of telling our story, by visualizing the data. And as Sumner argues, images have the power to create a safe passage to human mind, creating some sort of understanding even before language.

As humans, we have pre-drawn pictures in our heads which shape our interpretation of social life. Our repertoires of cultural experiences differ from one another (Spencer, 2011). As social scientists, when we are presenting research about a culture, an environment, an event or a person, words we choose might not be able to convey the meaning we try to communicate, or they may

create an image in the reader's head, an image which may take form from the individual's own experiences, that is different from what we want to share. The visual power of images could vivify our story, and provide more explicit, authentic narratives. Prosser & Schwartz (1998) suggest;

> (…) Through our use of photographs we can discover and demonstrate relationships that may be subtle or easily overlooked. We can communicate the feeling or suggest the emotion imparted by activities, environments and interactions. And we can provide a degree of tangible detail, a sense of being there and a way of knowing that may not readily translate into other symbolic modes of communication (p.116)

In fact, Prosser and Schwartz's observation that images can show things which could easily be overlooked at the time was substantiated in my research which I demonstrate in forthcoming chapters. When I looked back on photos I had additional insights which I had not noticed at the time.

Moreover, images do not simply illustrate the field in which the research was conducted or repeat textual data. Images and words (field notes, interviews etc.) complement each other in research, thus, they create a new representation of the data (Pink, 2007). As Prosser (1998) emphasizes;

> Taken cumulatively images are signifiers of a culture; taken individually they are artefacts that provide us with very particular information about our existence. Images provide researchers with a different order of data and, more importantly, an alternative to the way we have perceived data in the past (p.1).

As Pink and Prosser argue, images provide data which are qualitatively different from other types of data and embedded in them are cultural messages that we want to understand and communicate.

While images have potential to provide more powerful, richer data, they have some complexities. Banks (2001) defines these complexities as, the problem of images; poor appreciation of images as research materials; and the multivocality of images. Here I will touch upon these and some other issues that may arise.

The most discussed issue is the question of whether images represent reality. Often people interpret photographs as the real situation, as 'that moment' while images are 'representations of that moment'. Therefore, images are not 'the reality'; instead they represent the experiences and perspectives of the photographer. Prosser asserts: "A photograph does not show how things look. It is an image produced by a mechanical device, at a very specific moment, in a particular context by a person working a set of personal parameters" (2006, p.2). Goldstein (2007) takes the argument further and argues that "all photos lie", and he clarifies his argument with the fact that "photographs are two-dimensional representations of a three-dimensional world" (p.65), in consequence, they can never perfectly replicate reality.

Secondly, some of the issues stem from the presentational aspects of images. There is an immediacy and explicitness about visuals (Spencer, 2011). These properties are indeed benefits of images if used properly. Immediacy could be defined as the "jumping into the mind" aspect of images (OpenLearn, n.d.). Immediacy and explicitness of images provide the reader with quick and often clear ideas which could or could not be retrieved from reading a rather long text. On the other hand, these features could deceive the researcher and the readers. That is, people often make immediate judgements about images. In order to overcome the seductive immediacy and explicitness of images, researchers should always be careful while selecting and analysing

images - never to share any images which could put participants in danger, and make sure to provide enough information about the context.

Thirdly, images have indexical and iconic properties (Pauwels, 2010). Indexicality is "the perceived 'natural' and 'causal link with the depicted object", while iconicity is "the high resemblance of the depiction to the depicted" (Pauwels, 2010, p.194). Even though indexicality of images reflects some degree of accurate and explicit record of the reality, this "indexical relationship of images to actual reality has the potential for systematic distortion like any other medium in the hands of those who wish to persuade or shape attitudes" (Spencer, 2011, p.22). However, the expressive and conceptual power of images have the potential to outperform these issues, and just like any other methods, visual methods should be used with care.

Fourthly, images are polysemic (Rose, 2001; Prosser, 2006). That is, no matter how carefully an image was created, there are always several possible meanings that can be attributed to the image. This can be due to cultural differences, experiences and perceptions of the researcher and the reader. In research, an image holds the interpretation of the researcher. Given that no empirical data is perfect, unbiased or objective, and, especially in qualitative research, all data reflect the interpretation of the researcher, it is clear that photographs reflect the characteristics and choices of the producer and perceptions of the viewers (Pink, 2007), and the way a researcher interprets a photograph could be very different from that of another (Buchanan, 2008; Pink, 2007).

> …while film, video and photography do stand in an indexical relationship to that which they represent they are still representations of reality, not a direct encoding of it. As representations they are therefore subject to the influences of their social, cultural and historical contexts of production and consumption" (Banks, 1995, para. 6).

Fifthly, due to advanced technologies, images are vulnerable to manipulation, and a small change in an image can spoil the value of it (Spencer, 2011).

However, these challenges should not intimidate researchers from taking advantage of possibilities that visual methods offer. Pauwels (2010) argues that "many researchers…are overlooking the vast expressive potential of visual representations that opens up the way to scholarly argumentation and new avenues of expressing the unspeakable and unquantifiable" (p.219). With care, and proper decisions, visuals could create another dimension into research.

With these in mind, I took some images in the field wherever I could and these became especially useful during the analysis part to help me refresh my memory or to provide illustrations to the concepts which I explain in text. I believe, images added value to this research as a supplementary resource of information.

Having explained the methods I used for data collection, Table 6 below is an overview of the methods corresponding to each research question.

Table 6: Research Question - Methods Matrix

Question Number	Research Questions	Methods
1	• What do teachers think of tablet integration into education? • What are the motives behind their attitudes? • How do they use the tablets in practice?	• **Interviews** • **Observation** • **Visual data**
2	• What do students think of using tablets for their learning activities? • What are the motives behind their attitudes? • How do they use the tablets in practice?	• **Focus Groups** • **Observation** • **Visual data**
3	• To what extent could the UTAUT2 be suitable for educational context? • How do the new factors affect the model and what other changes could be made?	• **Questionnaire** • **Focus Groups**

4.3. Participants of the Study, Research Site and Gaining Access to Schools

Participants of this study were selected from the secondary schools which had been chosen to be part of the pilot phase of the Fatih Project. The pilot schools were the first ones to receive smartboards and later tablets which enabled me to access students and teachers who had had some time to experiment with the new devices.

Ankara, the capital of Turkey, was chosen for this research for various reasons. First of all, its position as the capital provided more options as Ankara had the highest number of participating

schools to the Fatih project. Second, because the project first implemented in schools in Ankara, local authorities, school administrations, teachers and students were more familiar with researchers which not only expedited the permission process but also provided convenience to find volunteered participants. Finally, Ankara is the city where my family lives; therefore, it was more convenient for me to visit the schools as I needed to be at different schools in the same day, it was also important.

Access to any school in the country is subject to approval of the local education authority. If the local education authority finds the research appropriate, all written research materials are stamped, and only these stamped versions are allowed to be used in schools. After successfully going through the authorisation, I visited school administrations to obtain their permission for me to access their schools and talk to teachers and students. Not all principals were eager and some required hard work of persuasion. The three participating schools were chosen randomly based on their administrations' approval. After receiving school principals' approval, I then went about obtaining possible participants' consents. In two of the three schools, students and teachers were more familiar with researchers so it was fairly easy to access participants while the third school required several visits before I could start conducting my research.

As briefly mentioned in the related sections, I followed different strategies to select participants for each step of this project. However, all selections were done by using a non-probability sampling technique; purposive sampling. Wellington and Hammond (2013) define a sample as "the smaller number of cases, units or sites selected from a much larger population. Some samples are assumed to be representative of the wider population" (p.174). Thus, sampling is the

process of selecting the cases, units or sites for a research. Purposive sampling method is preferred when the researcher wants to ensure that the selected sample could provide rich information on the issue that is being studied (Patton, 1990; Denscombe, 2007).

In that sense, I choose three schools among many others in the city based on the fact that they were part of the pilot phase for the Fatih project, which meant that they had received the tablets and other classroom technologies earlier than any other school. And once I selected the site that I wanted to study, I purposefully selected students and teachers who had had some time to experiment with their tablets and other classroom technologies. Purposive sampling fitted my aim as the group or sample I chose was an information-rich one. As a non-probability sampling type, however, purposive sampling has the limitation as the selection of participants is not randomized and not everybody has the same probability (chance) of being selected; thus the results may not be generalized as the sample might not be representative of the population. Having said that, selection of participants always involves a "compromise" (Wellington & Szczerbinski, 2007, p.67) between practicality and generalizability. However, generalizability is not a problem when the research involves theory testing and the results are not intended to be generalized to other populations beyond the sample being studied (Evans & Rooney, 2014; Robson & McCartan, 2016).

In order to draw a clear timeline of the participant selection, next I provide step by step explanation for each stage.

4.3.1. Questionnaire participant selection

Participants of the questionnaire part were selected among the students who had received tablets at least in the last 6 months in the pilot phase of the Fatih project. There were no limitations for age, gender or grade for participation, though equal distribution was desired. In order to find potential participants, I visited classrooms with the permission of the teachers in charge, and explained the students what was expected from them. To be able to get more 'reliable' results from the quantitative data previous research suggest having at least 200-300 participants. It took several visits to all three schools to reach a satisfactory number. Over 300 students accepted to participate, however, some of the questionnaires were either incomplete or empty; therefore, not included in the analysis. Volunteers were given a questionnaire in my presence to make sure that the questions and instructions were clear. Completion of the questionnaire then led to the recruitment for the next step: focus group participants.

4.3.2. Focus group participant selection

Recruitment for participation in focus groups took place right after the questionnaire stage. Students were asked whether they would want to participate in a focus group session and I set a convenient date and time with the volunteered students. Since the students who took the questionnaire befitted the requirements, I didn't follow any particular rules in selecting the participants. As mentioned earlier, focus groups took place in their own schools, in an empty classroom. Table 7 below is the list of participants for each focus group sessions.

Table 7: Focus Group Participants

	Pseudoname	Gender
Group 1	Sinan	M
	Nihal	F
	Zehra	F
	Buse	F
Group 2	Elif	F
	Arzu	F
	Beren	F
	Hilal	F
	Yavuz	M
	Arda	M
Group 3	Ebru	F
	Sinem	F
	Zeynep	F
	Hazal	F
	Yusuf	M

4.3.3. Interview participant selection

Since the participants of this stage were teachers, the only requirement to take part was experience with the tablets and other technology that came with the Fatih Project. I tried to choose teachers from different fields of expertise so that I could get a wider spectrum of experiences of teaching with technology, but there were some participants from the same field. Table 8 below demonstrates the interview participants with their respective fields.

Table 8: Interview Participants

Pseudoname	Gender	Subject
Hakan	M	English
Tolga	M	IT
Ayla	F	IT
Doruk	M	Mathematics
Esma	F	Music
Taha	M	History
Fuat	M	English
Merve	F	Philosophy
Efe	M	Vice Principal
Hande	F	Turkish Literature
Funda	F	IT
Kerem	M	Physics
Suzan	F	Biology
Semih	M	Geography
Seda	F	Chemistry

4.3.4. Other Key Informants

As mentioned before, I changed my original plan in response to things that happened in the field while I was there and some of those were local things that I hadn't imagined while some were on the national and political sphere. One of the changes I made was to interview some additional people which were not on my original proposal. Before going for data collection, I hadn't known if those people would be available to me so when I had a chance I decided opportunistically to include them in my study.

First, I interviewed a teacher trainer about his opinion on the project and the training sessions that teachers had to complete. Second, I had an opportunity to talk to a person from one of the responsible ministries from the project. In order to keep the person's anonymity, I decided not to

use a pseudonym or refer to the person as he or she. Due to this person's position in the ministry, any information about his/her job, gender or role could make him/her identifiable.

I couldn't have planned for these interviews but they were really useful additional dimension that helped me answer my research questions and understand the issue.

Because my time was very limited with these people and they were not willing to talk too much, I don't have a separate section on these people's data but rather I used the information I received from them as a way of supporting my other findings.

4.4. Research Timeline

Data collection took place in total of 8 weeks - which was the timeframe I could legally be away from the country where I study. This was not a visa based restriction, but a rule enforced by my sponsor. Since this was the case, I had to be flexible with my plans: ready to change on the spot, schedule and re-schedule an appointment, or stretch the time I spend in a school or sometimes cut it short. However, table 9 below provides an overview of the field work, and table 10 provides the details of data collection process based on each week.

Table 9: Overview of field work

	Number of incidents	Duration
Observation	5	40 mins
Teacher Interviews	15	30 mins to 1 hour
Focus Groups	3	45 mins to 1 hour

Table 10: Research Timeline

March – April 2014	30 April – 2 July 2014	
	Week	**Activities**
• Applied to the local education authorities for permission to access schools in Ankara through emails and phone calls • Access granted in early April • Contacted schools to obtain initial agreement. Three schools A, B and C accepted participation.	**1**	• School visits to negotiate access. 2 schools (A and B) agreed • Questionnaire distribution started in these 2 schools • 1 teacher interview
	2	• 3rd school (C) granted access • Questionnaire distribution continued • 3 teacher interviews in schools A and C
	3	• Questionnaire distribution continued • 2 teacher interviews in school B • 2 classroom observations (Biology and Maths) in school B
	4	• Questionnaire distribution continued • 3 teacher interviews in school B • 2 classroom observations (History and Turkish Literature) in school A
	5	• Questionnaire distribution continued and completed (Desired number of 300 was reached) • First focus group session with the Group 1 (see page 123) • 1 teacher interview in school C • 1 classroom observation (English) in school C
	6	• Focus groups with the Group 2 and Group 3 (page 123) • 1 teacher interview in school B • 1 teacher trainer interview
	7	• 2 teacher interviews in school A • Brief interview with a government official
	8	• 2 teacher interviews in school A

4.5. Transcription of Data

Transcription of the data generally took place soon after the collection, sometimes on the same day or week. As I was collecting several different types of data simultaneously, it was not always possible to transcribe them at same speed that I collected them, however I tried to transcribe everything before I forgot any details about that specific session, or otherwise I made field notes to remind myself the key points which I could need later. Transcription involved repeated listening of the conversations, especially for the focus groups as it required attention to the speakers and the details happening during the conversations due to students' speaking all at once. Transcribing required long hours of listening and typing, however, it provided "…familiarity with data and attention to what is actually there rather than what is expected" that later facilitated "…realizations or ideas which emerge(d) during analysis" (Bailey, 2008, p.129).

After transcribing the data, I moved on to the translation part which I explained in the following part.

4.6. Translation of Data

One of the challenges I faced before, during and after the fieldwork was translating the materials from English to Turkish, and later translating the data from Turkish to English. Because English is not yet a commonly spoken language in Turkey, all materials used for data collection had to be translated in to Turkish. I took the responsibility of translating all the materials and data throughout this research myself, and asked for help from friends or my supervisor in order to confirm the final versions. Apart from its cost saving aspect, I felt that a professional translator

might not have been able to reflect the nuances in the data as I was the one who had been there and seen it all.

I was aware that some data might be 'lost' in translation because language and cultural differences may affect the translation into another language "due to an insensitivity to specific national and cultural context" (Bryman, 2012, p.73-74), or simply there might not be an equivalence to every word. In that sense, translation of the questionnaire was especially challenging due to the structure of the questions. To give an illustration of what I mean, lets look at one of the scales and its items used in questionnaire to measure Hedonic Motivation.

HM1. Using the tablet is fun.
HM2. Using the tablet is enjoyable.
HM3. Using the tablet is very entertaining.

These three questions eventually refer to a similar concept from different angles. The purpose is to make sure that the participants' answers are valid in a sense that they provide similar answers for all three of them which guarantees that they read the question carefully, and understood what was expected from them. An English speaker could be able to distinguish these three questions, however, in Turkish, 'fun', 'enjoyable', and 'entertaining' mean the same thing and there are not words which correspond to them separately. It was hard to reflect the meaning to another language without changing the structure of the questionnaire, and in order to avoid redundancy I had to eliminate one of the questions from the Turkish version which otherwise would be repetition of the same thing.

In terms of the qualitative methods, since there were not pre-existing materials to be used, it was easier during data collection. However, reflecting the same meaning during translation without changing the voices of the participants or the cultural concepts they belonged to was a hard work. During this process, I had come to understand that when translation is involved, it is never possible to obtain a hundred percent accurate equivalent. It is a trade-off between the meaning and the voice, so, as a researcher, I had to choose the one I found more prominent. Another method I found more appropriate and helpful was to analyse the data in its original language and translate the results, therefore minimizing the diminishing effect of translation on the data. Finally, once everything was done, I checked the translated data with my supervisor to see if the meaning she understands is the meaning the participants wanted to reflect. This final process was particularly helpful to ensure that I could protect the meaning as much as possible while making it sound more natural in English.

As challenging as it could be, I found translation process a rewarding one, which pressed me to think about my data- meanings, concepts, voices etc. - carefully and understand it better before carrying on with the writing stage.

4.7. Analysis of Data

After collecting, transcribing and translating the data, the final step was the analysis. Because I had collected different types of data, they all required different methods and strategies during the analysis. More detailed explanation on data analysis and how certain analysis methods were

applied to the data is given in the corresponding sections of the Analysis chapter but here I talk about them briefly with more emphasis on the journey I went through in analysing the data.

4.7.1. Analysis of Quantitative data

In order to analyse the quantitative data, I followed a series of statistical analysis which are respectively: Factor Analysis, Descriptive Statistics and the Structural Equation Modelling. Statistical analysis is applied to a set of data which is believed to be a representative sample of the entire population. From this point, the main goal is to see the trends in the data (Gibilisco, 2014). The details of the steps I took in analysing the data are explained in the quantitative analysis section for the purpose of simplicity; keeping it all together would help the reader to follow through easily while creating the sense of cohesion.

Having had no experience in running full-scale quantitative analysis, this was one of the most challenging, time consuming and yet rewarding steps of this research. After coding the data in to the format that the only statistical analysis package I could somewhat use, SPSS, I started off searching for help from online sources. After realizing that the specifications of SPSS were limited and I needed another software package to analyze the model, I started looking for other options. I learnt that the software called ‘Amos’ is helpful when dealing with models and the data could easily be moved to Amos from SPSS. With the help of online videos and forums I could only go so far until I felt stuck with the analysis and could carry on no more, so I started to look for help from real people around the university. After attending some seminars, booking short help sessions with statistics groups, I was still in a conundrum and felt lost. That is when I

found out about the Methods Institute inside the university, and immediately started sending emails to people for help. It took weeks before I could reach someone who was willing to help. I met a person and explained him what I had in mind and where I got stuck. Even though he was willing to help, he was familiar with neither SPSS nor Amos, so we decided to leave all the analysis I had done aside, and start fresh with a program of his choice so he could help. He suggested that I learn MPlus and do my initial analysis with it, and come back for another meeting later. After spending several weeks trying to figure this new program and another week or two to do the analysis I finally thought I had completed the initial statistical analysis. However, the person who was helping me was not available for a long time, so, I figured I have to do this on my own as external help was not always available and I was running short with my funding. I started looking for papers, books, other theses to get the overall idea behind the Structural Equation Modelling to analyze the model, which is the most common technique for this type of data, and make sense out of it. After reading tens of forums I came across the program called SmartPLS, which has a different principle compared to other programs I had used. That is, rather than going through complicated analysis processes and drawing the model accordingly at the very end, this program let me draw the model I had in mind, then upload the data to do the analysis. After spending months, experimenting with several different software packages and programs, I finally analysed the data by using SPSS and SmartPLS on my own. What felt like a wearing process later turned out to be a very worthwhile one as I had a chance to learn three new programs and have improved in using another.

Apart from my personal experiences during the analysis, I realized a serious problem with the questionnaire which I had not anticipated before. I believe, this issue is not specific to the

questionnaire I used, but a general problem with the questionnaires and the way they are designed. The original questionnaire consists of scales which have been tested many times by other researchers. Additionally, I attached a simple questionnaire with questions intending to collect demographic information and several open-ended questions for students to explain their opinions about the tablets. Often times, when the main questionnaire shows a negative attitude from an individual, open-ended questions revealed that the reason behind was not that the student was not happy with using a tablet for their school work, but their tablet was faulty or had broken and they couldn't get it fixed, so they were not able to use it properly. In the open-ended section they made it clear that they would have wanted to use a tablet but not this specific tablet because it is not durable. Thus, as stated earlier, questionnaires are limited in their ability to capture the real story which became evident in this research.

4.7.2. Analysis of Qualitative Data

> Qualitative analysis transforms data into findings. No formula exists for that transformation. Guidance, yes. But no recipe. Direction can and will be offered, but the final destination remains unique for each inquirer, known only when—and if—arrived at (Patton, 2015, p. 521)

As Patton points out, qualitative analysis has its own ways of dealing with the data that are different form the quantitative analysis. The entire process is more than just 'analysis', it rather is a 'transformation' while the final product of this transformation is more than just 'findings'; they are the experiences, understandings and interpretations of the researcher about the people, situation, culture, context and so on that's being studied. And again as Patton implies, unlike the quantitative data, there are no correct answers or findings, so to speak, and the researcher only

stops when she/he is satisfied with the final result. When it comes to reporting these results, style and the language chosen to organize and present are personal choices of the researcher with no specific instructions. As Silverman (2013) states "The straightforward character of a quantitative methods chapter unfortunately does not spill over into qualitative research reports" (p.352). This freedom at first seemed to be a great help as I felt like I could play around with the data and find different ways to present it. Then, I realized that having too many choices, or too much freedom was not necessarily a plus as it left me in an indecisive, unsettled mode. From beginning to the end, analysing and presenting the qualitative data was a series of choices I had made, then repeatedly changed based on my readings, discussion with my supervisor and colleagues.

As I wanted to explore teachers' and students' opinions about the tablets, I selected Thematic Analysis for this research. I did not want to push my expectations or prejudices into the data (even though the effect of the research is always there) but rather see what would emerge from it. In that sense, the flexibility that thematic analysis offers suited my goal. As Braun and Clarke (2006) explains "Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data…(it) provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex account of data" (p.5-6). Moreover, as Boyatzis (1998) states, thematic analysis allows the researcher to not only identify themes that are explicit but also the "underlying ideas, assumptions, and conceptualisations – and ideologies" (Braun & Clarke, 2006, p. 13) which are latent. As it is demonstrated in the qualitative analysis section, my data yielded both explicit and latent themes which all together created a comprehensive and complex understanding of the teachers' and students' perceptions of tablets. Clarke and Braun identifies six stages in applying thematic analysis, which I believe every researcher goes through

without even realising it. The stages are categorised as *becoming familiar with the data*- which mainly took place during the transcription and translation process but later my continuous reading of the data helped; *generating initial codes* – this might be the messiest stage of the entire analysis process as I identified numerous codes some of which were highly related while others seemed to be suggesting an independent pattern; *searching for themes* - I finally decided to group the codes in to clusters depending on their relation to each other or their meaningfulness together; *reviewing themes* – I organized and reorganized my themes repeatedly until I felt comfortable with it; *defining and naming the themes* – this process took careful thinking and long discussions with my supervisor in order to find the most appropriate and illustrative labels; and finally *producing the report* – which again took careful thinking in order to find the most suitable way of presenting the themes, one which I could feel comfortable with and makes sense to the reader. This is presented in Chapter 5.

Once I familiarized myself with the data and decided to look for the initial codes, I thought I could make use of a software package to speed up the process and obtain results which could look nicer with visuals. Thus, I allowed myself couple of weeks to learn NVivo as the university provided free license for students. Again, I attended workshops provided by the university, and made use of online sources as well as the tutorials provided by the company itself. Unlike my success in learning the statistical analysis programs, my attempt with NVivo didn't pay off. Not feeling comfortable in using this software, I decided to do it the traditional way: with colourful markers and sticky notes.

When I finally set my strategy and was ready to start analysis, I realized that I had been spending more time thinking than actually doing anything which put me into panic mode. Feeling guilty for doing nothing, I seeked advice from my supervisor who put me at ease by telling me that thinking is actually a part of the analysis process. After this conversation it took me a little while to set myself to write down everything in my mind but I started off by writing anything without looking for perfection. Once I identified the final themes and started producing the report I shook of the guilt and progressed pretty quickly with the analysis. All the thinking I had done became very useful, and the process itself was very informative and rewarding. Even though it didn't require as much technical effort as the quantitative analysis, the qualitative analysis involved too much mental effort. In both cases, I got to learn as I progressed into the analysis.

4.7.3. Analysis of Observation Data

Observations are important parts of this research and provided a valuable insight into the situation in the schools. Because observation was a supplementary method, in analysing observation data I triangulated the data against the other types of data I collected, in a way compared and contrasted them, and embedded the observation data into the main data rather than treating it as a main source of data on its own. This was supported by Robson and McCartan (2016) where they state that the observation could be used as supplementary method to 'validate or corroborate the messages obtained by [another] method" (p. 321).

4.7.4. Analysis of Visual Data

This research has always been a learning process for me from the beginning. However, up until I started this research, I didn't know that images could actually be used as a type of data, and I came to learn that they could be very useful. Just like the qualitative data, images provided data which were highly depended on my interpretations of them. As Pink (2007) points researchers are subjective readers of visual data: Their experiences, backgrounds, and the disciplines affect the meanings that they acquire from images.

Pink (2007) also states that analysis can take place in the field where the images were created or it can be performed in another location. However, once the data is moved from its original place, where it was meaningful, to another place, even though the content remains the same, it is a new context which shapes different perspectives in interpreting the images. Pink's argument on the change of context was also verified in my research. The following images are good examples of the shift in context. These photographs were taken in different schools, Image 1 shows a typical classroom, while Image 2 one is from the entrance of a library. The picture of Atatürk (the founder of the Turkish Republic) and his statements are placed over boards and doors. These pictures are part of everyday life in schools, in government buildings, and even in public places in Turkey whereas mainly in western cultures this might not be perceived as an ordinary practice. These images are meaningful in their own context, when they were moved to another context, this new context shaped interpretations.

Image 1: A typical classroom

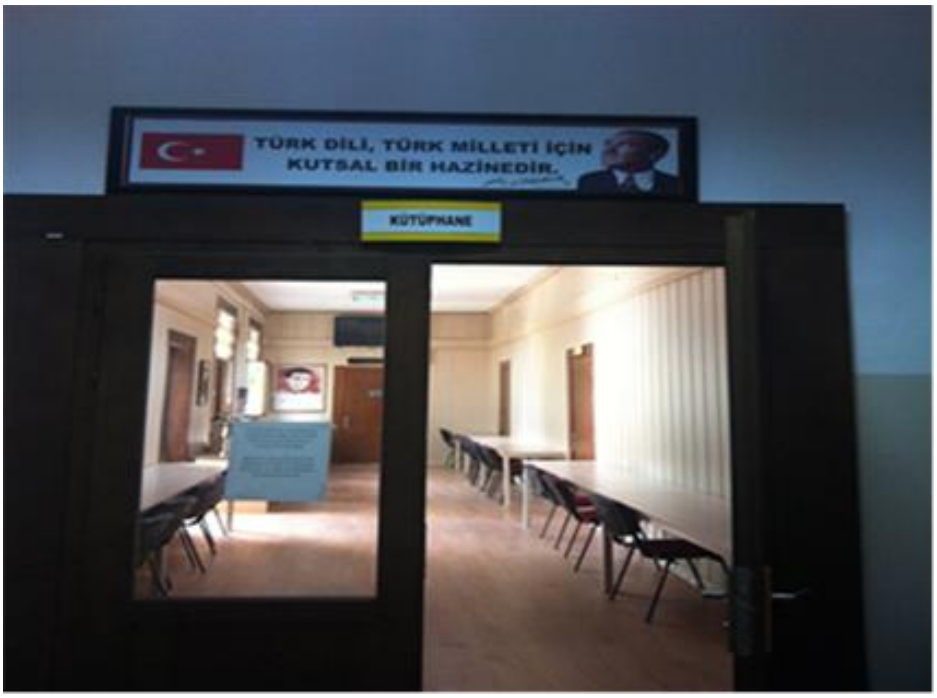


Image 2: Entrance of a library

As the researcher who took the images, I was lucky during the interpretation as I was familiar with the context first from my own experiences as a student in secondary school, and second from my experiences as a researcher who spent some time in the context. Nevertheless, it is not to say that my interpretations are entirely objective or unbiased. With these in mind Pink suggests an approach to the analysis of images which is based on three assumptions:

i. It is not possible to obtain a true visual record of any process or event; therefore, the analysis can never be a complete authentic record of the real situation.
ii. The context of images should be analysed in order to understand how the content is influenced by the involved individuals' subjectivities and intentions.
iii. The analysis should not only focus on the content itself, it should also take into account the different meanings that different people give to the images in different contexts.

Therefore, in analysing the images I followed the suggestions given above. That is, I took into account the fact that the images I created in the field may not reflect the complete story itself, but the field notes and the conversations with people in that context guided the analysis process. The analysis governed both subjective and objective assumptions. While I focus on the content of the images objectively, I tried and focused on the effects of the context, and made subjective meanings out of the images.

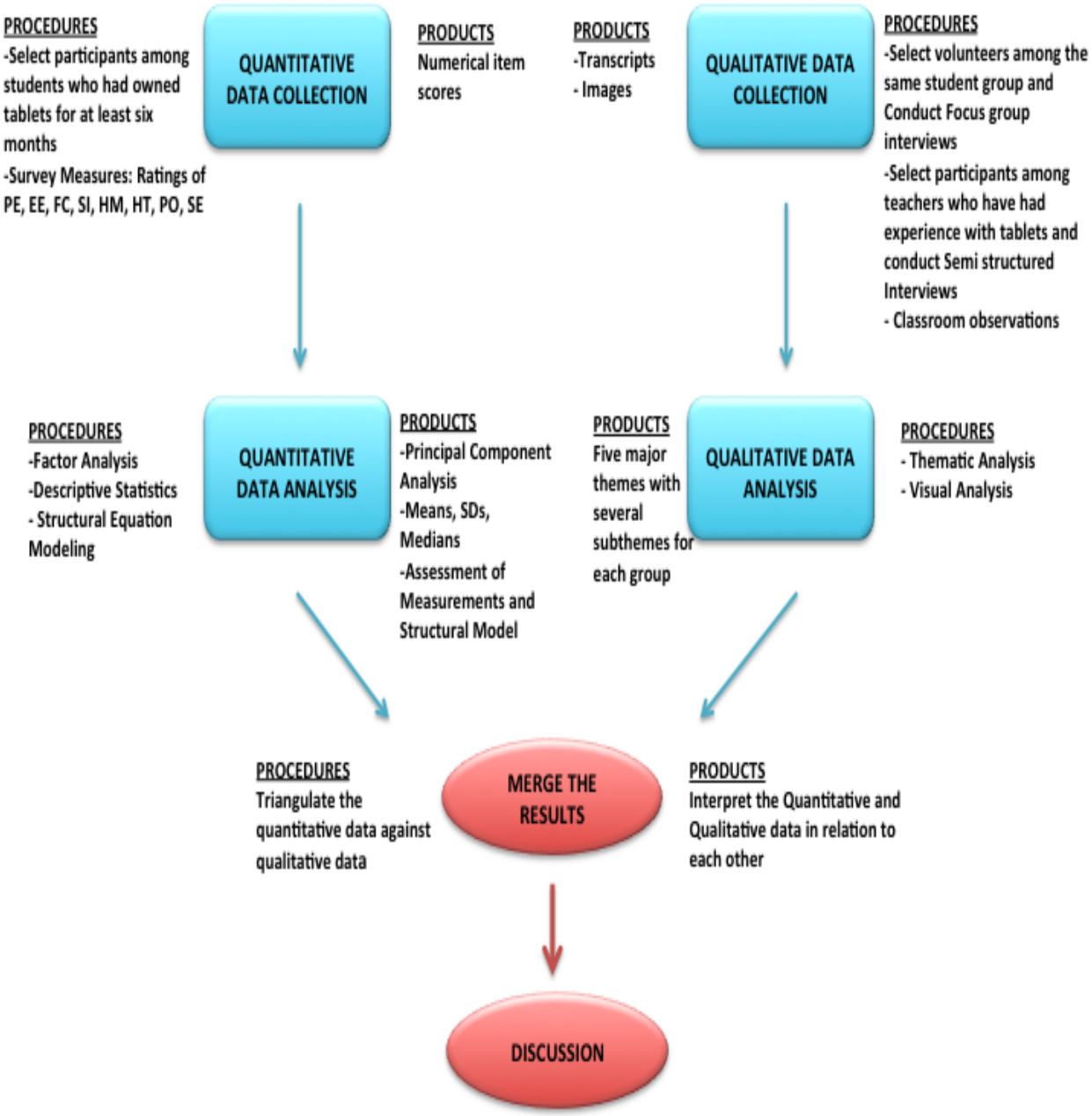


Figure 15: Overview Of Research Design

Source: Adapted from Wittink et al. as cited in Creswell (2013)

4.8. Ethical Considerations

In a research project, the researcher has the responsibility to evaluate ethical considerations upfront (Borg & Gall, 1983) because any research involving people has the potential to create "harm, stress, and anxiety, and myriad other negative consequences" for the participants (Robson & McCartan, 2016, p.205) and the researcher. According to the British Educational Research Association (BERA) Ethical Guidelines for Educational Research (2011):

> Individuals should be treated fairly, sensitively, with dignity, and within an ethic of respect and freedom from prejudice regardless of age, gender, sexuality, race, ethnicity, class, nationality, cultural identity, partnership status, faith, disability, political belief or any other significant difference (p.5)

In a similar manner, Hammond and Wellington (2013) offer a word of caution for researchers to treat the participants fairly, to follow ethical guidelines, to choose fair and honest methods away from deception, to not to manipulate data in order to obtain desired results, to ensure that the anonymity of the participants are protected during the dissemination of the data and any group or individual is not disrespected, and to avoid mixing one's ideas and values with the conclusion drawn from the data.

In this regard, this study was put in practice according to the University of Sheffield's Code of Practice on Research Ethics after ethical approval was granted by the Department of Educational Studies. I followed the standard steps required by the ethics code which I refer to here not in separate sections but in a way embedded in my practice.

After obtaining the ethical approval the next step was to obtain approval of the participants (after gaining access to schools). This step is considered essential before conducting any research in

order to make sure that participants are fully aware of what is expected from them, what is involved in the research and what is going to happen to the data afterwards. In order to achieve this, I prepared informed consent forms along with information sheets for participants to read and ask any questions they may have. According to Burgess (1989) informed consent refers to the *"voluntary consent of the individual to participate in research*" (p. 6; p. 5). Even though consent form has a focal point in the ethics literature it is not an 'unproblematic universal principle' (Burgess, 1989; Robson & McCartan, 2016). My experiences with the ethical procedures while in the field supported this argument about the potential problems with consent forms which I explain here.

Counterintuitively, consent forms can sometimes contradict the principal of ethics by posing a threat to participants' privacy and anonymity (Robson & McCartan, 2016). For research involving human subjects, participant privacy must be the priority. Researchers must respect the participants' rights of confidentiality and anonymity unless it is willingly waived by themselves, their guardians or responsible others (BERA, 2011). Moreover, "research participants should be told at the outset of the study who will have access to data…the researcher must ensure that no unauthorized persons have access to them, and that the privacy of individuals to whom the data apply is protected" (Gall, Borg & Gall, 2007, p.85). As the researcher, it was my responsibility to ensure anonymity to my participants, inform them about the use of the data, and at the same time obtain their consents on a form. However, as mentioned earlier, this is a government-led project, therefore it is not a politically neutral topic. They didn't feel safe in providing a written consent in case I breach their trust and reveal the signed forms. Under these circumstances, teachers'

reaction to the forms was reasonable in the sense that they didn't want to leave any trace behind. I remember one teacher saying:

-*You want me to write down my full name and put my signature under it, and yet you offer me full anonymity.*

There is a popular saying in Turkish that comes from Latin *Verba volant, scripta manent* which translates as *Spoken words fly away, written words remain.* This being the case, I made a 'moral' decision rather than an 'ethical' one and carried on with verbal consent.

Second, obtaining a signed consent form does not guarantee that the participants have accepted to participate by their own will. Tyldum (2012) highlights this issue "In order to get access to all respondent groups, various forms and degrees of institutional, economic and emotional pressure are widely used to recruit respondents" (p.199). I can relate to Tyldum's argument from my own experience in recruiting participants among the students. As I explained earlier in this chapter, student participant selection happened on a 'voluntary' basis; however, every time I visited a classroom to ask students whether they would want to participate in the study and fill out a questionnaire, it always happened with a teacher's presence. That is not to say students were forced to take part, nonetheless, there is no way of knowing if they would have accepted participation if their teachers were not in the classroom. Again, I had to work with what was available to me at the time to the best of my ability to follow the ethical guidelines. Since it was out of my power to ask the teachers to leave, or find participants otherwise, I tried to be as "honest and open" (Hammond & Wellington, 2013, p.61) as possible to my potential participants. I made it clear that if they did not want to fill the questionnaire they could just carry

on with what they were doing, or if they were not happy with the questions they could return the questionnaire unfilled, without a name on it no one would know which form belonged to whom.

Finally, the rigid rules on obtaining informed consent form could potentially prevent quality research from taking place. That is,

> Data quality is held to suffer as a result of the processes put in place to gain informed consent. The key elements of this argument are that informed consent has an adverse effect on participation rates (in the extreme making some groups of people or some topics unsearchable); that the processes of gaining informed consent inhibit the development of the rapport necessary for the collection of authentic data; and that the quality of the data collected suffers as a result of the practical arrangements for gaining consent (Crow, Wiles, Heath &Charles, 2006, p.88).

Again, I can relate to this argument from my research, such that, the university ethical guidelines consider young people under 18 as a high risk group to study. And it is suggested to obtain a consent form from these young people's parents or legal guardians. This research was conducted with participants whose ages ranged from 15 to 17 who were, to my judgement, able to make their own decisions whether to participate in this research or not. Although I had prepared consent forms for their parents, after meeting the students and talking to their teachers, I decided to accept consent from the students. The primary reason behind this was the school administrations' reluctance to involving parents in the decision making process. They didn't want to deal with 'over-concerned' parents, and stated that after the permission of the local authorities and the school administrations', there was no need for parental consent because they could decide what is harmful to their students and what is not. Attempting to obtain parental consent would have been time consuming considering my tight timeline, and also would have dramatically reduced the number of participants because the majority of the students would have forgotten or would not have bothered to take the forms to their parents. Crow et al. (2006) suggest that rather than applying standardized regulations in providing ethical approval, context

specific approaches should be used by the ethical boards and committees. And I feel I have taken UK ethical guidelines to the Turkish context in a way that is sensitive to that different culture. However, as much as it is problematic, obtaining consent before conducting a research still is a crucial and honest practice.

In doing research with young people, there was another point that needs to be highlighted here. Ethics codes clearly states that in the case of discovering an unexpected illegal action during the course of study; after confidentiality and anonymity have been granted to the participants, the researcher must carefully consider the possible effects of disclosure to the related authorities. The researcher must inform the participants of his/her intention to disclosure with all the reasons before taking any action, and must be aware that it is the researcher's responsibility to explain the reasoning behind his/her decision, in case of a misconduct complaint (BERA, 2011). Luckily, there were not any issues that required me to make a decision about reporting to the authorities but there were some occasions where students told me about their unregulated behaviour away from the teachers' gaze in the such as using their tablets for gaming, or smartboards for watching movies when their teachers are not around or shooting videos in classrooms and sharing with their friends and so on. I made a judgment about what was a breach of school rules and what was dangerous for students. They never said anything to me that was dangerous or risky behaviour where they would be harmed. Therefore, I decided not to disclose these incidents as I promised my participants anonymity.

As mentioned at the beginning, researching with human subjects always involves risks. However, risks are not only for the participants, for the researcher too. During my ethical

approval application, I reported that there was not any risk for myself because I had not anticipated any. Nonetheless, reflecting back to my experiences on the field, teachers' refusal to sign a consent form was one to learn from in the future about what happens if people refuse to sign a consent form. Teachers could have reported things that are politically highly sensitive and later claim that they didn't say any of these which could possibly put me in a difficult predicament in case it became an issue with the responsible ministry. It was an unforeseen situation and in my judgement it still remained low risk because I wasn't going to identify people's names and so no one would be able to identify other people or themselves in my work and accuse me of misrepresenting them. Because they wouldn't know what the other people had said.

As for the rest of this research, ethical considerations have been a part where I constantly learn, relearn and adjust my practice depending on the context or situation.

4.9. Chapter Summary

In this chapter, I presented and discussed the methodological and ethical choices that I made throughout this research. I tried to present my choices in a sequential order so that I could create a storyline of before, during, and after the field work. With this purpose, I provided my positionality in this research and its effect on my decisions, I explained my choices in research design and justified my reasons in adopting a mixed methods strategy. Explanations of methods that were used during data collection were also provided. I talked through the very first step of looking for participants to gaining access to the schools, collecting data to transcription and

translation processes. My choices, decisions and experiences in analysing of different types of data were also presented. I concluded the chapter with the ethical considerations for this research where I explained how I applied the contexts of 'ethics' into my research, the predicament I faced with the consent forms, and discussed the overall incompatibility issues with the guidelines which were specifically designed for the UK, and could not entirely be applied to other contexts. In the next chapter, I present the analysis processes both for the qualitative and quantitative data, findings and finally the discussion around these findings.

CHAPTER 5: ANALYSIS, FINDINGS and DISCUSSION

5.1. INTRODUCTION

This chapter encapsulates the analysis of both qualitative and quantitative data, findings and discussion embedded together. I present the analysis, findings and discussion for the qualitative and quantitative strands separately, and later in the chapter combine and discuss both parts in relation to each other. I don't, however, address the research questions here, but rather talk about the findings from both types of data in general. The reason behind this was that often times analysis might produce unexpected results; themes or patterns that was not anticipated might not be addressed by the research questions. Organizing the findings around the research questions would have limited the discussion to the themes which only answer the research questions but other important findings might be lost. Therefore, in order to preserve the findings in their entirety I decided to name this section as Analysis and Findings, and address the research questions in the following Conclusion chapter. Smith (1995) support this flexibility related to heading selection and argue that researchers could make heading choices "depending on the particular slant [they] are taking and the emphasis [they] are making" (p. 24).

Moreover, this chapter is also called the Discussion because the discussion of the findings is also presented. Because qualitative and quantitative data are different in nature, their presentations require different style and language. The reader may find the qualitative part more interpretive and informal with discussion embedded there and then with the support from literature. I am aware that this is not the traditional way of reporting findings and discussion but, I believe,

especially for the qualitative section, providing the discussion and literature right away is the best way to make sense of the data. Hatch (2002) highlights this:

> Neither the data displays nor the explanations are sufficient by themselves; both are essential to helping readers see perspectives you are trying to illuminate. As major themes are described and patterns and relationships are reported and supported, it is appropriate to weave references to relevant literature into your discussion…such connections will help readers make sense of findings as they are being presented (p.230-231)

And Robson and McCartan (2016) submit to this freedom in presenting data when they say "Go for whatever approach best tells the story that you are presenting" (p.495). Again, Smith et al. (1995) states that qualitative data have a flexible way of presenting the results and discussion.

The quantitative section, on the other hand, has a very specific language and a more 'straightforward' flow of steps; it deals with 'results' rather than 'findings', and because nothing is complete until I get to the very end with the analysis, discussion of the quantitative results could not be offered during the analysis step. Therefore, for this part, I explain the analysis step by step, provide explanations as needed, but the discussion of this part will be included at the end of the section.

This chapter concludes with a final discussion of the findings from both parts where I merge and compare the data in order to create a richer explanation of the findings.

5.2. QUANTITATIVE DATA

In this part I examine and report the results from the quantitative part of this research. In order to analyse and make sense of the data I used both descriptive and inferential statistics. These are explained in detail in their corresponding sections, but in short, descriptive statistics or analysis provide quick information about the data and the sample without making generalizations. Inferential statistics, on the other hand, comprises the rest of the analysis where I draw inferences from the data. In order to analyse the data and validate the proposed research model, (which I have modified and experimentally used in a new context for the purposes of this research), the Statistical Package for the Social Sciences Programme (SPSS) version 21 and SmartPLS version 3.2.3 were used.

This chapter is divided in three main sections: 1. Factor Analysis, 2. Descriptive Statistics, and 3. Structural Equation Modelling. While the first two parts have the purpose of understanding the structure of the data and the sample, third part is where the actual data analysis takes place.

In statistical analysis, I used abbreviated nomenclatures (acronyms) of the factors for simplicity. However, I am aware that it is not always easy to keep these in mind so throughout this chapter I use the full names now and then as a reminder, but here I provide a table to serve as a key. A fuller description of these terms also given.

Table 11: Construct, Abbreviations, and Definitions

Full Construct Name	Acronym	Definition
Performance Expectancy	PE	the degree to which a user believes that using a specific technology will improve the job performance (Venkatesh et al., 2003).
Effort Expectancy	EE	"the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p.450)
Social Influence	SI	"the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003, p.451).
Facilitating Conditions	FC	the belief of a user that organizational and technical support exists (Venkatesh et al., 2003).
Hedonic Motivation	HM	"the fun or pleasure derived from using a technology" (Venkatesh et. al., 2012, p.161).
Habit	HT	perceptual construct that reflects the results of prior experiences (Venkatesh et al., 2012, p.161)
Self-Efficacy	SE	"an individual's assessment of their skill level in performing computer related tasks" (Stylianoul & Jackson, 2007, p.13).
Psychological Ownership	PO	the degree to which people feel that 'the target of the ownership (material or immaterial in nature) or a piece of it is "theirs"' (Pierce, Kostova & Dirks, 2001, p.299).
Behavioural Intention to Use	BIU	

Before moving on to the details with the statistical analysis, I first explain some of the common terms and concepts I use throughout this chapter, and then provide simple information on the number and gender of the participants.

The terms and concepts which I explain here are specific to quantitative analysis and may not always lend themselves to an easy definition for people who are less experienced with statistics due to the specific linguistic differences in the meanings attributed in the statistical context.

Variable: A variable is an entity that is measured, counted, experimented, or manipulated in a research. And simply, a model represents the relationships between variables. In this research I have two types of variables: independent and dependent. Independent variables are the ones that are not affected or changed by other factors while dependent variables are affected or changed by the independent variables. In this case because I am trying to understand whether Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Habit (HT), Self-Efficacy (SE), and Psychological Ownership (PO) cause any changes on the students' Behavioural Intention to Use (BIU) the tablets, the BIU is the dependent variable while the rest are independent.

Scale and Item:

> A scale is a type of composite measure that is composed of several items that have a logical or empirical structure among them…For example, when a question has the response choice of "always", "sometimes", "rarely", and "never", this is a scale because the answer choices are rank-ordered and have differences in intensity…the individual questions that use this format are called (Likert) scale items while the (Likert) scale is a sum of several (Likert) items" (no parenthesis in the original) (Crossman, 2014, para. 1).

Thus, in this research the entire questionnaire is made up of 9 scales: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Habit (HT), Self-Efficacy (SE), Psychological Ownership (PO), Behavioural Intention to Use (BIU), and 32 items (questions).

Construct: A construct "is an attribute, proficiency, ability, or skill that happens in the human brain and is defined by established theories" (Brown, 2000, p.9). These are latent (hypothetical) variables which "are not directly observed but are rather inferred (through a mathematical model) from other variables that are observed (directly measured)" ("Latent variable," 2016, para. 1). That is, for example, it is not possible to directly observe or measure students' Performance Expectancy (PE) or Self-Efficacy (SE) or Behavioural Intention to Use (BIU). What I can measure are the answers given to the questions (items) in the questionnaire and these items together make up the construct. Simply put, Hedonic Motivation (HM), for instance, is a construct consisting of several observable items (questions).

Even though they are not always necessarily the same thing by definition, from now on, whenever the terms 'variable', 'construct', 'factor' are used, they all refer to the PE, EE, SI, FC, HM, HT, SE, PO and BIU unless it is clearly stated otherwise.

The participants of the quantitative study were students which had had their tablets for at least six months as shown below.

Table 12: Demographics of Participants

Gender	Number of Participants	Percentage
Girl	140	52.6
Boy	124	46.6
Other	2	0.8
Total	266	100.0

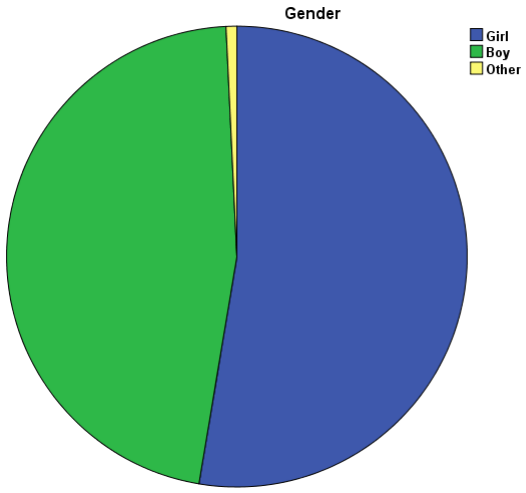


Figure 16: Demographics of Participants

Figure 16 Table 11 and Figure 16 show the number of participants in relation to their gender. As it could be seen, total of 266 students answered the questionnaire after the ones with excessive missing answers were left out. For the most part, distribution of genders is quite balanced for boys and girls, while a very low number for 'other' is understandable.

5.2.1. Factor Analysis

"Factor analysis is a technique that is used to establish the validity of scales; to demonstrate that the different items of a multi-item scale "belong" together, but also that they are different from other scales" (Dawson, in press). In other words, factor analysis tests that the questions that were supposed to measure Performance Expectancy (PE), for example, in fact measured the PE but not any other construct, lets say Effort Expectancy (EE). It is a way of making sure that all the questions (items) in a scale belong to that scale while also making sure that no two scales measure the same thing. There are two types of factor analyses: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). They both have different purposes and need to be part of the statistical analysis if the scales are not already well-established and proven valid and reliable by other research. Even though the majority of the scales in this research are already well established, the newly added scales 'Self-Efficacy' and 'Psychological Ownership' needed to be tested. Therefore, I carried out Exploratory Factor Analysis on the entire data, and revalidated the old scales.

Exploratory Factor Analysis (EFA) is "an exploratory procedure that searches for relationships amongst the items (questions), and assigns items to scales (factors) purely on the basis of these relationships" (Dawson, in press). It is helpful in determining the underlying factor structures and what the factor structure looks like according to participant responses. As it is an exploratory step, the researcher has no preconceived (apriori) assumptions about the relationships between the factors.

EFA was conducted on all the scales to check the consistency of the proposed factor structures with the actual data. The Principal Component Analysis (PCA) was performed with Varimax rotation. The PCA is a commonly used method in Exploratory Factor Analysis. “The main goal of a PCA analysis is to identify patterns in data; PCA aims to detect the correlation between variables” (Raschka, 2015). While using the PCA, statistical packages (SPSS in this case) provide different types of factor rotations that can change the final appearance of the output. Rotation looks for a simple structure in the data and makes the output more understandable and reliable thus making the interpretation more easily (Thurstone, 1947). I chose the Varimax rotation because it’s the most common rotation type used in research due to the simpler and easily interpretable results compared to the other types.

The Kaiser-Meyer-Olkin (KMO) measure of sample adequacy has returned 0.903 which is well above the minimum requirement of 0.5 (Field, 2009). The KMO is an index to determine the appropriateness of factor analysis. Values for the KMO are always between 0 and 1, and the closer the KMO to 1, the more appropriate the data deemed for factor analysis and Bartlett’s test of sphericity which is a sign of the validity and suitability of the responses given to the questions being addressed thorough the study returned well within the limits ($p < 0.05$) $p=0.000$. Both looking at the KMO and the Bartlett’s test of sphericity I could conclude that factor analysis was appropriate for the data. Thus I could move onto the factor analysis.

Exploratory factor analysis suggested retaining 8 factors (components). However, since the model I am testing has 9 factors, I set the number of factors to be extracted as 9. All factors had eigenvalues greater than 1 as suggested by Kaiser (1960) except for BIU. ‘Eigen’ is a

mathematical term which in German means ‘own’. Eigenvalue in factor analysis means the amount of variance explained by a factor. That is, the higher the eigenvalue is for a factor, the more important that factor is for the researcher to keep. Eigenvalue is an index that helps in deciding the number of factors to be kept in the analysis and to be carried forward to the model testing.

However, purely deciding on the eigenvalues may not always be reliable, so a scree test is suggested. The scree plot showed that the straightening point of the curve starts right after the eighth factor as shown in the Figure 17. Looking at the plot, I resolved that there was not much difference between the eight and the ninth factors, and besides Jolliffe (1986) suggests retaining anything above 0.7 eigenvalue. Therefore, I decided to retain all 9 factors as proposed in the research model. This indicates that all 32 items could be reduced into 9 components. Basically, there are 32 questions (items) in the questionnaire which can meaningfully be grouped into 9 categories (components). These 9 components together explained 81% of the total variance. That is, when we assume that there are 9 components, we can predict 81% of the information in all of the 32 items.

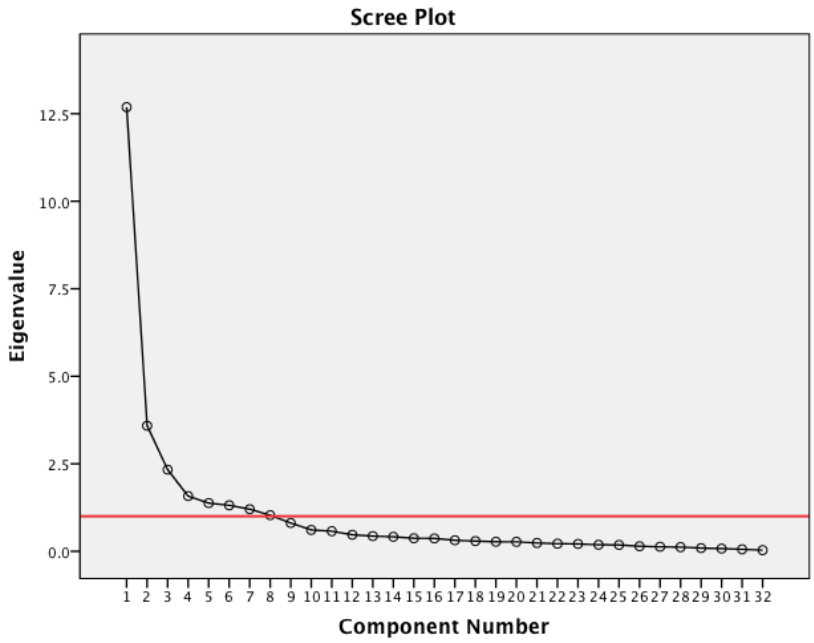


Figure 17: Scree plot of the eigenvalues

Table 12 below shows the Rotated Component Matrix for the 9 factors. This matrix is the result of the Principal Component Analysis and visually shows which items (question) belong to which factor (or scale). Numbers in the columns are the factor 'loadings' which refer to the strength of the relationship between the items and the factors. That is, it tells us how strongly a question is related to the attitude it is supposed to measure. In order for a relationship to be considered important, a cut-off value of 0.5 is suggested. The Rotated component matrix in Table 13 showed that item loadings were mainly well over 0.5 which suggests strong relations between the items and the constructs that they are loading on.

Tracing across the table, for example, for the Social Influence (SI), we see that there are two items (questions) in this construct: SI1 and SI2 with loadings 0.818 and 0.761, respectively. This suggests that since SI1 has a higher loading, it has a stronger relationship with the SI. Thus, we

can say that as a question SI1 performs better than SI2 in terms of measuring the effect of Social Influence (SI) on the Behavioural Intention to Use (BIU). However, since they are both higher than the suggested cut-off value of 0.5, I conclude that both questions did a good job in the questionnaire. We can also see that the SI2 has another loading of 0.411 on to the PE. This situation is termed 'cross-loading' which means that question SI2 has some relationship or similarity to the PE. Since it is lower than 0.5 and also lower than SI2's loading on to its own construct (SI), it could be ignored. However, there were two items EE1 and EE2 with cross-loadings onto another item with loadings closer or higher than their expected loadings, and EE2 with a loading 0.362 lower than the suggested 0.5. These two items showed relatedness to the PE more than the EE and looked a bit problematic. I decided to run a factor analysis on the EE to see if all the items belonged to this construct. Table 14 below suggested that all 5 items have sufficient relationships to their construct. Therefore, all items were kept for the analysis.

Table 13: Principal Component Analysis of All Items

Construct Name	Item Names	PE	EE	SI	FC	HM	HT	SE	PO	BIU
PE (Performance Expectancy)	PE1	.822								
	PE2	.898								
	PE3	.872								
	PE4	.852								
EE (Effort Expectancy)	EE1	.497	.515							
	EE2	.548	.362							
	EE3		.796							
	EE4		.772							
	EE5		.709							
SI (Social Influence)	SI1			.818						
	SI2	.411		.761						
FC (Facilitating Conditions)	FC1				.795					
	FC2				.792					
	FC3				.893					
HM (Hedonic Motivation)	HM1					.839				
	HM2					.855				
	HM3					.864				
HT (Habit)	HT1	.346					.532			
	HT2						.905			
	HT3						.906			
SE (Self-Efficacy)	SE1							.768		
	SE2							.720		
	SE3							.744		
	SE4							.747	.312	
PO (Psychological Ownership)	PO1							.329	.621	
	PO2								.737	
	PO3								.608	
	PO4								.815	
	PO5								.622	
BIU (Behavioural Intention to Use)	BIU1									.825
	BIU2									.848
	BIU3									.808
Eigenvalues	12.689		3.587	2.332	1.577	1.378	1.315	1.203	1.031	0.809
% of Variance Explained	14.116		10.550	9.775	8.858	8.455	8.453	7.983	7.336	5.473

Extraction Method: principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Items with loadings lower than 0.5 have been suppressed

Table 14: Component Matrix[a]

	Component
	1
EE1	.776
EE2	.716
EE3	.845
EE4	.863
EE5	.722

Extraction Method: principal Component Analysis
a. 1 component extracted

Dilorio (2005) suggests that an item which is essential to the scale might not perform well in every sample "if the item were not relevant for the sample" (p. 273). Thus, the items with loadings closer to the desired limit 0.5 or the items with cross loadings may have to do with the participants of this study because I used the scales with a different demographic group: a group of students instead of the consumer context for which these scales were developed.

Overall, the factor analysis suggested a clear factor structure and all the items were kept for the analysis.

5.2.2. Descriptive Statistics

Here, I provide simple descriptive statistics about data. As the name implies, these statistics provide a short summary or a description of the data without trying to make generalizations or inferences beyond what they might suggest. It is an easy and quick way to understand the nature

of the data, such as the central tendency in the data, or information about the population that is being studied.

Table 14 below demonstrates the descriptive statistics for each construct. Both Mean and Median values have been provided along with the Standard Deviation. There has been a debate over presenting descriptive statistics for scales. Stevens (1946) argues that most of the time psychological measurements are conducted with 'ordinal scales' which prioritise the order of values but the differences between these values are unknown. To make it clear, in this research, I used a seven-point Likert scale, points being: 'Strongly Agree', 'Agree', 'Somewhat Agree', 'Neutral', 'Somewhat Disagree', 'Disagree' and 'Strongly Disagree'. Stevens (1946) and his supporters claim that the scale rank orders these values but we don't know if the difference between 'Strongly Agree' and 'Agree' is the same for 'Strongly Disagree' and 'Disagree'. Simply, ''…the average of 'fair' and 'good' is not 'fair-and-a-half'' (Jamieson, 2004, p. 1218).

Mean (Average) marks where the centre of data is located, that is, the typical answers that participants chose to give to the questions in a given scale. Calculation of the mean involves the assumption that the differences between the points (Strongly Agree to Strongly Disagree) in the scale are equal. As we don't know if this is the case, calculating the Mean and Standard Deviation is meaningless, and instead Median could be used (Stevens, 1946; Forrest & Andersen, 1986). Median is the middle value in a rank ordered list. Since the differences between the numbers do not necessarily need to be the same, use of Median is suggested by Stevens and others in the field.

On the other hand, Lord (1953) makes a contrary claim and argues that "…the numbers don't remember where they came from, they always behave just the same way, regardless" (p.751). Sauro and Lewis (2012) share this view and promote the use of Mean on condition that the researcher is cautious about interpretation. That is, while we can say that the Mean value of 4 might be more than 2 but it doesn't indicate that it is twice as good or worse, while also the difference between 4 and 6 is not the same as 4 and 2.

I am, by no means an expert to make any claims on the issue or to pick a side. Thus, in the light of these contrary views, I chose to present both the Mean and Standard Deviation as suggested by Lord (1953) and the Median values as suggested by Stevens (1946), and the reader could follow whichever they find more appropriate. Here, I provide a sample interpretation of both values.

A seven-point Likert scale was used for this research (see Appendix). These values are important for the interpretation of Mean and Median; therefore, I provide the scale to be used as the 'reference point'.

Strongly Disagree	**Disagree**	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Agree**	**Strongly Agree**
(1)	(2)	(3)	(4)	(5)	(6)	(7)

As I mentioned earlier, Mean (Average) marks where the centre of data is located, shows the central tendency in participant answers. In this case, as seen from the Table 5 below, Mean

scores are between 2.3 to 4.5 indicating a Disagree-to-Neutral tendency in the participant answers.

Standard Deviation indicates how dispersed the data is from the Mean, in other words, the amount of variation in participant answers. Standard deviation decides if the mean is reliable and how polarised the participant answers are. In short, the closer the Standard Deviation is to 0, the more reliable the Mean is. As seen from the Table 15, the standard deviation ranged from 1.6 to 2.1 indicating a relatively broad dispersion of the item scores from the Mean. That is, answers broadly differed from their typical values. Looking at the Table 15 for Hedonic Motivation (HM), for example, we can see that HM has a Mean value of 3.54 and the Standard deviation is 2.19. This suggests that the central tendency of the participant answers for HM is somewhere around between 'Somewhat Disagree' and 'Neutral', and 2.19 standard deviation suggests that the range for answers are very broad, thus highly polarised.

In terms of the Median, as explained above, it is another preferred way to understand where the centre of the data is, or in other words, what is the central tendency in the participant answers. Median represents the middle value, such that, in a given construct, lets say Habit, when all the participant answers are rank-ordered and put together in a line, the middle answer (Median) happens to be 2, which suggests that the participant answers for Habit were mainly based around 'Disagree'. And the same principal applies when looking at the Standard Deviation in relation to the Median values.

Even though researchers are divided between the use of Mean or Median, Table 15 also shows that these values were not a lot different from each other, and they both provided similar information about the data.

Table 15: Descriptive Statistics of the Constructs

Construct Name	Mean	Std. Deviation	Median
Performance Expectancy (PE)	2.87	1.81	2.25
Effort Expectancy (EE)	4.54	1.69	4.80
Social Influence (SI)	2.75	1.81	2.00
Facilitating Conditions (FC)	4.30	1.92	4.66
Hedonic Motivation (HM)	3.54	2.19	3.33
Habit (HT)	2.32	1.60	2.00
Self-Efficacy (SE)	3.80	1.95	3.75
Psychological Ownership (PO)	3.85	1.74	4.00
Behavioural Intention to Use (BIU)	4.11	2.10	4.00

5.2.3. Data Analysis – Structural Equation Modelling (SEM)

In order to analyse the data, I utilized the Structural Equation Modelling (SEM) approach. SEM is a series of statistical methods which enables the measurement of complex relationships among the variables (Teo, 2011). SEM is a commonly used method in social sciences due to its capabilities to measure directly unobservable concepts, such as human behaviour, intelligence and so on, and it has become popular in education (Teo & Khine, 2009). To make it clear, for example, it is not possible to directly measure human intelligence in the same way as it is to measure height or weight: instead, measurement instruments (a questionnaire in this case) have been developed to 'indirectly' measure human intelligence ("Structural Equation Modelling",

2016). These instruments are driven by theory, and SEM statistically tests the theory against the data at hand. Loehlin (2004) claims;

> So long as we want to try to describe complex real-life phenomena as they occur in their natural settings, it seems that our chief alternatives are the literary essay and the path model (p. 232).

SEM is a form of path analysis as there are paths in the model which tell us about the relationships between the constructs that we are trying to measure. Loehlin's assertion of equating an essay and a path model may or may not always be applicable or acceptable in every discipline but it suggests one thing that SEM is one of the best ways to statistically explore a "real-life phenomena".

There are several different approaches to the Structural Equating Modelling (SEM), and each approach is more suitable for a specific purpose. For this research, I chose the Partial Least Squares (PLS) based SEM. Henseler, Hubona and Ray (2016) suggest that PLS is particularly a promising technique for new technology research. Partial Least Squares (PLS) is a prevailing method due to its less complex, more flexible and versatile nature, and its ability to work well with small sample sizes (Bouesteix & Strimmer, 2006; Raman & Don, 2013). PLS has an exploratory nature; on that account it is considered to be more suitable and useful in behavioural and social sciences when testing of a new model involves. Besides, PLS has good inferential abilities which makes it ideal to draw interpretations from the model (Karimi & Meyer, 2014). There are critiques of PLS due to its lack of precise "goodness-of-fit" test statistics or parameters which exist in other types of SEM. Goodness-of-fit refers to the discrepancy between the actual data and the model's predictions. Even though there are some parameters in PLS to evaluate the model's goodness-of-fit, these parameters are still debated over in the field. However, Lee

(2000) argues that “PLS avoids many of the restrictive assumptions imposed by other causal models…This overcomes the disadvantage of the lack of formal significance tests for parameters resulting from non-parametric methods” (p.196). Thus, I found PLS based SEM suitable for the purposes of this research.

There are various software packages available with similar specifications and choosing one is only a matter of personal preference. Before finding the right software for me, I had experimented with several other software, and found the SmartPLS (version 3.2.3) statistical program relatively simpler and quicker for less experienced researchers like myself. Therefore, the rest of the analysis was completed with the help of this software.

The Structural Equation Modelling (SEM) can be divided in to two parts: measurement model and structural model. The ‘Measurement model’ also known as the ‘Confirmatory Factor Analysis (CFA)’, CFA refers to the part of the analyses where reliability and validity of the scales are evaluated and refined. The ‘Structural model’, on the other hand, is the model itself where the relationships between the variables (constructs) are assessed and evaluated. Hypotheses testing takes place in this second part.

Before moving on to testing the hypotheses and drawing conclusions from the structural model, it is essential to go through the measurement model analysis or the CFA (Anderson & Gerbing, 1988) to ensure the reliability and validity of the scales used in data collection.

5.2.3.1. Assessment of the Measurement Model

This part is concerned with the validity and reliability of the measurement items. In order to assess these, ‘Convergent Validity’, ‘Discriminant Validity’ and ‘Reliability’ were determined. The SmartPLS provides all the required measures which are displayed in the tables below.

Reliability and Convergent Validity

Validity, overall, refers to "the degree to which a test measures what it claims, or purports, to be measuring" (Brown, 1996, p. 231). Convergent and Discriminant validity are statistical tests to measure the validity of the questionnaire that I used in this research. Convergent validity ensures that “a test designed to measure a particular construct is actually measuring that construct” (Andale, 2016). That is, convergent validity should be established in order to ensure that the questions in the questionnaire in fact tested the behaviour, trait or etc. that they were expected to do.

Reliability, on the other hand, refers to the quality of the questionnaire in terms of producing trustworthy data. Reliability tests are done to check if the questions in the questionnaire re internally consistent.

There are common statistics to look for in order to understand if validity and reliability has been achieved. This is fairly simpler for reliability for which presenting the Cronbach’s Alpha is the common practice which is provided in Table 16. The accepted level of Cronbach’s Alpha is 0.7

and above, and looking at the Table 16, we can observe that all constructs have alpha values well over 0.7. Thus, I can conclude that reliability has been achieved.

In order to establish convergent validity, however, three criteria should be fulfilled:

i. Factor loadings of items should be greater than 0.5 (Hair et al., 2006; Hair et al., 2010), or >0.7 for more conservative researchers
ii. 'Composite Reliability (CR)' of each construct should be at least 0.7 or above (DeVellis, 2003),
iii. The 'Average Variance Extracted (AVE)' should exceed 0.5 for every construct (Fornell & Larker, 1981).

Table 16 below shows all required measures for convergent validity and reliability and their accepted limits.

As described previously, the term 'factor loadings' refer to the strength of the relationship between the items and the construct which is a sign that if an item (a question) belongs to a scale. Literature suggests min value of 0.5 factor loadings as sufficient, but anything 0.7 and above is considered good. As seen from the Table 16, all outer loadings on the construct were above the cut-off point 0.5 as suggested by Hair et al. (2006; 2010), ranging from 0.682 to 0.967.

'Composite Reliability (CR)' is another measure of reliability which is required for validity of a test. It refers to the overall reliability of a collection of similar items. Recommended value for the

CR is 0.7 and above. Table 16 shows that all constructs have CR values over 0.8 which suggest that the second criteria for convergent validity has been satisfied.

The ‘Average Variance Extracted (AVE)’ could be described as the degree that the items (questions) in a test explain the researched phenomenon. If we trace the Table 16 for the constructs PE and EE and look at the AVE column we can see that the values of AVE are 0.866 and 0.618, respectively. This tells us that the questions I used to measure PE did a better job than that of EE. However, overall, all constructs have AVE values greater than 0.5 which is the recommended cut-off point. Therefore, all three criterion of convergent validity have been fulfilled.

Table 16: PLS Output - Reliability and Convergent Validity

Variable (Construct)	Item Name	Outer Loadings (> 0.70)*	AVE (> 0.50)*	CR (> 0.70)*	Cronbach's Alpha (> 0.70)*
PE	PE1	0.905	0,866	0,963	0,948
	PE2	0.947			
	PE3	0.941			
	PE4	0.928			
EE	EE1	0.805	0,618	0,890	0,845
	EE2	0.767			
	EE3	0.825			
	EE4	0.843			
	EE5	0.682			
SI	SI1	0.930	0,865	0,928	0,844
	SI2	0.930			
FC	FC1	0.919	0,804	0,925	0,880
	FC2	0.895			
	FC3	0.875			
HM	HM1	0.967	0,945	0,981	0,971
	HM2	0.983			
	HM3	0.966			
HT	HT1	0.859	0,763	0,906	0,848
	HT2	0.882			
	HT3	0.879			
SE	SE1	0.883	0,756	0,925	0,892
	SE2	0.906			
	SE3	0.855			
	SE4	0.832			
PO	PO1	0.728	0,612	0,887	0,840
	PO2	0.860			
	PO3	0.703			
	PO4	0.832			
	PO5	0.778			
BIU	BIU1	0.927	0,881	0,957	0,932
	BIU2	0.946			
	BIU3	0.942			

**Indicates an acceptable level of reliability or validity*

Discriminant Validity

Discriminant validity is concerned with the distinctiveness or uniqueness of each construct (Campbell & Fisk, 1959). In order to test the scales for discriminant validity, I used the Fornell-Larcker (1981) criterion. The SmartPLS provides these measures which are presented in Table 16.

The diagonal values showed in bold are the square roots of the AVE values which is accepted as the required criterion for discriminant validity. In order to establish discriminant validity, the diagonal values in table should be greater than the off-diagonal values in their respective rows and columns. As observed from the table, these values are greater than any off-diagonal value which suggests that discriminant validity has been established.

Table 17: Discriminant Validity

	BIU	**EE**	**FC**	**HM**	**HT**	**PE**	**PO**	**SE**	**SI**
BIU	0,938								
EE	0,479	0,788							
FC	0,383	0,562	0,897						
HM	0,443	0,475	0,277	0,972					
HT	0,261	0,253	0,175	0,502	0,873				
PE	0,386	0,565	0,303	0,512	0,425	0,931			
PO	0,616	0,542	0,384	0,464	0,341	0,418	0,782		
SE	0,565	0,598	0,464	0,516	0,351	0,495	0,596	0,869	
SI	0,288	0,362	0,226	0,475	0,477	0,601	0,328	0,366	0,930

In this section I provided evidence of validity and reliability for the measurement model. With this hand, I can now move forward to testing the structural model.

5.2.3.2. Assessment of the Structural Model

After testing the measurement model and establishing the reliability and validity of the measurement items, I now move on to the structural model. The structural model relates the constructs with each other based on the theory and on my assumptions, and then tests the relationships between the constructs. In this stage, I create the model and provide statistics from which I can then draw inferences. As with the measurement model, I used the SmartPLS for the structural model.

In this section, I present the results of the structural model and hypotheses testing. First, I present the proposed model for this research with the additional constructs and relationships (Figure 18) and then the model with its original constructs from the literature (Figure 19) in order to show the difference created by the additional scales from this research.

Figures 18 and 19 below show the path coefficients (the values on the arrows), which represent the strength of possible casual relationships between the independent and dependent variables, and the R^2 values (values in blue circles), which refer to the percentage of variance explained by the explanatory variables, therefore predictive power of the model (Chin, 1998).

Predictive power of a model can be described as its ability to allow the researcher to make predictions about the real world phenomenon that is being researched. In order to measure the structural model's explanatory power, R^2 values were used. R^2 simply can be described as the 'quality of the model', or a measure to decide how well the real phenomenon, in this case student intention, is replicated by the model. In other words, R^2 tells us how likely it is that we can

predict the students' Behavioural Intention to Use the tablets according to the model I created. The R^2 value of 0.460 indicates that the structural model explained 46% of the variance in BIU. Additionally, another 46% of the variance for EE is accounted for by the structural model. In order to make meaningful interpretations, Falk and Miller (1992) suggest that the explained variance by a dependent variable should be at least 10%. Moreover, in some fields and cases where predicting human behaviour is the purpose, the R^2 value is expected to be lower than 50%, as human related phenomena are harder to predict and more complex than other phenomena, such as physical events (Das, 2015). In this case, analysis suggest that the model I proposed could predict the students' intention to use tablets up to 46% accuracy. Thus, I conclude that the structural model demonstrates enough explanatory power.

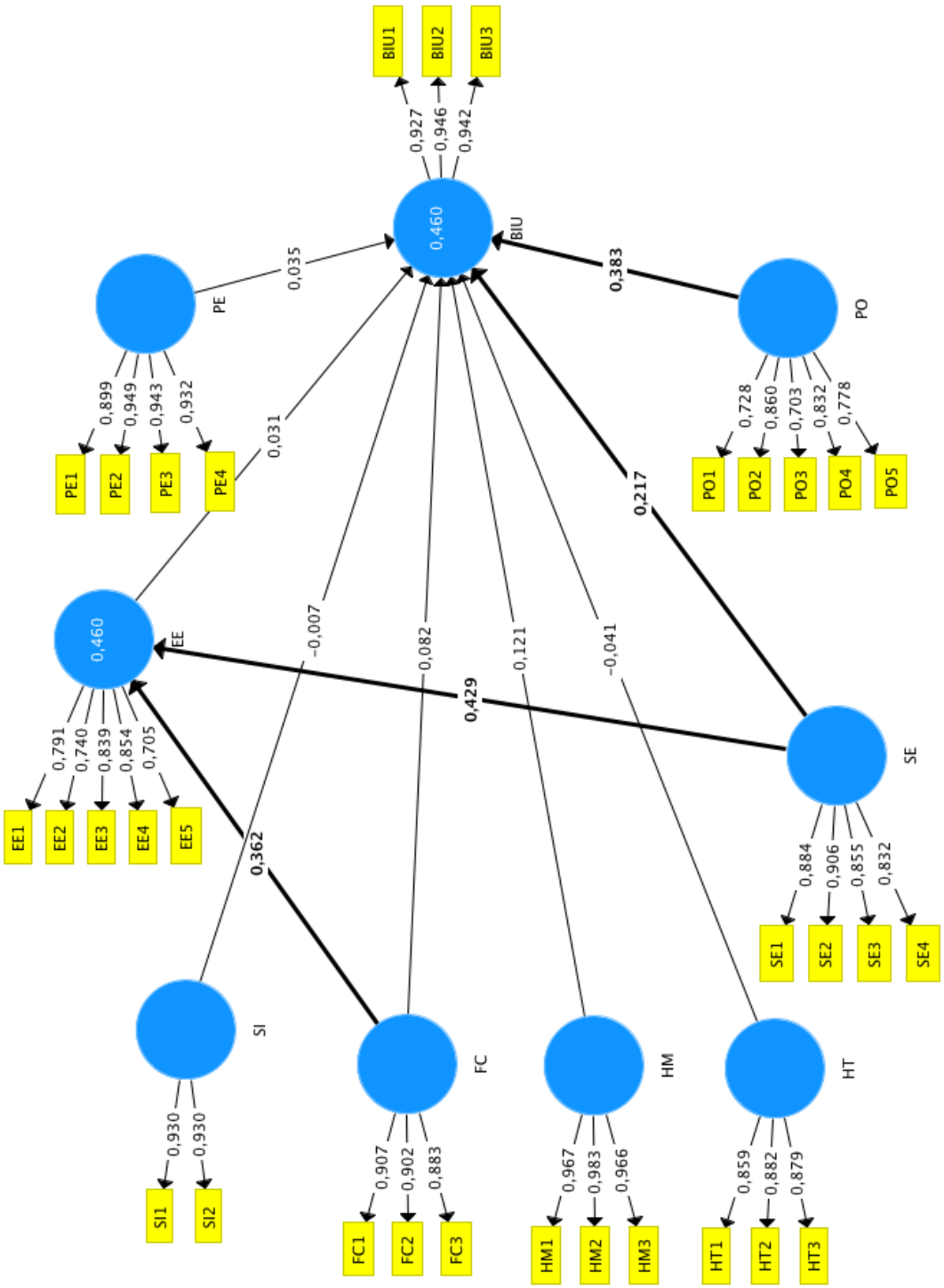


Figure 18: The Structural Model

**Bold lines indicate the statistically significant results*

In order to test the statistical significance of the paths/relationships in the structural model, bootstrapping was carried out with 500 samples. Bootstrapping is simply a 'resampling' technique. Because in many cases the data collected by a researcher is limited; it is not always feasible to reach out too many participants and collect more data in order for the statistical analysis be more meaningful. The idea behind the bootstrapping is to create more samples from the original data at hand, analyze these samples, and compare them against each other to see how accurate the original analysis results were. In statistical analysis, it is assumed that the collected data is a representative sample of the population from which it was collected, so the newly created samples should behave like the original data and yield similar results.

In the Table 18 below, I provide the Path Coefficients between the constructs, and significance statistics (*p* values) to evaluate the significance of the relationships between the constructs that is helpful in deciding which hypotheses were supported by this research, and the effects sizes (f^2).

Table 18: Results of Hypotheses Testing

Hypotheses	**Path**	**Path Coefficient**	***t*-statistics *(p values)*** *	**f^2 (Effect size)** **	**Findings**
H1. Performance Expectancy (PE) will significantly and positively influence students' Behavioural Intention to Use (BIU) technology.	PE→BIU	0.035	0.528 (0.598)	0.001	Not Supported
H2. Effort Expectancy (EE) will significantly and positively influence students' Behavioural Intention to Use technology.	EE→BIU	0.031	0.413 (0.680)	0.001	Not Supported
H3. Social Influence (SI) will significantly and positively influence students' Behavioural Intention to Use technology.	SI→BIU	-0.007	0.105 (0.917)	0.000	Not Supported
H4. Facilitating Conditions (FC) will significantly and positively influence students' Behavioural Intention to Use technology.	FC→BIU	0.082	1.424 (0.155)	0.008	Not Supported
H5. Facilitating Conditions will significantly and positively influence students' Effort Expectancy.	FC→EE	0.362	6.450 (0.000)	0.191	Supported
H6. Hedonic Motivation (HM) will significantly and positively influence students' behavioural intention to use technology.	HM→BIU	0.121	1.479 (0.140)	0.015	Not Supported
H7. Habit (HT) will significantly and negatively influence students' Behavioural Intention to Use technology.	HT→BIU	-0.041	0.687 (0.492)	0.002	Not Supported
H8. Psychological Ownership (PO) will significantly and positively influence students' Behavioural Intention to Use technology.	PO→BIU	0.383	5.553 (0.000)	0.154	Supported
H9. Self-Efficacy (SE) will significantly and positively influence students' Behavioural Intention to Use technology.	SE→BIU	0.217	2.741 (0,006)	0.042	Supported
H10. Self-Efficacy will significantly and positively influence students' Effort Expectancy.	SE→EE	0.429	7.938 (0.000)	0.268	Supported

* $p < 0.05$ statistically significant
** $f^2 = 0.02$ is small, $f^2 = 0.15$ is medium, $f^2 = 0.35$ is large as suggested by Cohen, 1988.

Table 18 shows the results from bootstrapping and the findings of hypothesis testing. Out of 10 hypotheses, only four (H5, H8, H9 and H10) were supported by this research. Surprisingly, all 4 of the supported hypotheses are the ones I decided to add to the original model based on the literature review. The remaining 6 hypotheses were taken from previous research but unlike the original UTAUT2 study (Venkatesh, Thong & Xu, 2012), I found that Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Habit (HT) have no statistically significant effect on students' Behavioural Intention to Use (BIU) the tablets. Analysis revealed that the added scales Psychological Ownership (PO) and Self-Efficacy (SE) significantly and positively affect students' Behavioural Intentions to Use (BIU) tablets. It has also been found that Facilitating Conditions (FC) and Self-Efficacy have statistically significant effect on Effort Expectancy (EE).

To provide an example on how to read the table and interpret the numbers, tracing across the table for the fifth hypothesis, H5, we can see that the Path Coefficient for the path from FC to EE is 0.362. In order to decide if this coefficient or relationship is statistically significant, or in other words, to see if this hypothesis has been supported we can look at the *p values* column. It is a common practice that $p < 0.05$ is accepted as statistically significant. For this path $p=0$ which suggests that it is statistically significant, thus the hypothesis is supported; Facilitating Conditions has an effect on students' Effort Expectancy.

However, Glass (as cited in Kline, 2004, p.95) states, "Statistical significance is the least interesting thing about the results. You should describe the results in terms of measures of magnitude –not just, does a treatment affect people, but how much does it affect them". And

Carver (1993) argues "…too many research results in education are blatantly described as significant, when they are in fact trivially small and unimportant" (p. 287). Therefore, in order to decide whether the supported hypotheses are meaningful and not 'trivially small', it is important to look at their effect sizes. Effect size is the magnitude of the impact that a variable has on another variable. f^2 values in Table 18 show the effect sizes. For the example above, if we look at the f^2 values in the table for H5, it is 0.191 which suggests that the effect of Facilitating Conditions (FC) on Effort Expectancy (EE) is medium thus it is not a trivial effect. Even though effects sizes could be used as an indicator, it is suggested to use intuition and not take these values as absolutes because however small it might be, the importance of these effects could change depending on the discipline or the research context. In light of this I discuss the results from the Table 18 in detail below.

Out of 4 hypotheses supported, the effect of the Self-Efficacy (SE) on the Effort Expectancy (EE) has the largest effect size (0.268) and it is considered as a medium to large effect. That is, higher level of self-efficacy leads to higher level of effort expectancy. This suggests that the more students feel competent in using technology, the easier they will perceive the tablets to be used.

While the results of this study showed no significant effect of the Facilitating Conditions (FC) on the Behavioural Intention to Use (BIU), it was, however, found to have a medium to high effect (0.191) on Effort Expectancy (EE). This implies that students perceive using tablets easier if they believe technical support is available in case of need.

The third supported hypothesis suggests that the Psychological Ownership (PO) has a medium effect on the Behavioural Intention to Use (BIU). That is, students who feel that they 'own' their tablets will show higher intentions to use the tablets for their schoolwork.

The fourth supported hypothesis suggests that the Self-Efficacy (SE) has an effect on the Behavioural Intention to Use (BIU), however it is small. A small effect can easily be overlooked but it doesn't always mean that the effect is trivial (Sullivan & Feinn, 2010). Therefore, even if it may not always get as much attention as the factors with stronger effects, it is important to keep it in mind while implementing a new technology in schools. Previous research suggest that Self-Efficacy plays an important role in technology acceptance because people with enough competence will adopt and use technology more than people without skills. Thus, the more students feel competent in using tablets, the sooner they will adopt tablets in their schoolwork.

In addition, both FC and SE were found to have indirect effects on BIU, however these effects were not significant.

Additionally, in order to see the results if Psychological Ownership (PO) and Self-Efficacy (SE) were not included, I tested the structural model only with the original scales from the literature which showed that only 3 out of 6 scales have significant effect on the BIU.

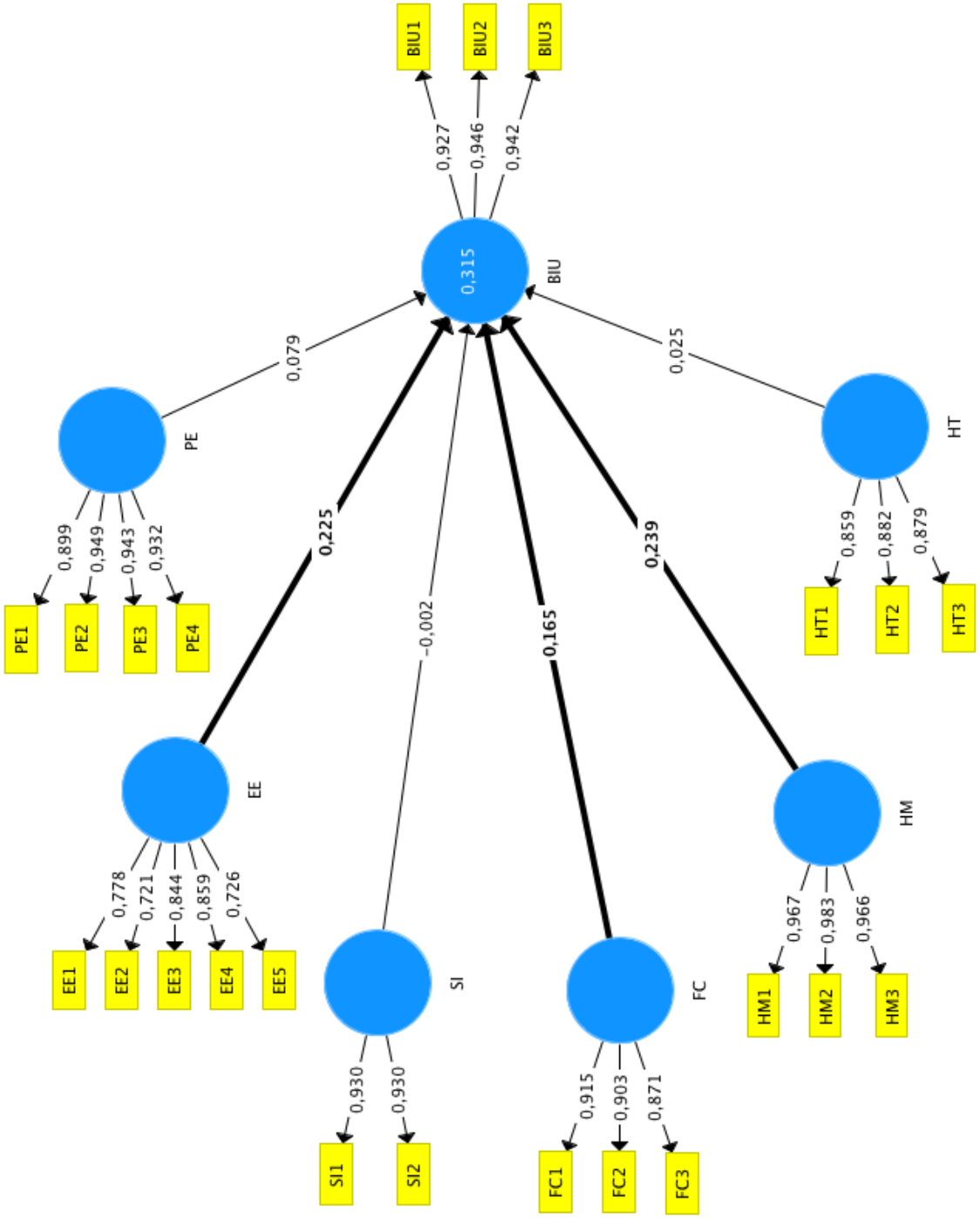


Figure 19: The Original Structural Model without the Proposed Scales

*: Bold lines indicate the significant results

Table 19: Results of Hypothesis Testing with the Original Constructs Only

Path	**Path Coefficient**	***t*-statistics** ***(p values)***	f^2 **(Effect size)**	**Findings**
PE→BIU	0.079	1.045 (0.296)	0.004	Not Supported
EE→BIU	0.225	2.874 (0.004)	0.036 (small)	**Supported**
SI→BIU	-0.002	0.027 (0.978)	0.000	Not Supported
FC→BIU	0.165	2.480 (0.013)	0.027 (small)	**Supported**
HM→BIU	0.239	2.744 (0.006)	0.048 (small)	**Supported**
HT→BIU	0.025	0.369 (0,712)	0.001	Not Supported

As seen from the table, the only supported hypotheses are EE, FC and HM's effect on the BIU. This suggests that when PO and SE are not present and the effect of SE and FC on EE are removed; that is, if all the changes I made on the model are eliminated, some of the original scales predict BIU. This means that the effect of the PO and SE on students' intentions can surpass the effects of the original scales. Thus, PO and SE should be looked for while implementing ICT in schools.

5.3. QUALITATIVE DATA

This analysis is the product of a long and demanding process of thinking, reading and writing. Making sense of the data was a complex, puzzling and painstaking process. I started by transcribing the interviews, listening to them over and over again, and analyzing the data in its original language before translating the parts I decided to present here. Translation took careful work in order to maintain the meaning without adding to or losing anything from the data. I read through the transcripts of the interviews many times before themes started to emerge. I chose thematic analysis because it is "still the most useful in capturing the complexities of meaning within a textual data set" (Guest, MacQueen & Namey, 2012, p.11) and it helps researchers "to use a wide variety of types of information in a systematic manner that increases their accuracy or sensitivity in understanding and interpreting observations about people, events, situations, and organizations" (Boyatzis, 1998, p.5).

Before I could actually begin analysing the data I had to go back to reading because I realized that there were patterns in the data which related to themes I had not thought about before. Good writing requires good reading. As I read through the literature, I found myself in a new depth and breadth of thinking which later shaped the way I went about writing my analysis. Even though I thought I knew what I wanted to say about the data, the actual writing process was very challenging. It took me a lot of courage to decide where and how to start writing. However, once started, I realized that writing is another form of discovery; I discovered what I really know or don't know, and what I really want to say about it as I progressed in my writing. The beauty of writing this chapter was that my perspective has strongly shaped my interpretation. That is, I had the freedom to decide what is important, and how to make it accessible to others. As the

researcher, I understand that there could be other possible interpretations but as Boyatzis (1998) argues:

> Thematic analysis is a way of seeing. Often, what one sees through thematic analysis does not appear to others, even if they are observing the same information, events, or situations. To others, if they agree with the insight, the insight appears almost magical. If they are empowered by the insight, it appears visionary. If they disagree with the insight, it appears delusionary. (p.1)

Therefore, every theme and approach in this chapter is my understanding, interpretation and presentation of the data; it is the way I see it and I will provide arguments to demonstrate the work is not 'delusionary'.

In this part I begin with the interviews, first teachers then students, and present the analysis, which I have organized in themes, along with the relevant literature. As stated before, I chose to refer to the literature alongside the data, because even after the analysis I needed to read supplementary literature to help inform my analysis. I looked for evidence for the themes I had identified so that I could draw around other research and support my analysis. Therefore, I believe, including the literature with the data where relevant forms wholeness and helps the reader to follow and understand easily in contrast with having separate chapters for data and related literature.

5.3.1. TEACHER INTERVIEWS

15 teachers were interviewed in order to understand their attitudes towards using tablets, to explore the motives behind these attitudes, and with the help of observations, to find out their classroom practices with tablets. After analysing these interviews, I classified the main concepts into themes and subthemes based on their relevance. While presenting the data here, I use pseudonyms for all teachers.

The process of generating the themes started with identifying the main patterns in the data which I thought were important to report here. I generated these themes based on the emerging behaviours, meanings, states, relationships, conditions and so on in the data. This initial stage created too many themes which needed reducing. Whilst I saw that all these things are important, it was sometimes difficult to identify and articulate exactly what those things had in common with each other. After rereading the data, reading the literature, and discussions with my supervisor, I realized that some of the themes were closely related which then led me to merge some of the initial themes by creating subthemes. Thereby, I formed the final version based on theory, for instance *'Teachers' Own Theories of Learning'*, and the data itself, such as *'Toxicity Discourse'*. I created the labels to provide meaningful reference to the data. Finally, I formed the diagram (Diagram 1) below to help me organize the patterns in the data where the subthemes relate to their parents by being 'examples of…', or 'contexts for…' or 'causes of…' or 'settings for…' and so on (Taylor & Gibbs, 2010).

The main themes I identified are 'Resistance', 'Teachers' Own Theories of Learning', 'Frustration with the Government', 'Toxicity Discourse', and 'Discourses of Uncertainty'.

Diagram 1 below shows the themes and subthemes which emerged from the analysis. The diagram works its way from inside to outside. Main themes (parent), shown in dark blue, are located in the inner circle, subthemes (child), shown in green, are located in the outer circles. One-way arrows show the direction of relationship from concepts to categories (parent to child) while double-sided arrows explain a reciprocal interaction.

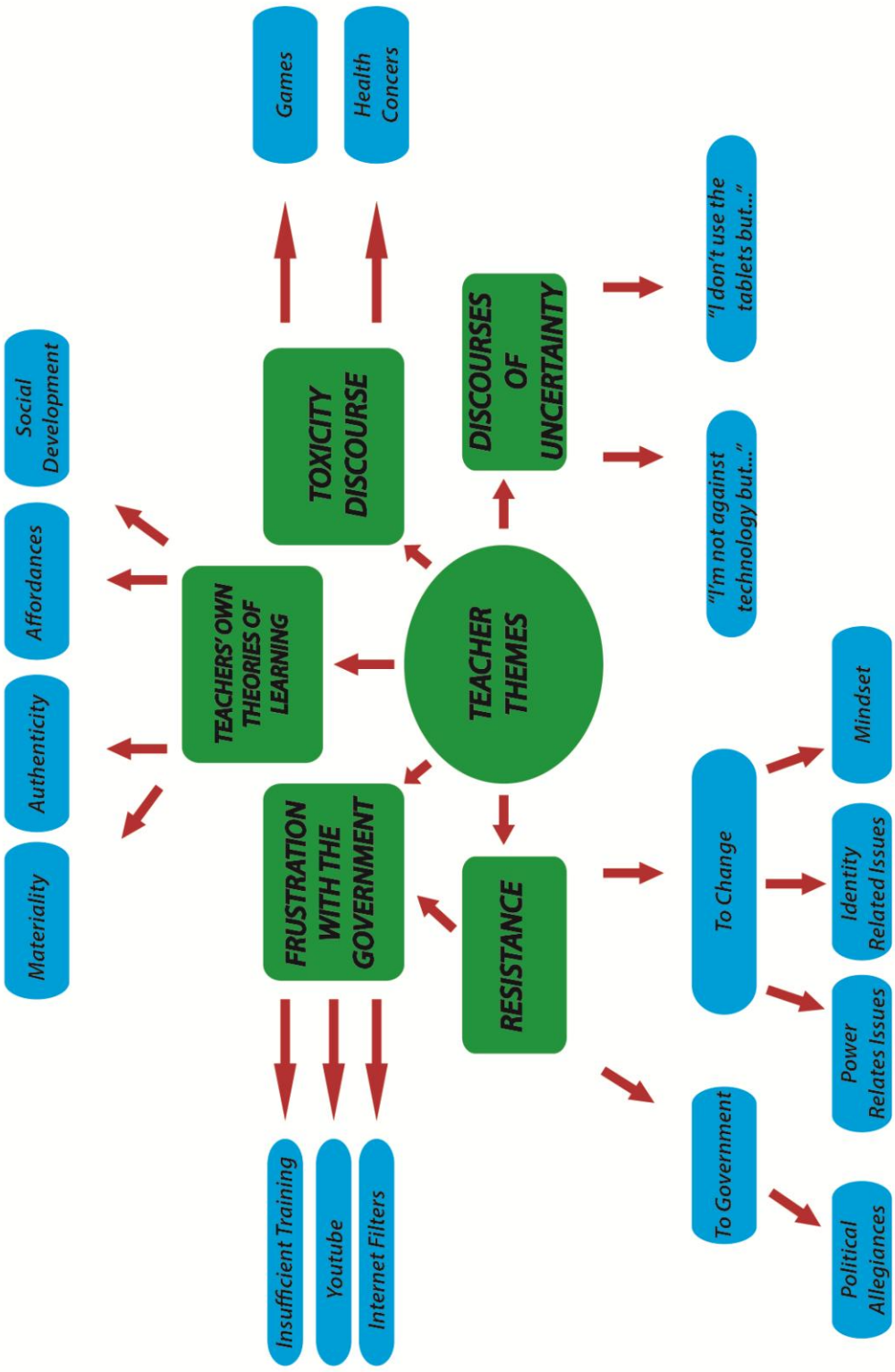


Diagram 1: Themes from Teacher Interviews

Here I explain the themes and the subthemes in detail and shows how these themes are located in the data.

5.3.1.1. RESISTANCE

Here when I use the term ‘resistance’ I am referring to teachers’ negative and non-cooperative attitudes towards tablets. Resistance is one of the main themes that emerged in every interview in different formats. In thematic analysis, themes can either be directly observable in the data or they can be identified at latent level (Boyatzis, 1998). Resistance is a latent theme which doesn’t appear explicitly in the data, but I inferred it from teachers’ discourses. Braun and Clarke (2006) indicate that “a thematic analysis at the latent level goes beyond the semantic content of the data, and starts to identify or examine the underlying ideas, assumptions, and conceptualisations – and ideologies - that are theorised as shaping or informing the semantic content of the data” (p.13). As Braun and Clarke suggest, this theme refers to the underlying reasons that some teachers felt resistant to the tablets.

Teachers stated various reasons for their attitudes, most of the time without specifically articulating their resistance. The theme ‘Discourses of Uncertainty’ indicates some ambivalence about their own resistance. This situation is looked at deeper in the related theme but in a few words teachers articulated uncertain, contradictory ideas about technology without seeming to acknowledge the preconceptions in their discourses about tablets. For them, their articulated reasons to hold negative attitudes towards tablets were legitimated, valid and deserved. At the semantic level, it is hard to see patterns of resistance; however, a deeper look into the data

reveals the ‘unspoken’ (latent) teacher resistance which is explained in this section. This took repeated readings and cross referencing within the transcripts to discern these undercurrents.

Teacher resistance is a complicated issue and there is not simply one reason for that. Technology has always created tension in schools; advanced devices and systems have not helped much in improving the situation. Indeed, technology creates tension beyond schools and it is not confined to digital technology (Buckingham, 2007; Palmer, 2006). Previous research has identified several reasons for teacher resistance and tried to propose explanations and solutions to the situation. However, education still remains one of the most traditional zones of our lives. In a book published in 1976, Van Wyck stated that teacher resistance is the most important single factor that affects adoption of new innovations, and after almost 40 years not much has changed. Even though Fullan (2001) emphasizes the importance of resisters in suggesting new ideas, in schools, when it comes to technology adoption, resistant teachers are seen as the ‘troublemakers’, and most of the time they are the sole agents of success or failure. However, teacher resistance is usually overlooked by the policy makers and the administration which then clogs the entire process of adoption (Fullan 1991; Elmore, 1995). Duke (2004) and Williamson & Blackburn (2010) argue that identifying who is resisting and why is the main step to avoid or stop resistance. Therefore, understanding the motives behind the resistance is a crucial factor for technology acceptance. Bohn (2014) lists four main resistance behaviours among teachers as: resisting the administration, resisting out of lack of confidence, resisting change, and resisting out of apathy. The finding of this research suggests a similar trend. I found it appropriate to create main themes and subthemes that I thought were in hierarchical relation. Data analysis revealed two main resistance patterns: teachers mainly resist (1) change, (2) the government.

Resisting Change – *"This shirt is too big for us"*

Change comes with a price. And educational reforms are prone to bring resistance with them. It takes a great deal of effort to make people embrace a change or an innovation in education as all the actors in the system have long-established habits and practices. Among all actors, teachers have the power to seal any project's fate; without their support, initiatives and reforms have little chance of survival (Berkovich, 2011; Zimmerman, 2009; Elmore, 1995). No matter how common technology is in our daily lives, for many teachers, it doesn't have a place in traditional classroom settings; therefore, it is a form of change. As Heymes (2008, p.69) states;

> Individuals and societies resist change. Technology brings change. (…) education has its own sets of rules and expectations of behaviour. Technology threatens to reorder those behaviour patterns and is therefore a threat.

Just like Heymes underlines, for teachers, technology is a form of change which threatens to transform habits, practices, and settings; therefore, in education, change is usually paired with negative emotions. Fullan (2001) asserts that:

> Change is a double-edged sword (…) If you ask people to brainstorm words to describe change, they come up with a mixture of negative and positive terms. On the one side, fear, anxiety, loss, danger, panic; on the other, exhilaration, risk-taking, excitement, improvements, energizing. For better or worse, change arouses emotions… (p. 1)

During interviews, all teachers expressed very strong and emotional feelings with clear negativity. For them, the idea of bringing tablets in the classrooms evoked a mixture of unpleasant feelings some of which were anxiety, anger and distress. An English teacher Hakan, for example, gave the answer below to my question about his feelings towards tablets.

> *I'm against the idea of making students addicted to any kinds of screen (...) I teach language, my students should be able to speak, listen and write. I believe learning lasts longer as you awaken more senses; students should touch, feel and smell their books. You*

> *can't do these with a tablet, it kills basic human feelings (…) The smartboards have been very useful for me, I don't need to walk around with a CD player anymore, and the boards also provides visuals*.

For Hakan, having tablets in his classrooms was paired with concerns about addiction, multi-modality, and permanent learning. What may seem like a simple reaction actually gathers several emotions under the umbrella term of resistance. His assertions expressed the feelings and concerns of many other teachers. Therefore, here, I break down his assertions and explain them in detail.

Since the introduction of tablets into schools, addiction has been one of the topics that teachers, parents and media have popularly expressed concerns about. For many teachers, new media embraces the possibility of harm such as addiction, which, for them, was also a part of the old media. There have been suggestions in reports, blogs, newspaper columns and talks addressing students' apparent over exposure to technology. Griffiths (1995) defines technology addiction as "non-chemical (behavioural) addictions that involve human-machine interaction" which can either be "passive (e.g. television) or active (e.g. computer games)" (p.15). Several research projects have reported addiction especially among teenagers and young adults and suggest that addiction may occur when the device offers entertainment and excitement to the user (Griffiths, 1995), and well-educated young people, mainly college students are more inclined to become addicts (Kandell, 1998; Hall& Parsons, 2001). They also pointed out that these groups of young people are often the frequent users of media and Internet with access to these technologies which therefore increase the chances of addiction in the young. In another study 'The World Unplugged' a project led by the University of Maryland in 2010, where around 1000 students

from 10 different countries in 5 continents were asked to leave all kinds of media for 24 hours and report their experience. Around 80% of the students reported feelings such as boredom, confusion, distress, failure, isolation and inescapability of media, while only around 20% reported benefits such as freedom and uninterrupted face-to-face interaction. The researchers emphasized that the young people are in need of 'news curation' which refers to the necessity of teaching to stop checking on 'what just happened' in world or in friends' lives. They concluded that "news curation needs to be taught to students as a life skill in both their personal and professional lives" (Moeller, Powers & Roberts, 2012). These and many other research results in the literature are in line with teachers' concerns. By making the statement above, Hakan, on behalf of other teachers, was voicing genuine concerns. Therefore, their concerns were not unreal. However, what he and other teachers didn't comment on is that they were tapping into popular culture discourses which positioned young people as victims of the technology- always "(…) at risk-as essentially vulnerable and in need of protection", as opposed to learners in control of what they were doing- "(…) liberated and empowered by technology" (Buckingham, 2007, p.85). However, I argue that this has implications: By regarding the young as vulnerable beings rather than rational, sensible adults-to-be, we get in the way of development of informed and responsible future generations. What educators need to understand that just like the old technologies, the new technologies will not disappear from our lives. There will always be new technologies, environments, or platforms in which young generations create a new culture that would arouse disapproval from adults (Marsh & Millard, 2000). As it is not possible to create a wall to 'protect' the young, I argue that it is the responsibility of educators to help young people make informed and careful decisions about how they use technology and to become critical readers and users of the Internet without becoming addicts of it. In that respect, I am not arguing

that the teachers' concerns were wrong but I am arguing that education should support young people whereby they can be in control of their relationship with technology rather than being positioned by it.

Hakan goes on to state his concerns about students' multiliteracy skills which he connects to his concerns about multimodality.

> *I teach language, my students should be able to speak, listen and write. I believe learning lasts longer as you awaken more senses; students should touch, feel and smell their books*

In traditional education settings literacy is perceived in its most basic form: as a required competency in reading, writing, grammar and language whereas the new technologies offer a wide range of multimodal possibilities of communication and decision making (Jewitt, 2006). According to Kress (2009) multimodality can be conceptualized as a "domain of inquiry" (p.54), which encompasses representational and communicational elements or modes of meaning making: linguistic, visual, spatial, gestural and audio (Iyer & Luke, 2010). Therefore, our means of communication is not limited to spoken and written words anymore (Kress & van Leeuwen, 2001). The landscape of communication is changing and students' experiences of learning are and will be "increasingly visual, aural and interactive" (Williamson, 2005). The student data suggests that students are already using several other modes to communicate. With their tablets, writing is still on the screen but this time accompanied by other modes, mainly images and/or sounds. The difference is that they no longer depend solely on the 'linguistic' modes of communication (Jewitt, 2006). Naturally, this widening of our modes of communication requires

different literacy skills (Downes & Zammit, 2000). Thus, traditional practices of literacy – listening, speaking and writing as suggested by Hakan - are not sufficient for the requirements of the new era and it is educators' responsibility to equip students with necessary skills. As Luke (2003) argues, literacy has become more complex. And now that digital and multimedia texts are part of students' daily communication and decision making processes, "touching, feeling and smelling books" as claimed by the teacher is not enough. Again what we see here is a popular discourse, a genuine but a non-evidenced concern about students' learning. Like many other teachers, Hakan believed that traditional literacy skills are what the students need to be 'competent'. His resistance to tablets stemmed from this belief that language based skills are the only skills the students need and he can provide for them; therefore, tablets have nothing to offer. He did not recognize the change that tablets offer in the way the students communicate, create, and learn; that other modes can in fact enrich communication and language does not always need to dominate (Taylor, 2012). However, Livingstone (2003) voices a concern that if we do not teach the students to be the critical active participants of media literacy, we are in danger of creating passive consumers of online communication. And Williamson (2005) states;

> It is important, first, (…) that young people can become responsible producers of meaning, able to identify and make use of the variety of the modes of communication that will be required of them throughout their lives; and secondly, (…) that they are adequately equipped to be able to identify how they, as citizens, are influenced by the communicative practices which surround them on a daily basis. Without educating young people to develop these understandings, (…), they will be unable to constructively critique anything they have learned, unable to account for its cultural location, or creatively extend or apply it; they will only grow into unquestioning adults incapable of innovation.

If we follow Williamson, avoiding or banning the use of tablets in the classroom could possibly do more harm than good in the near future. If we do not educate young people, the concerns

voiced by the teacher have higher chances of becoming real and we will create a society of irresponsible, critically illiterate consumers of technology.

Finally, Hakan finishes his answer with a statement about the smartboards.

> *The smartboards have been very useful for me, I don't need to walk around with a CD player anymore, and the board also provides visuals.*

This is an interesting and common statement among all the teachers I spoke to. Neither Hakan nor the others were ever asked about the boards, but whenever a question about tablets was posed, their answers always ended with a positive statement about the boards (see the theme *'Discourses of Uncertainty'* below for details). Often it is hard to distinguish whether the negativity teachers held was against technology or change, as technology is itself a kind of change. These two feelings are overlapping at some point but there is a nuance between the two. I argue that in many cases, and in my data too, teachers do not directly resist technology. They seem to resist technology when it implies pedagogic change; therefore, they resist. Hakan's last statement cited above is a good example of that.

Smartboards were introduced to the schools just before tablets and they use very similar software with very similar interfaces. During interviews not a single teacher complained about the smartboards even though they are technology too. They all expressed very positive feelings and reported active use since their introduction. Moreover, classroom observations for the English lesson and other lessons also revealed active teacher use of smartboards while tablets were not

allowed. Even though smartboards were actively used, teachers did not use them any different than a black/whiteboard. Teachers used to write or draw on regular boards and now they uploaded their materials to the smartboards or found them online while the role of students had not changed at all. During a regular English lesson, for example, the entire lesson depended on students 'staring at the screen', 'listening to the audio' coming from the board instead of the old CD player, and filling in the blanks in their question sheets. All this could have been done with a tablet in front of each student, also enabling students sitting at the very back to see and hear better.

As stated earlier, looking at the semantic level, Hakan and others are very much against the idea of technology for various reasons. However, closer examination to his assertions explains the genuine reason for his negativity. When provided with a technology that does not demand much effort, change or skills, teachers are happy to accept and finally adopt it in their practices which suggest that they only resist when technology brings a radical change. Even though the smartboards themselves are technology, in fact one of the latest ones, they secure teachers' authority in the classroom without demanding much skill to operate, whereas tablets enable students to engage in activities away from their teachers' gaze and controlling them is out of teachers' power.

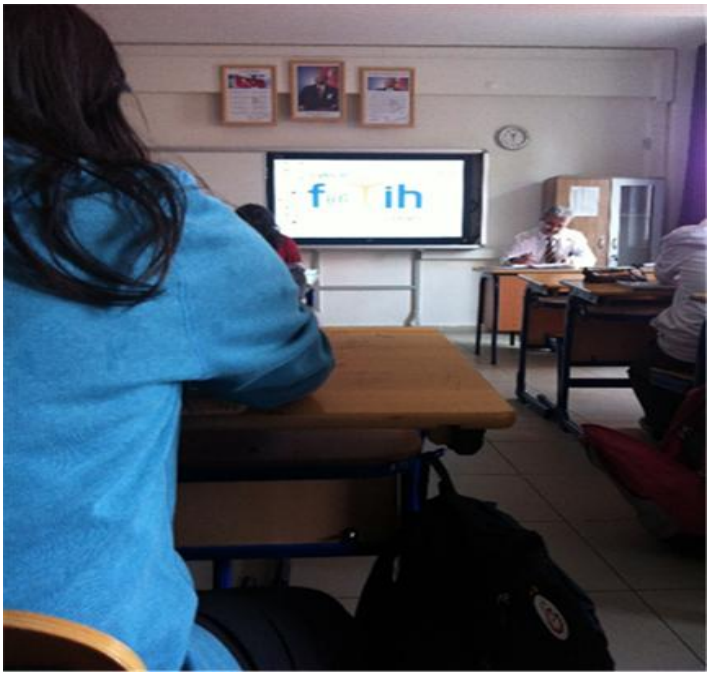


Image 3

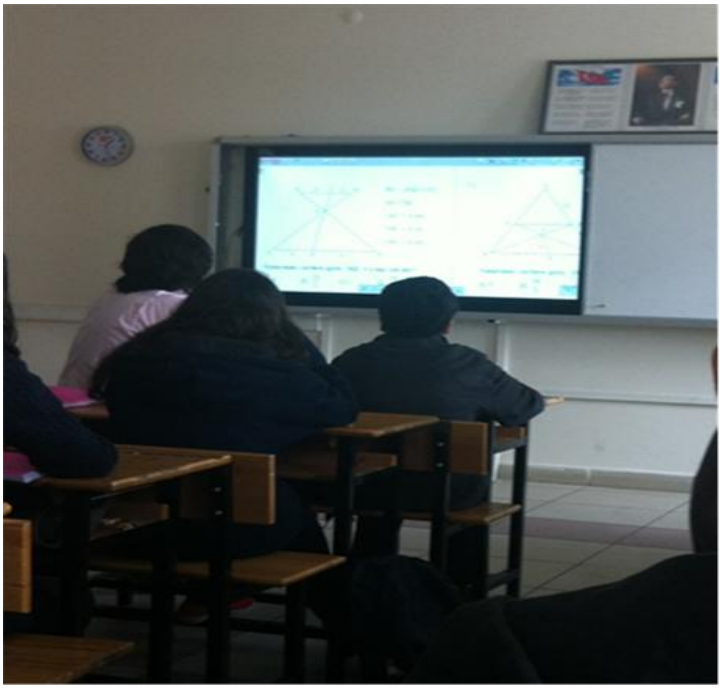


Image 4

Image 3 and Image 4 were taken during the classroom observations which represent the regular teaching practices of teachers in their use of the smartboards. In the first photo (Image 3), the teacher was sitting in the front seat and controlling the board with a wireless mouse while explaining a geometrical concept to his students. The second photo (Image 4) shows the teacher getting ready to start his lesson. As the photo illustrates, the first thing he set up is the smartboard. As a part of the FATIH project, students are supposed to have their tablets with them for various activities. However, no student was allowed to use them. Both of these photos demonstrate the point I explained above; teachers were not reluctant or resistant to use all technology, they seemed only to resist when technology implied a radical change in their practices or in the classroom settings by posing a threat to their authority. Therefore, I argue that transformation from black/white boards to smartboards was only a small step for teachers while providing tablets to students was a big leap. Thus, it is not technology per se, which teachers resisted, if it was, smartboards would have fallen into that category too. However, teachers seemed to welcome the smartboards while holding a strong rejection against tablets which suggest that they were resisting the pedagogic change that tablets offer, not the technology itself.

Moreover, these images also reflect how the classrooms remain organized in a traditional way with the teachers controlling from the front. The students have their places arranged in desks and rows ready to 'listen and learn' from the teachers who dominate interaction.

In another interview an IT teacher stated:

> *If the government had given us overhead projectors and USB drives, we could have achieved 100% productivity and success rate (…) It was my master's thesis in 2000; it took 14 years to fully utilize projectors. We will use tablets when its time comes in 15 years, but now we just keep pushing* (Tolga)

His approach to the tablets was rather interesting: for him, a simple overhead projector- a technology from 15 years ago- could be the solution for the problems of education, providing absolute efficiency both in teaching and learning. As an educator, and as a technology teacher, he believed that every technology has their time but this time is not this moment it is sometime in the future. This shows how slowly any change or innovation in education is absorbed, and reflects teachers' unwillingness to comply with the new technologies.

Yet another technology teacher:

> *If there was a projector in my classroom, I would set it up and be ready to teach in 5 minutes with all the videos, power points etc. And I would teach very very effectively!* (Ayla)

As seen from their statements, teachers valued projectors and PCs connected to them more than tablets even though tablets are far more advanced and versatile devices. However, again, projectors require only one person to control them while students' attention needs to be drawn to that one source; therefore, do not require much change from traditional practices.

If looked at carefully, several deeper reasons for teachers' resistance to the change could be pointed out from their discourses. I have identified these as *'Power related issues', 'Identity related issues'* and teachers' *'Mindsets'*. These are the main reasons that unfolded from the analysis.

> In the educational context, learning space is bordered by the classroom walls, lesson space by the hour or 40-minute time signal, and curriculum and timetable space by the grid of subjects to be covered and the time and physical space allocations assigned to them. Tasks tend to be singular and defined or assessed at a given point in time, and learners are expected to be on task, which often means all students on the same task at the

> same time. Being not on that task is seen as being disengaged from learning (Lankshear & Knobel, 2006, p.14)

Lankshear and Knobel's description of traditional settings and methods of education are likely to be familiar to many of us, and this is what teachers traditionally have in mind when describing a regular day in school. Set places, times, materials, practices and actions create the space for 'education' (Davies & Merchant, 2009). Being able to create more flexible places, times, materials or actions, tablets pose a challenge to teachers' mindsets **(**Lankshear & Knobel, 2006) about education. In this mindset, teachers have absolute power in the classroom where they have traditionally led and controlled every task and activity. It seems that, for them, having complete control over the classroom was part of their teaching and could not be thought separately. Anything threatened to alter this power balance or the classroom environment could potentially face resistance on teachers' side. Tablets, considering their mobile nature, are powerful candidates to bring teachers' worst nightmares in to life. Teachers seemed to perceive that with tablets at hand, students would not need the teacher as the source of knowledge anymore; rather teacher becomes the guide on the path. Moreover, teachers believed that the mobility of tablets could potentially liberate students, and enable them to work individually without a need for teachers to be the centre of attention. These perceptions or 'nightmares' were indications that not enough support had been given to teachers who were rightly concerned to prioritise pedagogies which were going to work for them.

> *Smartboards are under our control but each one of them (students) owns a tablet. It is impossible to control them* (Hande)

> *We are unable to control all tablets, so we placed boxes in each classroom. Teachers collect the tablets into the boxes before each class begins* (Ayla)

These quotes reflect how much teachers were concerned about losing control over the students and access to knowledge, and their determination to maintain the status quo. Teachers believed that traditional settings were required for learning to take place; therefore, felt the need to control students throughout the lessons.

In addition to teachers' efforts to main their authority as the gatekeepers of information, with tablets in classrooms, they now face another challenge – a rebellion in which students were empowered by the government.

> *Tablets have caused problems between me and the students (…) If I ever try to collect the tablets, the students say that they were given by the government and I can't take them* (Esma)

Esma's statement is an example of this new challenge some teachers regularly face. Before tablets were officially part of the curriculum, teachers would have collected any item or device which they found distractive. Now, some students used the new policy to argue against their teachers and did not let their tablets be taken away from them. This act illustrates a shift in power and places teachers in a vulnerable position.

Teachers' insecurity around the tablets and not being able to prevent students' from using them, had led teachers to invent different methods to deal with the situation: (in some cases) collecting the tablets, shaming the students who were caught playing with their tablets, or even trying to overlook the presence of tablets are some of them. In this way, the teachers marginalized the role of technology in the classroom.

Besides, tablets seemed to threaten teachers' roles and identities as teachers in the classroom: they felt insecure and confused around technology, struggling to position themselves in relation to tablets. For them, their roles were quite clear and they did not want to negotiate that. Stenberg (2010, p. 343) argues, "We teach who we are", and 'who we are as teachers' plays an important role in the classroom practices (Owen-Jackson & Fasciato, 2012). Tablets questioned 'who they were as teachers', and created confusion around their roles, making them question 'how to be' and 'how to act' (Sachs, 2005, p.15). In this way, tablets posed a threat to teachers' professional identity in the classroom; consequently, teachers stood their guard. Not knowing how to take advantage of tablets' potential while keeping the power balance and protecting their identities, it seemed teachers developed strong resistance to tablets which had led not to use them.

In this section, I explained and illustrated the reasons for teacher resistance against technological change and provided the details of their, so to speak, 'inner' or 'personal' incentives to be resistant towards tablets. The next part covers issues related to their political identities.

Resisting Government – "*This is not an educational move, it is rather political"*

The quotation in the title was a typical and powerful discourse among teachers with different political views than the current governing party. Apart from resisting the change that technology brings, some teachers had very strong political beliefs which prevented them from agreeing any changes in policy unless it offered benefits in the short term. In other words, some teachers resisted out of partisanship; because they hadn't vote for the current government in power, therefore they wouldn't support any initiatives coming from them. Interestingly, some teachers

seemed to feel that not using tablets could be a way to protest against the government. Duttun & Penner (1993) argue that sometimes the policy change under consideration or the way it is presented can cause resistance because the proposed change can be perceived as an agent of government (Pettigrew, 1977). In fact, these were the very feelings of the teachers, as their negative attitudes to government consequently brought up negative feelings towards tablets. Their political allegiances seemed to, in a way, inhibit their reasoning such that unless there is an immediate advantage of using tablets, teachers were going to maintain their stance against them. Their argument was that if the government really cared for education, they would have only fitted the smartboards and cabled Internet connection instead of spending taxpayers' money for tablets and 'health damaging' Wi-Fi connections. The following quote shows how powerful teachers' ideas were in considering tablets as political agents rather than as operational towards educational improvement.

> *I believe tablets only serve politicians. If, during the election campaign, the prime minister had said they improved the infrastructure and placed smartboards in classrooms, the public wouldn't have really cared much, but when he said they were going to distribute tablets to every student it suddenly became a big deal* (Kerem)

Kerem asserted that tablets were solely introduced as part of the election campaign, and education was not the main motive behind this initiative. However, he also referred to the smartboards, in a way that using them as a criterion for comparison. His opposition was only towards tablets, for him, smartboards would have been enough for education. Here, I echo that reasons for teacher resistance are interrelated; one cannot simply be thought independent of another. What we see here is the intertwining of teachers' power and identity concerns with their

political views. They seemed to resist tablets because they saw them as political agents, but when it was in their advantage they did not show the same resistance. Even though smartboards and tablets were the parts of a project implemented by the same government, teachers did not see them as political materials because the boards provided immediate advantage to teachers by keeping their power and identity safe in the classroom. Seemingly, teacher resistance took place selectively; they picked and chose what to resist depending on the profit/loss balance under the circumstances.

In this section I explained and illustrated some of the prominent reasons for teacher resistance. It is a serious issue when it comes to the success of initiatives and it needs to be thoughtfully considered and addressed. Teachers are often loyal to their traditional teaching practices and are likely to show resistance to any major change. Resistance seems to be formed when the technology in question poses a threat to teachers' traditional practices or offers a sudden radical change (Van Wyck, 1971). Their reasons range from power concerns to identity problems to mindsets and finally to political views. It is not possible to consider any of these reasons independently as in many cases they have reciprocal relationships. Teachers' resistance cannot be overcome overnight as it is the result of long established practices and habits; however, understanding the reasons behind it is a serious first step towards solving it.

5.3.1.2. TEACHERS' OWN THEORIES OF LEARNING

I noticed that teachers had developed theories to legitimize their attitudes towards tablets. These theories can be classified as 'materiality and authenticity of learning materials', 'affordances of

tablets' and concerns for 'students' social development'. In this part I explain in detail how these theories manifest themselves and provide examples from the interviews.

Materiality and Authenticity of Learning Materials

The advent of technology has transformed the ways we do things; however, when it comes to using technology in schools, the transformation doesn't easily happen. Even though we read and write in digital format every day for different purposes, when teaching and learning is concerned teachers do not trust any materials other than the good old pen and paper.

> *Everything is digitized, teaching and learning happens with teacher-student-pen and paper* (Taha)

As reflected with this statement, teachers had the idea that learning takes place in certain ways under certain conditions. The old cliché 'teachers teach as they are taught' seems to still hold especially when technology integration is in question (Moore, & Hunt, 1980). It seems teachers highly value the ways in which they had learnt themselves; because those methods worked for them, therefore they should work for their students. Their understanding of learning handed down on to the next generations as a cultural value, shaping not only what we should learn and but also how we should learn. Among these values, the idea of materiality and authenticity of the learning materials play an important role. For the teachers, materiality "…signifies a practice that is grounded in the everyday, in the world of material things and may involve the exchange or manipulation of material things…" (Pinch, 2008, p.464). As Taha pointed out, in traditional practice, pen and paper are the only materials required for learning to take place. Because

moving from print to digital requires ‘a material change’ (Poster, 1998), digital resources have no value as they do not have the material properties required for learning.

> *… students should touch, feel and smell their books. You can’t do these with a tablet…* (Hakan)

For teachers, the digital learning materials in the tablets were perceived as “mobile and volatile” whereas physical materials were “stable in time and space” (Bayne, Ross, Williamson, 2009, p.112). The non-material nature of digital sources therefore prevented physical contact which, for teachers, stimulated more feelings and eventually left deeper marks in students’ brain, as well as creating ephemeral records of students’ learning rather than ‘real’, ‘lasting’ copies. Teachers highly valued the reassuring materiality of the printed books or hand written notes through which you could feel the weight of its ‘reality’ (Garland, 1982, as cited in Dillon, 1992).

Halpern (2010) explains this idea as:

> (…) there is something deeply satisfying about a “real” book, whose binding you can crack and fold as you move from beginning to end. E-books, by contrast, are ephemeral. Yes you can carry thousands of them in your pocket, but what do you have to show for it? (p. 2).

For teachers the idea of materiality and authenticity complemented each other in a way that material properties of books, pen, paper, notebooks and so on, were seen as a proof for authenticity of these materials. And the ephemeral, non-material nature of digitized learning materials created authenticity problems due to their highly mediated nature; an abstracted ‘imitation’ of the ‘original’ (Bayne, Ross, Williamson, 2009) with which “learning and

knowledge are less anchored in physical artefacts" (Traxler, 2010, p.7). For teachers, holding a tablet full of digital books was not same as holding a 'real' book, or digital note taking could not afford the learning that handwriting may provide. The 'imitated' digital materials were not authentic for teachers; not "genuine, real, truthful, valid or reliable, credible or legitimate" (Tatsuki, 2006).

> *There is auto correction feature in the tablets which fixes the mistakes and beautifies their writings automatically. Thanks to it my students' hand-writings are terrible* (Hande)

For Hande, handwriting was the way for students to absorb the knowledge she taught whereas digital note taking was not as authentic as the 'original', it was a digitized copy created by machines. Taking notes on paper with beautiful handwriting was perceived as a way to success, and moreover, with handwriting students could have a record of every step of their note taking in front of them rather than digitally perfected versions. Thus, digital notes were not seen as authentic as handwriting.

As explained here, teachers saw high value in having physical learning and teaching objects and authenticity of these objects were very important for them in deciding whether or not accept tablets as part of their practices. As Bayne et all (2009, p.112) suggest, it is as if they see digital text as 'imitation'.

Affordances of Tablets

Another theory that the teachers referred to while explaining the reasons behind their negative attitudes was the tablets' affordances. The concept of 'affordance' has been a controversial topic and there exists several descriptions of it depending on the concept and use. Affordances and their educational uses were explained in the literature review, so here, I talk about the teachers' understanding of the concept.

Song and Fox (2008) state that affordances are bidirectional relations between the "capabilities of a technology" and the "abilities of the learner". Therefore, in order to make full use of the tablets for education, their capabilities play important roles where the users are able to manage these capabilities based on their needs. In this study, all the teachers agreed about the 'capabilities of tablets' not being enough to be useful for education. Teachers questioned the affordances of tablets for their teaching activities and affordances for students' learning. For teachers, tablets' lack of material properties, as outlined above, made them incapable of 'affording' learning.

I am not against technology but tablets do not afford permanent learning (Fuat)

As this teacher clearly reflected, tablets' affordances as educational tools were under serious discussion. For them, tablets did not offer educational affordances. However, as it was identified and outlined in the Table 4 in the Literature Review, this research found evidences of affordances in terms of tablets' educational uses.

Here, I explain which of these affordances were / were not exploited by my study, and explain how or why they were/were not exploited.

Of the eleven affordances in Table 3, nearly half of them were evidenced. Portability and Mobility, Connectivity, Interaction and Collaboration, Data Storage and Retrieval, and Game Based Learning were observed during the field work. However, I should note that affordances which were observed were not always taken advantage of 'purely' for educational activities. That is, students seemed to take advantage of tablets' affordances mainly for entertainment purposes such as social media and online gaming. However, if combined with effective curriculum and pedagogy, these affordances could prove useful for teaching and learning activities. In fact, even though students did not use them for their schoolwork, I argue that they still learn from social media and gaming unintentionally. For example, the language of majority of the games they were playing is English, which is not an official or commonly used language in Turkey. Yet, they learned the language used in the games in order to survive which could easily take their English teachers months to teach. Moreover, they created a virtual world in Minecraft where students from each classroom represented a community and they attacked as a class while the other class was having their lecture. It was a great example of interaction and collaboration which naturally occur. Students took advantage of data storage and retrieval capabilities of their tablets mainly for image and video creation and accessing them later.

Affordances which were not exploited in my research should not be interpreted as though they were not afforded. My argument is that they were not observed because they were the ones which could unfold if the tablets had been used appropriately for education activities. That is,

students and teachers' rejection might have caused these affordances to stay buried. Further research should be conducted to explore this in detail.

Concerns for Students' Social Development

Apart from their theories related to more formal, school related learning issues, teachers also referred to their concerns for students' social development. For them, technology set a barrier between the students and the real world by absorbing all their attention to online activities in the virtual world. Donath and Boyd (2004) argue that in the physical world people's social connections are parts of their social identities while the teachers hold the belief that students prefer to form offline identities and this process harms their ability to communicate in the physical world. Again, this is about authenticity- teachers did not value relationships online.

> *I do not want to see my students constantly looking at screens because it destroys communication and friendship. They prefer digital communication to face-to-face chats in and out of the classroom. We're raising a generation that is lack of communication skills. We should consider our society's future; I don't know what kinds of parents they will grow up to be.* (Merve)

Merve clearly articulated her concerns about her students' social communication skills and believed that tablets negatively affected and shifted the way students communicated. Other teachers also reflected their concerns about students being consumed by the technology. For teachers, by providing tablets, the government actually enabled students to spend more time in the virtual world, drifting away from their studies and personal relationships, therefore damaging their abilities to present themselves in real life environments as well as inhibiting their learning.

There was a sense in which the teacher dislocated the idea of personal relationships from online interaction.

As presented within the context of '*Teachers' Own Theories of Learning'*, teachers, whether voluntarily or not, seemed to have developed and internalised theories for their negative attitudes towards tablets even though many of them were not aware of such theories in literature. It is interesting how they perceive, judge and decide in a well-structured manner to explain their attitudes. This phenomenon bears resemblance to the concept of 'rationalization' in human psychology which suggests that "controversial behaviors or feelings are justified and explained in a seemingly rational or logical manner to avoid the true explanation, and are made consciously tolerable—or even admirable and superior—by plausible means" ("Rationalization", 2016, para. 1). Theory holds that people rationalize actions, beliefs, values and any other inner thoughts not only to self but also to others ("Rationalization", n.d.). Considering teachers' discourses and real life practices, I argue that they have found reasons and explanations to 'rationalise' their behaviours in regard to tablet use which then was used as a supporting reason for teacher resistance. Even though it might not always be possible, policy makers should be aware of the reasons for teacher rationalisation and provide seminars or training to educate teachers, especially the younger generation teachers, in order to overcome such barriers in front of successfully integrating technology.

5.3.1.3. FRUSTRATION WITH THE GOVERNMENT

This theme includes several issues teachers had experienced at the time of interviews. By the time I report these findings, some of these issues will have already been resolved but I believe it is still important to report them. Different from the other themes, this theme covers the difficulties and challenges that stem from the government actions. Teachers raised several issues but *"Insufficient Training"*, *"YouTube Ban"* and *"Internet Filters"* were the ones mentioned several times and seemed to really disturb teachers. Here, I explain all three in detail.

Insufficient Training

> *Training sessions are insufficient; teachers' ICT skills fall behind that of students* (Efe-Vice principal)

Efe's concern as the vice principal was not arbitrary. He articulated a very simple yet powerful problem that had the potential to be the source of other problems such as aforementioned teacher resistance and power struggles in classrooms which in turn led to rejection of tablets. This is also supported by the BECTA report which states that insufficient training could act as a barrier between teachers and technology (Scrimshaw, 2004). In fact, interviews revealed that regardless of gender or age group, all teachers complained about insufficient training. Definition of 'insufficiency', however, varied person to person as they all had different needs and expectations. For teachers, insufficient meant: low quality content, unqualified trainers, incompatibility between training materials and the materials in classrooms, inconvenience due to speed of the sessions.

> *Trainers recruited by the ministry are unqualified. I think the ministry underestimates us; they grab a random person from the street and send him/her as a trainer. My colleagues and I learned to use this technology on our own*. (Taha)

Taha, like many other teachers, stated his dissatisfaction and complained about incompetency of trainers. These trainers were selected preferably from IT teachers but this research found that there were trainers from several different backgrounds. The problem with trainers was that many of them were supernumeraries in their schools so they did not get many opportunities to teach their own subjects. An interview with a trainer showed that often teacher trainers choose to become trainers for two main reasons: first, they were tired of being idle, second, they faced the threat of being assigned to another school in another city because they were supernumeraries and they were not needed. Since the majority of them had families settled there, they did not want to move; therefore, became trainers. This, consequently, created a group of unmotivated people that became trainers in desperation. Ultimately, this created a 'domino effect': unhappy, unmotivated trainers created unhappy, unmotivated teachers.

> *During the sessions, we were told that I would be able to select a question and open it on the smartboard, students would see the same questions on their tablets and work individually while I could see their screens from my tablet and project any of their work back on to the board…They only tell us stories, we have had the smartboards for 3 years and just received the tablets*. (Doruk)

What Doruk referred to here was the problem of incompatibility between training materials and the actual materials in classrooms. Teachers were frustrated by this incompatibility. They were promised fully functioning devices with Internet access and remote control mechanism for

teachers' devices which would enable them to see and control students' tablets. Training sessions were based on these assumptions that the new devices would help teachers. However, in real life, none of these devices functioned flawlessly and government filters made Internet access almost impossible. Moreover, the connection between the devices couldn't be established therefore teachers had no control over students' tablets. Because training sessions did not reflect upon the real situation that teachers faced, many had to learn to cope with the 'unforeseen' situation through their own efforts. They were told that they would be in charge of the technology in their classrooms but now that this proved to be false due to incompatibility of theory and practice, teachers, as mentioned before, chose to master only what served their interests. This case of disparity between training materials and real life situation and its negative effects on teachers was underlined in a study by Manternach-Wigans (1999) where they expressed teacher frustration due to the very same issue. Again, a problem with training gave rise to another bigger problem with ICT integration into teaching.

> *Training sessions are not really enough. Some teachers don't even know how to turn on a computer so the sessions start from the very basics. There is not enough time to move on to the main part* (Hande)

> *The problem is there are lots of teachers without much skills to use technology so the sessions move very slow and can't get to the main content.* (Funda)

Hande and Funda were not the only ones who experienced difficulty with the speed of the sessions. Especially, younger teachers seemed unhappy about the speed as they found it too slow for their level. They frequently complained about older teachers' non-to-low level of technology competency as the sessions were directed to the lowest level. This difference in teachers' ICT

competency put pressure on teacher trainers too, as they had predetermined schedules. However, sessions were usually spent with the basics which resulted in very limited presentation of the key features of the technology. Once more, teachers became unmotivated to use technology due to organization problems in training. Rather than assuming one-size-fits-all, teachers should have been given training based on their levels and needs to ensure they remained eager and interested.

For various reasons as stated above, teachers were frustrated with training provided, and therefore frustrated with the government for leaving them on their own with all the confusion and chaos. These were the main problems pointed out by teachers. However, I argue that there was another aspect to training which requires serious consideration. Teachers needed pedagogical support as much as they needed technical skills (Veen, 1993), if not more. Wild (1996) argues that providing technical skills doesn't mean that teachers will use technology. And technical skills are not useful unless teachers are able to integrate technology into their teaching. Interestingly, teachers didn't mention the lack of pedagogical training during our interviews. This might be because they had already set their minds to not use tablets for various reasons as discussed earlier, and they didn't think they needed pedagogical help with smartboards because the way they used it was similar to the way they had used black/white boards. Thus, it might have been fairly simple for them to adapt the smartboards into their teaching.

Whatever the reason might be, they should have been given pedagogical training as well as skills training if the ministry wants training to be relevant and useful.

YouTube Ban

YouTube was another hot topic during the interviews. Even teachers who didn't want to be involved in the study had something to say about it 'off the books'. At the time of interviews, YouTube was banned in the country due to political issues[1]. Teachers seemed really upset about not being able to access the videos on YouTube which they used as teaching materials. Teachers used YouTube videos mainly as supplementary materials to their standard curriculum because most of the content was either abstract or hard to explain with words. YouTube made access to visual tools very easy for them. Due to very powerful filters, which is explained later in detail, that the government applied, many websites, whether really harmful or not, could not be accessed from the school network. Teachers had relied on YouTube to provide visuals but with the ban they felt furious to the fact that government left them no choice. A teacher stated:

> *We cannot watch videos because most of them are on YouTube. I don't know how to address this problem, but we want YouTube back on. We are going to organize a protest walk* (Suzan)

Many other similar statements were made during interviews and it was clear that teachers valued YouTube as a tool which helps enhance their teaching. Even though the way YouTube was used not more than the way once TVs used, teachers preferred it to other means such as the official videos provided by the government. Since YouTube by definition is an "entertainment and social interaction website" (Lance & Kitchin, 2007), this could be a promising beginning of a change in teachers' mind about using social networking/social media in Turkish schools.

[1] http://www.theguardian.com/world/2014/mar/27/google-youtube-ban-turkey-erdogan

Internet Filters

After YouTube ban, teachers mentioned another accessibility problem: filters. Government imposed powerful filters on school networks in order to prevent access to inappropriate content as well as social networking sites, games and so on. "However, filtering can never be 100% effective. Filtering technologies are prone to two simple inherent flaws: under-blocking and over-blocking" (Internet Society, 2012). Over-blocking was the situation in schools and that is, filters were not capable of distinguishing good content from bad ones, therefore, lots of useful websites were not accessible. Teachers had to make sure the websites or visuals they wanted to show their students could be accessed before the lessons started. Some teachers also reported that they had been unable to use the computer labs to do 'hands on' activities due to filters.

An IT teacher said:

> *In the simplest case, I choose a picture related to the topic, click on it and it says 'access denied'. Students try to search information like Euclid Theorem for maths or another topic related to philosophy, but it is all blocked, so we can't use the Internet as a resource. I personally find filters nonsense, but just like everything, the Internet needs to be controlled.* (Funda)

And a history teacher:

> *We can't access every website; we keep receiving 'harmful content' messages. If we can't watch documentaries about history then what is the point of having technology? I'm a teacher. Why can't I access any site I want to?* (Taha)

Funda and Taha's summaries of the situation give an idea of the extent that filters work. Government's policy to protect children had gone way out of its purpose blocking useful sources

along with the bad, and leaving teachers helpless and frustrated. After visiting 35 schools in the UK, Ofsted (2009) reported two types of filters used in the schools as "managed" and "locked-down" systems (p.4). According to the report, "managed" systems had fewer restrictions in comparison to the "locked-down" systems, allowing students to take responsibility while using the Internet. The "locked-down" systems, on the other hand, were more effective in keeping the students safe while in school but less effective in teaching them to use the Internet responsibly. In the long term, these students were found to be more vulnerable (Ofsted, 2009). The filters used in the Turkish schools seemed to be "locked-down" types as they tended to block wide range of websites and content. However, as the Ofsted report stated, the filters were only valid within the school network and students were able to access any content by simply connecting to another network or using another device outside the school. Buckingham (2007) argues that even though there are valid grounds to restrict access to some sites, filtering is not the solution; it is rather "ineffective" and "self-defeating" (p.94). Rather than seeing the young more vulnerable and trying to put them in a protection bubble, as he argues, schools should focus on educating them about the possible threats, and teach them to make informed-decisions while online. Considering that majority of the students had smartphones many with data plans, they could easily access any content even in the school borders. Thus, the question that comes to mind is: 'If the filters didn't stop students from accessing any 'harmful' content, then who were they for? A chemistry teacher, Seda, suggested the following:

> *YouTube, Twitter etc. should not be banned and filtered. Students have to learn using them responsibly and teachers have to learn to control them* (Seda)

Seda's statement confirms Buckingham's argument in educating the students to be responsible while she also left room for teacher control. Previously I presented the IT teacher Funda's statement where she also argued for controlled Internet use. While Seda and Funda appeared to disagree with filtering, this disagreement was conditional. They both mentioned the necessity of having 'control' over students' Internet use. Perhaps the 'control' mechanism referred by Funda and Seda might be the 'managed' systems which blocks the content selectively rather than entirely. Byron (2010) recommends schools to move towards 'managed' systems to encourage their students to be more responsible for their own safety. However, 'managed' systems require teachers who have the knowledge and skills to oversee students' development to protect themselves while online. Previous research suggests and emphasizes the importance of digital media education for students whereas research on teacher skills, practices and effectiveness in improving students' ability is limited (Livingstone & Haddon, 2009). The filters government imposed strangled the teachers at the most, and righteously, they reproached about the extreme coverage of the filters. Thus, I argue that education should start with the teachers. We should start with demolishing their prejudices about Internet, and giving them training to gain related skills to educate the young about possible threats and ways to be safe from them both in and out of the school.

5.3.1.4. DISCOURSES OF UNCERTAINTY

As the title suggests, this theme was shaped out of teachers' uncertain discourses about tablets and technology in general. Here I'm going to present and discuss two most articulated statements

during the interviews. Every teacher, without exception, formed a sentence using either both or one of the statements that I present here.

I don't use the tablets…but…

Interestingly, when I asked teachers whether they used the tablets as a part of their teaching, every answer started with this sentence. Every time a 'but' was articulated it was then followed by a statement about how well they used the smartboards. This was interesting because I never asked them whether they used the smartboards or what they thought of them. They, whether consciously or unconsciously, felt a need to say something about them, something positive. It seemed like teachers see it as a compensation for not using tablets.

> *I don't use the tablets (…)* ***but*** *I find the smartboards useful because they provide visuals* (Merve)

> *I don't use the tablets for my teaching; I only use mine for reading outside the school,* ***but*** *I use the smartboards because it organizes me with pre-uploaded materials, everything I need is there* (Suzan)

> *I don't like the tablets because it is not useful for my lessons. They only put the textbook in it along with couple of videos, that's it.* ***But*** *I use the smartboards actively because I can access to different resources from the smartboards* (Semih)

These are only some of the statements to picture teachers' uncertainties about tablets. When looked at it closely, in all statements, the most significant word is undoubtedly the 'but'. It represents the dilemma teachers had between the tablets and smartboards. 'But', in this context,

seems to represent teachers' defensive, ashamed and worried feelings. On one hand, they had developed sound reasons for their negative attitudes towards tablets, while on the other hand they needed to seek compensation for their negativity. That is, in a way, the use of 'but' in this particular sentence construction shows that teachers felt uncomfortable not using tablets or at least articulating this so they seemed to be seeking to justify it.

I'm not against technology but… we are not ready

The teachers also used this second statement or similars very frequently. Teachers, when asked about technology integration into education in general, seemed to express positive ideas. However, they all believed tablets were steps ahead of today's education and they shouldn't be in schools.

> *I'm not against technology, I believe it is important that we keep up with the world,* ***but*** *it is too early for tablets, we are not ready* (Hande)

Like Hande here, technology is a requirement of the modern world and as a country we should keep up with the other countries. However, she also believed that our time had not come yet. Surprisingly, she didn't have the same idea about the smartboards. This pattern was common for all teachers who stated their positive ideas about technology but not tablets. As if tablets were not today's technology but coming from the future whereas the smartboards were just what we needed at the moment.

> *I'm not against technology* ***but*** *this shirt (tablets) is too big for us* (Kerem)

Just like Hande, Kerem also referred to the same idea of not being ready for tablets. He took it a step further and claimed that tablets were too much, too advanced for us to handle now.

> *I'm in favour of technology use in education* ***but*** *I am against seeing it as our only alternative for a better education. Technology should not replace teachers* (Taha)

What Taha was referring to here was the belief that the government aimed to replace teachers with technology, so there would soon be no need for teachers in schools, and they would start losing their jobs. He genuinely voiced his concerns about tablets threatening their position as teachers.

Teachers seemed to contradict themselves as their discourses suggested one thing while actions suggested another. The same phenomenon was evident in Ertmer, Gopalakrishnan and Ross's (2001) study where they concluded that teachers' vision about technology do not always match with their actual practices. Teachers seemed to be uncertain about technology integration in classrooms as they gave more credit to, or showed positive discrimination towards any technology that they felt comfortable around, like smartboards while showing disdain for other things, like tablets. This uncertainty, might be the result of teachers' rationalisation process, as for them, the devices they could control and operate with less effort with minimum changes in their practices were 'educational' while other like tablets were always mentioned with a 'but'. This uncertainty, however, could be redirected for the better if the policy makers could create a

well-organized flow of processes where teachers are educated, trained and supported while the gaps in the technical and pedagogical aspects of the project are filled.

5.3.1.5. TOXICITY DISCOURSES

> …our culture has evolved faster than our biology. This clash between our technology-driven culture and our biological heritage is now damaging children's ability to think, learn and behave. (Palmer, 2006, p.3)

This theme acts as an umbrella for two issues teachers reported: Games and Health Concerns. While creating the label for this theme I drew on Palmer (2006) who, in her book, explains so-called sources of toxicity around our children in today's world. I found that some of the ideas teachers put forward were similar to that of Palmer's and it was only fair to use a label which I think represents their shared opinions.

Games

The first subtheme under the '*Toxicity Discourse*' is '*Games'*. It was no surprise to hear the teachers complain about students playing games. With devices like tablets capable of connecting to Internet and handling several tasks effortlessly, one can easily predict that gaming would happen. And teachers were not unfamiliar with this situation. Students have always found something that catches their interest more than lectures and with the ubiquity of smartphones gaming has become prevalent. However, introduction of tablets into schools by the government's hand had moved gaming to another level. Students were now 'officially allowed' to play games in the classroom, during the lessons. Even though the majority of the teachers preferred not to

use the tablets for teaching, students were well aware of the fact that they could have their tablets with them at all times. For various reasons as explained earlier, teachers could not control student devices and the methods they were used to use to deal with smartphones did not apply to the tablets. As stated earlier, some students rebelled against the collection of their tablets, thus teachers could only ask students to turn them off and put them aside.

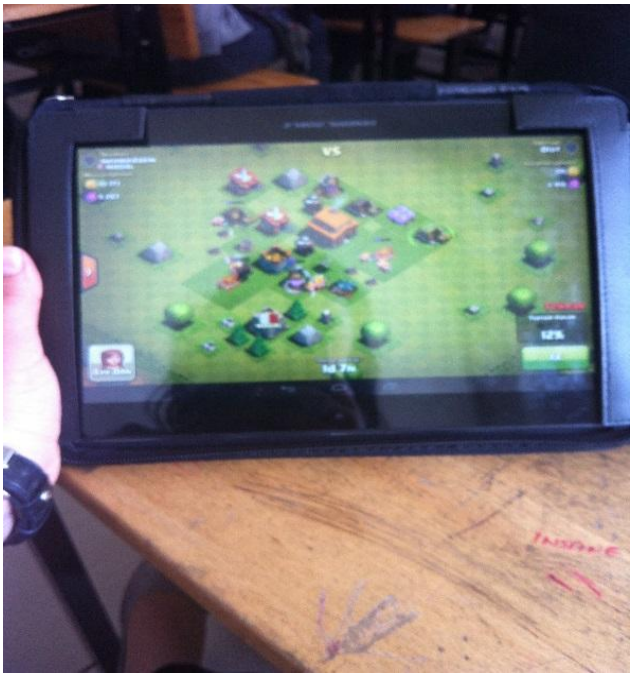


Image 5

However, restricting the use of tablets didn't seem to help with the situation. The tablet in Image 5 belonged to a student who was caught playing a game during the lesson. The teacher seemed upset rather than angry. He then showed it to me in a manner that he wanted me to see what they were dealing with every single day. He warned the student to put it away and continued with his teaching. In some respect, teachers were right in their complaints as they were helpless against

the situation. Disorganization and technical problems in the implementation process had put the teachers in a very difficult position, perhaps more than any other actors of the entire project. This was reflected in their statements:

> *…tablets have lifted our control over the students, the minute I turn my back they start playing games* (Suzan)

However, there was another aspect to the situation. As much as teachers found games disruptive and were frustrated with students playing during lessons, they also implied that games did not belong to school and it is part of the youth culture.

> *…you and I, we all know it that tablets haven't done anything for education apart from trouble and games* (Semih)

> *…they (tablets) only served students to play games, that's all*. (Kerem)

Whenever we talked about tablets, at some point came a time teachers suggested that tablets were only good for gaming; thus it helped the students to play games; which in turn caused trouble. It sounded like an equation with many variables;

tablets → games → students → trouble

In any case, games seemed to have negative connotations for the teachers. As Griffiths and Davies (2002) assert, "…the image of a typical gamer (and the pastime of computer gaming) is seen as socially negative, educationally detrimental, and remains firmly within a youth

subculture" (p.1). However, whether teachers had always had negative opinions about games or they had developed this attitude after their negative experiences is a question that this research cannot answer. Had the situation been different there is a possibility that games might not have this much of negative undertone to teachers.

Health Concerns

Introduction of tablets into the schools brought the ever-lasting argument with it: Are they harmful? During the interviews several teachers voiced concerns about tablets harming their health by emitting radiation through Wi-fi connections. They seemed very serious about their concerns and complained about the risks that they face every day in their work environments. Esma, the music teacher, expressed her concerns:

> *35 students, all have a tablet with wireless connection, classrooms turn into base stations. Can you imagine how harmful it is to our health?*

And another teacher shared the same concern:

> *They have fitted the entire school with wireless Internet. Our work place has become unhealthy.* (Semih)

Esma and Semih's statements reflected the general belief among the teachers that I talked to. They were already frustrated with tablets for several other reasons which were explained earlier, and tablets' potential to harm their health, seemed to be another reason for their negative

attitudes towards tablets. Some teachers seemed to take this issue very seriously as this very same matter also came up during one of the focus group sessions with students. A student explained their teachers' concerns about radiation:

> *Some teachers do not let us use our tablets due to the risk of radiation exposure. Our music teacher, for example, asks us to switch our tablets to airplane mode*. (Sinan)

Unlike their teachers, students seemed to pay no attention to this issue at all, and they, in a way, found their teachers' attitudes amusing which was easily discernable from the way they explained the situation among giggles and laughter. Zeynep, another student from a different focus group, made the comment below:

> *Our history teacher is very serious about radiation; he would wrap aluminium foil around his head if he could to avoid any harm*

Zeynep and the other students in the group found this comment very funny that they kept talking about it for a while, demonstrating their teachers' attitudes half-mockingly. For them, teachers' concerns were in a way superficial.

The debate on the effects of mobile devices on human health is still ongoing and research results vary between possible damage to no significant effect. The World Health Organisation (WHO) suggests that there is not significant evidence to show an established link between mobile device use and adverse health effects (2010). Yet, teachers were worried about themselves and their

students, so their concerns should be heard. We have learned from mistakes of the past that things that seem innocuous can sometimes turn out to have sinister effects, such as asbestos (Health and Safety Executive, n.d.). For years it was thought to be perfectly safe and used in all sorts of buildings to insulate and avoid fire until it was found to be poisonous. These new technologies have only been around for a short time, so we don't know much about their possible side effects, therefore it is always reasonable to be cautious. Nevertheless, people were also terrified of television and radio when they were first introduced (Buckingham, 2007).

However, the point I argue here is that there was a miscarriage of justice towards tablets as what teachers were worried about was essentially the wireless Internet connection itself, rather than tablets. In this sense, any device, whether mobile or not, with wireless connection capabilities could potentially be harmful. This includes mobile phones, computers and even the smartboards in classrooms. Switching the tablets off or putting them on airplane mode wouldn't do any good as long as there are other devices connecting to the Wi-Fi. Considering that almost every student and teacher had a mobile or two, and every classroom was equipped with a smartboard with connection capabilities, tablets were not the only devices to blame for any possible adverse health effects.

In this section, I presented, explained and discussed the themes that emerged from the analysis of teacher interviews. Even though they are gathered under different labels, all the themes are interrelated with each other, explaining the teachers' attitudes, thoughts, beliefs and behaviours about the tablets and in general technology. Taken all together, all themes suggested a negative trend towards tablets with teachers' motives and reasons, and showed that integration of

technology into schools could not possibly be successful without teachers' collaboration, and policy makers should take into account the things that are important for teachers.

Next, I explain the themes that emerged from the student data.

5.3.2. STUDENT FOCUS GROUPS

After interviewing teachers, I held 3 focus groups with students from each of the 3 schools. These students had filled out a questionnaire before the focus groups and were chosen among volunteers. Groups were formed with 4 to 6 students depending on the number of volunteers. Focus group sessions took place in their schools. In all 3 groups, volunteer students already knew each other which created a friendly environment and most of the times fun atmosphere. These sessions substantially differed from teacher interviews in terms of style and the data gathered. Student sessions were a lot less formal, mainly casual talks.

Even though the themes I present here mainly reflect problems with the tablets, overall, students reflected positive attitudes towards tablets. This might seem contradictory but students presented problems as if they were reviewing the tablets and trying to provide useful feedback for future devices that might be introduced to schools. They were happy to be given tablets, but displeased with their quality and functionality. They all reported different aspects of tablets that they liked, but the problems they reported were common for all. Their expectations from technology were higher, and devices they wanted to have were more advanced. Therefore, themes came out of the data mainly reflects main patterns embodying the problems students voiced and agreed on in every session.

The diagram below (Diagram 2) works same as the Diagram 1, showing the main and subthemes that emerged from the student data. Again, I chose to use a diagram to present the student data as visuals could be more powerful in presenting complex ideas and situations than text itself.

I should also mention that, just like the teacher themes, student themes are interrelated in one way or another. Thus, even though they are presented under different labels, they should be considered as parts of a whole, which could only make sense when considered all together.

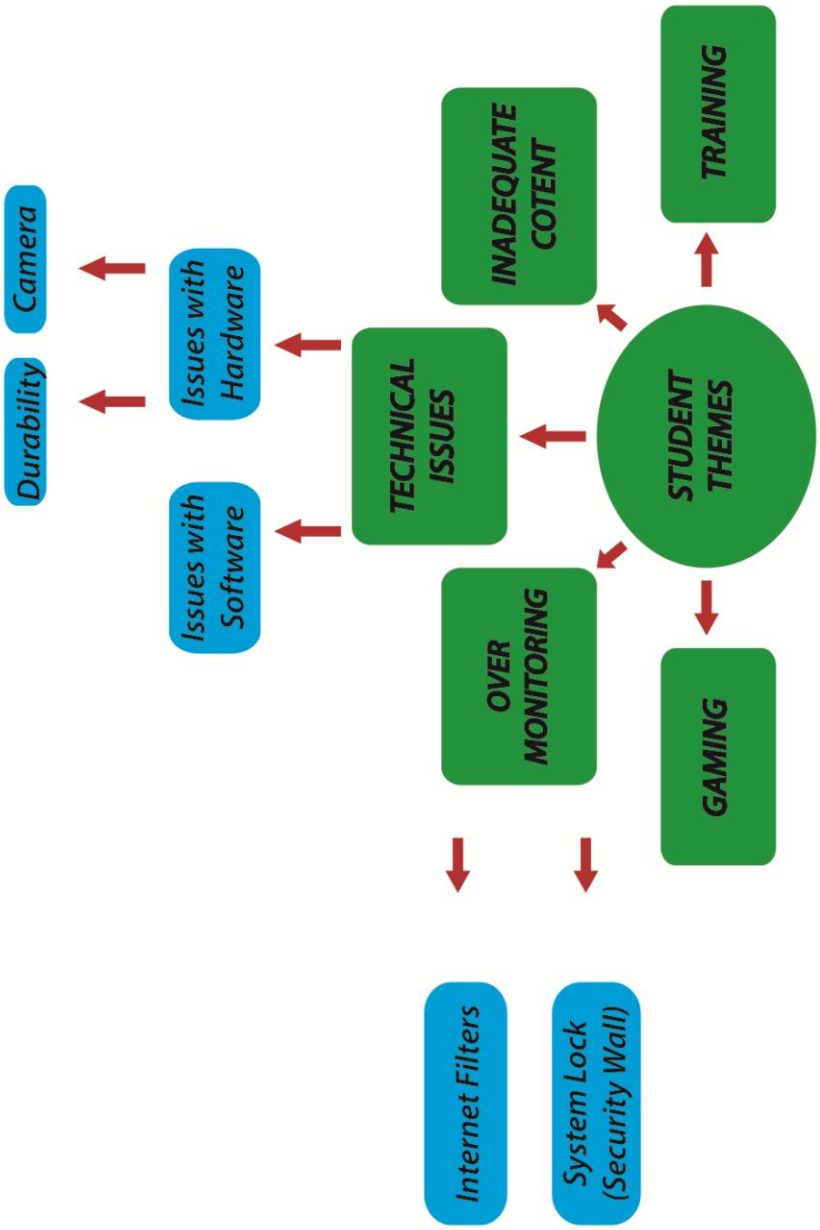


Diagram 2: Themes from Student Interviews

5.3.2.1. TECHNICAL ISSUES

This theme refers to the technical side of the problems students faced with their tablets. During our conversations, students reported several issues such as system malfunctions, failures or missing applications and specifications. I broke down these issues as Software and Hardware Issues as these technical problems either stemmed from the software or hardware.

However, I should note here that there is a fuzzy boundary between the software and hardware. Even though the division between them may seem very clear, it is not always binary. Sometimes it is quite difficult to make the division because the kind of software we use is often dictated by the hardware that we have which means a change in hardware may cause a knock-on effect on the software or sometimes vice-versa. The subtheme '*Camera*' is a good example of this which is explained further in this section.

Issues with the Software

Before I start to present the theme, I should note to clarify that the term 'software' in this context refers to both the operating system and the applications on it rather than a specific 'software package' as it is commonly used in computers. Basically, it covers every piece of program that make the tablets function.

Software issues was one of the main points that students spoke about frequently whenever I asked them whether they used their tablets for their school related activities at school or home. Most of them had tried using their tablets for homework, school projects, note taking and so on.

They found that the software overall was unreliable to use as an educational tool due to constant errors occurring. The most common problem students encountered was with information storage as their notes constantly got lost for no apparent reason. They reported problems with e-books and some pre-uploaded applications which students were expected to use. Thus, issues with the software along with their teachers' prohibition had led some students to stop using their tablets for school related activities in and out of the school. However, the majority of them continued playing games. They went back to using textbooks, but they still seemed positive that they would have used their tablets if the software had been reliable and user friendly.

> *I now use textbooks for all subjects as my notes on the digital versions were deleted for no reason in the past* (Elif)

> *It is very hard to take notes on the digital books, and the notes can disappear sometimes. I use books (*Buse)

What Elif and Buse emphasized was mainly the question of the usability of tablets. These are advanced devices with versatile features but without reliable software they cannot serve the purpose that the government had hoped for. Students were well aware of the possible uses and benefits of these devices and yet they were clever enough to evaluate the usability and functionality of them. They seemed to have clear expectations from technology and usability was their priority. In their study with university students Edmunds, Thorpe and Conole (2012) found similar results with respect to ICT. This shows that regardless of their levels in education, students have similar expectations from technology. Failing to meet these expectations "may prove counter productive or simply be ignored" (Edmunds, Thorpe & Conole, 2012, p.12).

> *They would have been useful for us and we wouldn't have carried textbooks if the tablets were reliable* (Nihal)

In fact, Nihal pointed out to the "counter productive" effects of not taking user expectations into account before setting out any initiatives.

Therefore, in order to successfully integrate tablets or any other technology, we need to make sure that the technology in question is usable and suitable for the needs of the students.

Issues with Hardware

The second part of the technical issues students raised was the issues with hardware. Here, hardware refers to the physical components of the tablets. Students either complained about the low quality of the make of devices or the limited/missing functions which I explain here.

Durability

As much as their usability, students heavily commented on the durability of the tablets. Almost every student had sent their tablets for repair at least once. During our conversations and also classroom observations, students brought their tablets to show how cheaply they were made and how easily they could be broken. The students who wanted to keep using their devices found the solution in wrapping their tablets with sellotape.

> *The Tablets are very low quality. They are easily broken; so we need to tape them to keep in one piece.* (Yavuz)

Whilst this was the case for some, many others had just given up on repair; therefore, not using their tablets. Students were not happy and dissatisfied with fragility of tablets.

However, I should note that hardware issues mainly depended on the brand of the devices. That is, at the time of this research, government had contracts with three different providers: Samsung, Vestel (a domestic company) and General Mobile. The majority of the tablets were provided by Vestel, which unfortunately didn't deliver as good quality devices as the other two. Students with Vestel tablets constantly referred to their friends' devices who received one of the two other brands. They made exhaustive comparisons of different brands in every aspect from their durability to functionality some of which are explained in the following parts. One of the students, Arda, explained his experience with his tablet:

> *Even though I took very good care of my tablet last year, it broke down at least three times due to its low quality. I was given a new tablet every time which resulted in losing all personalization that I created, so this demotivated me. Quality was important for us regardless of the brand. Tablets distributed this year (General Mobile) are better quality that that of last year's (Vestel), and I believe this is a sign of educational inequality* (Arda)

And another student Yusuf:

> *These tablets are like tablets of pills, broken easily. The power button is broken on my device* (Yusuf)

Arda and Yusuf were only two students representing many other students who faced the very same problems with their tablets. Students wanted durable devices which they could carry around and personalize with no fear of damage. Arda's point about 'personalization' was an interesting one showing that students wanted to 'own' their devices by personalizing them. This is in line with the questionnaire results and the model where the factor 'Psychological Ownership' showed strong effects on students' 'Behavioural Intentions to Use' their tablets. This suggests that students should be allowed to own their devices both physically and psychologically rather than having to borrow them from the school administrations on a daily basis as it is done in some schools.

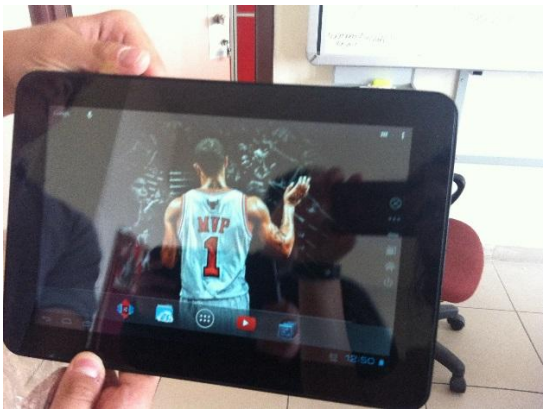


Image 6

Image 7

Image 8

Image 6 and Image 7 are two different screens of the same tablet which show the personalized background photo and applications. Again Image 8 shows another student device with a personalized background and application choices made for the home screen. These pictures clearly demonstrate students' eagerness for personalization as Arda stated.

However, students did not want to tradeoff between ownership and durability, without one, the other was not enough for them. As a matter of fact, some students abandoned their devices because they were tired of getting the tablets repaired, and setting them up over and over again. Once again, students had clear expectations from the technology and the tablets which were provided by the government had failed to meet these expectations.

Camera

The second hardware related topic which was discussed frequently was the missing camera on some of the devices. This issue was raised so many times and gave way to long, heated discussions that it could be a main theme in its own right. I chose to present it under the hardware related issues for simplicity as cameras are mainly considered as hardware. However, as stated earlier, there is not a dichotomy between the hardware and software, and cameras are borderline as a category. Such that, the visible, tangible part of a camera, such as the lens, would be the hardware aspect whereas the part which processes the image and creates the end results would be the software aspect of it, such as the camera application one could have on their mobile device. Thus, the hardware sees and captures the image and the software interprets it. This smooth and quick transition between hardware and software creates a fuzzy boundary between them. That is, for students, not having camera hardware had functional implications which had a kind of software feel to it.

Students talked about several missing features of their tablets individually, but lacking of a camera had created a common reaction among them. Again, this seemed to be a brand-specific issue since only students with Vestel tablets complained about it, and it was even a bigger issue for the students who didn't own a smartphone with a camera.

> *In every phase, tablets were provided by a different company. Students within the preceding phase received Samsung tablets while we were given Vestel. (…) They have both rear and front camera but our tablets don't have any*. (Hazal)

Just like Hazal every student with a tablet without a camera made a similar statement. When I asked why they specifically wanted cameras, the major responses were 'taking selfies', which

requires a front camera, taking pictures, and shooting videos. Some students whose tablets had a camera even reported amateur video shooting and sharing them via YouTube.

Since the producing company had not included the hardware aspect of a camera on the tablets, having the software aspect (a camera app) of it provides no use for the students. In some cases, the exact opposite was also true. The students who had received Samsung or General Mobile tablets had a camera on their devices, however for some devices the security lock (see page 237) that the government imposed unabled them to download a software (an app) to make use of the hardware.

All these suggest that many of the students are capable of creating with technology rather than simply being consumers of it. They are ahead of the curve when compared to their teachers and probably the policy makers. They demanded more than a simple device, they want to be able to create, edit and share in different forms from text to image to sound.

5.3.2.2. OVER-MONITORING

Another issue which students were quite unhappy about was the filters and system locks that were imposed by the government on student devices. I labelled this theme as "Over-Monitoring" because discussions with the students showed that they were overwhelmed with these so-called security measures, and they said the government had taken it too far.

Here, I present this issue in two parts: '*Internet Filters*' and '*System Lock*'.

Internet Filters

As presented earlier in teacher data, students too complained about the Internet filters that blocked the online content in order to prevent students from accessing inappropriate or harmful content. As presented earlier, filters are not always capable of distinguishing the good content from bad ones. Thus, they are susceptible to either over-blocking or under-blocking the content. The filters imposed onto the school networks were "locked-down" type of filters which 'over blocked' the content leaving students and teachers desperate. The extent that these filters could block was so wide that every student complained about not being able to prepare their homework and projects by using their tablets or simply searching for anything on the Internet while in school.

> *I go online to find sources for my homework but even websites with useful information is blocked* (Nihal)

In theory, the tablets were not supposed to connect any other network other than the ones in schools, and the government placed another so-called security measure (System Lock) to make sure this was the case. However, as it is explained in more detail in the following section, students found a way to deactivate this lock which enabled them to connect other networks outside the school. Still, students were angry at the filtering in their schools.

> *Providing tablets was a good idea but filtering the Internet (even the useful sites) is just not acceptable* (Beren)

> *Since we were given tablets then let us make use of them, remove the filters, and free the Internet!* (Yavuz)

While some teachers had stated a necessity for some control, students favoured free Internet with no filters and blocked content. As seen from the quotations, some students were really angry and demanded free Internet. Even though some leading researchers like Byron (2010) suggests using "managed" systems which block less content could be helpful, I argue that, whether with/without filters and regardless of the types of filters, educating the students should be our priority for informed, responsible future generations. Blocking the online content may seem to keep the students safe within the school limits, but it doesn't provide lasting safety skills while also hindering students' ability search, access, evaluate and use online information and making use of possible online opportunities.

> We must empower children and young people to access and enjoy the opportunities and benefits of the digital world, be risk aware, but not fearful, and support them to develop skills to become digitally literate (Byron, 2010, p.11)

As Byron suggests, we should empower the young people and equip them with necessary skills. In today's world, they have access to Internet almost everywhere.

> Trying to protect children with overly restrictive Internet filters doesn't make it go away. Schools try to create 'walled gardens' with Internet filters, but students have to walk outside those walls to go to the buses every day. On the way home on their cell phones, on their computers at home, using the Wi-Fi at McDonald's — they're back in the Wild West. Students don't need walled gardens. What they need is guidance in how to manage the reality of the Internet (Miller, 2016, para. 8)

Therefore, I join Miller in his argument, and I second his words - trying to protect the students with filters on their school tablets is a vain attempt while the better option is to educate them.

System Lock (Security Wall)

Student devices came with a system lock which aimed to prevent any changes on the devices such as deleting existing apps or downloading new content. This lock also ensured that the tablets could only connect to the school network. In government's terminology it is called the 'security wall'. The government wanted to make sure the tablets were only used for 'educational' purposes and the students were safe from any harmful content.

> *The ministry blocks everything so our tablets are empty inside: It is almost impossible to access any useful information. It is also boring to use the tablet like this. Usability is very limited because lots of programs that we need are missing.* (Hilal)

Initially this 'security wall' worked well in preventing students from changing anything in their tablets. And as Hilal stated, students found the tablets empty and boring; therefore, not fit for the purpose. However, students soon found a way to unlock their devices and majority of them unlocked their tablets. The information spreaded quickly among students and there were even several web sites, blogs and YouTube videos[2,3] showing ways to unlock the devices.

According to the statements in the press[4], authorities said that they were expecting students to unlock their devices, and they were learning together with the students to improve the security systems to protect the young. They stated that they were delighted with students' attempts to challenge the security wall which was a promising sign to raise our own Bill Gates and Steve

[2] https://www.youtube.com/watch?v=VIsVgsSZKf8

[3] https://www.youtube.com/watch?v=iZGjvEwWF7k

[4] http://www.teknokulis.com/haberler/guvenlik/2012/04/15/ogrenciler-fatihin-sifresini-kirdi

Jobss. The government had been working with the Scientific and Technological Research Council (TUBITAK) to improve the system lock. During the conversations and observations, I found that majority of the devices were unlocked; however, a group of students reported that they were no longer be able to unlock their tablets, therefore they abandoned them.

> *-Do any of you play games with their tablets?*
> *-No, we don't even bring them to school, they are locked anyway. We play games with our phones (Beren)*
> *-Other students told me that they have somehow unlocked their devices.*
> *-We unlocked them too, but after the latest software update, it is not possible to unlock anymore*

This conversation signals that in the near future, the government might be able to strengthen the security-wall and prevent more students from unlocking their devices. Even though many of them could unlock their devices at the moment, they were not happy with the way they were treated. They didn't like to be controlled and monitored as if they could not to be trusted and annoyed with the fact that they had to look for a way to unlock the tablets after every repair or system update. Students wanted to use their tablets just like any other mobile device without any restrictions. In a sense, they wanted to be in charge of their devices and own security without an artificial 'wall' which isolates them from the world in the name of security.

Some researchers (see Buckingham, 2007; Byron, 2010) suggested the use of Internet filters under certain circumstances to protect young people, however, the use of system lock on the student devices, I argue, was an unnecessary and inhibitory attempt. Just like the Internet filters, students should be given opportunities to use their tablets responsibly; they should learn to make

use of technology, and be able to distinguish what is 'educational' without the need for restrictions. They should be able to play games and visit social networking sites if they want to, and we should teach them to use these sources without being too much distraction for them.

5.3.2.3. INADEQUATE CONTENT

Besides the more technical issues students also had quite a lot to say about the inadequacy of their tablets' content. The word 'content' here covers applications and programs for various purposes from professional drawing apps to games. This theme is highly interrelated with the previous one: to some degree, it can be considered as the result of the government's *'Over Monitoring'* acts.

In terms of tablets' content, every student had a different requirement but there were some common demands. Microsoft Office programs were highly demanded in order to prepare homework, projects or presentations. During a classroom observation, a student walked up to me and started to explain why they needed MS Office programs and how hard it was to prepare their schoolwork without it. Other programs in demand were drawing and photo editing apps, music apps, social media apps, games, Google Play Store and Android Market.

> *I received my tablet in 2013 and Android market was not there. There was only EBA market (the domestic market with materials for students) with applications which would be suitable for 0-6 age group*. (Arda)

On a standard Android tablet, one could find the majority of such apps already installed or one can easily download them. As Arda stated, when the tablets were first introduced many of the standard applications were removed, and as mentioned above, the devices were locked to prevent students' from downloading anything 'uneducational'. However, students were not happy with what was provided so they found alternative ways to make their tablets work. That is to say, as long as they can unlock their devices, students could download many of the apps, but even if students could get around any restriction, some of the apps or programs they asked for were either not in the Android market or too expensive for students to buy themselves, such as the MS Office or professional drawing programs. Students claimed that they needed such programs for their schoolwork, otherwise, without them, their tablets were useless.

> *I don't use my tablet for schoolwork because there are not any useful programs* (Sinem)

> *…Our homework and projects, for example. We prepare them on our computers at home with PowerPoint, and transfer them to our tablets via a USB stick. Because there aren't MS Office programs on our tablets, we can't prepare anything, can only display. Once we come to school, we transfer the project to the smartboard via the USB or a cable* (Ebru)

The lack of useful programs had put some students off using their tablets. And the fact that they couldn't find a way to solve this problem had led them to go back doing things in the old ways just like Ebru explained; using their computers at home to prepare schoolwork and transferring them via a movable device like a USB. This is an issue that needs to be addressed because it is against the purpose of giving tablets to the students. The fact that students still needed computers

for their very basic schoolwork single-handedly destroyed the idea behind mobile devices hindering the government's effort to transform the education.

Moreover, the lack of games, social media apps and cameras took away the positive effects of enjoyment; the hedonic motivation students can get from using their tablets. Previous research found that users' perceived enjoyment can in fact lead them to feel positive towards tablets (Davis et al., 1992, Brown & Venkatesh, 2005). Removing all the fun from the tablets in order to make them more 'educational' rendered the tablets boring and unfit to use in students' eyes.

As I explain in the coming sections, games and other fun things could sometimes be more educational than the content the government had selected for the students. Thus, the students should have given the educational tools and programs as well as the ones they could enjoy to spend time with.

5.3.2.4. GAMING

Teachers' furiosity of games explained earlier and as the other side of the equation it was no surprise that games came up as one of the themes in the student data. Games took up a serious amount of students' time in a regular day (Paraskeva, Mysirlaki, Papagianni, 2010) and school time was not an exception to that. They used to play games in school with their mobile/smart phones but the introduction of tablets moved their gaming experience to another level while providing the 'legal' grounds to play. This, however, created a chaotic environment, especially for teachers, due to the reasons explained earlier in teacher data.

...I pretend to take notes but actually play games on my tablet (Zehra)

Gaming even created unexpected and unwanted situations and occasionally caused tension.

> ***(Ebru points to Yusuf)*** *Among us he plays games the most. He plays every kind of games. He even downloaded a makeover game where he uploads our pictures and plays around with them. He even gave our Math teacher a makeover and he didn't like it. He was going to fail Yusuf but we convinced him.*
>
> ***(Zeynep)*** *The same happened with our Turkish Literature teacher and I barely convinced her.*

Furthermore, as might be expected, all students received devices (unless broken or system locked) capable of doing similar things thus they now could do more than single player games, so they started playing multiplayer online games with each other during the school hours. Students' game preferences varied but they reported two most commonly played multiplayer online games: OKEY and Minecraft. OKEY is a tile-based game usually played by 4 people. To make things clear, OKEY is very similar to the game of Rummikub with minor differences. It can be played individually or in teams of two. Minecraft on the other hand, is a well-known, Lego style adventure game in which players can create their own worlds. These games have a common characteristic: they are more fun when played with others. Students seemed to play OKEY for fun but Minecraft involves another element which fuel students desire to play: competition.

-Do you all play Minecraft together?

-Yes, students from another classroom burned our houses (Hazal)
-So, you play it with other students outside your classroom?
-Yes, they always attack us during lessons; they have burned down our houses 4 times. But we have a plan (Yusuf)

During this conversation all 5 students started talking at once, all complaining how cruel the students from the other classroom were and how unfair it was to be attacked while they were in a lecture and unable to defend themselves. It seemed that these students watch each other's' schedules before attacking to make sure their opponents couldn't go online comfortably. Williamson and Facer (2004) note that even though competitiveness is better to be kept away from classrooms, it is a sign of readiness to "develop and demonstrate expertise" (p.268). I don't have time to discuss this in detail here but there is a growing field of 'gamification' looking at the ways to "harness the motivational power of games and apply it to real-world problems" (Lee & Hammer, 2011, p. 1).

Similarly, Image 9 was taken during a break. These two boys always come to this stairwell on every break to play Minecraft. The students agreed for me to take their pictures but didn't want to talk so I asked their teachers. He had said that these boys' classroom was the only one in the entire school where the Wi-Fi connection was very weak, so the boys came here to play. Their devotion to the game that they were playing had led them to create a sort of private space in the public space of school. In their little 'private space', they formed a sense of companionship through the game while crouching and having lunch in a physically uncomfortable but mentally rewarding space for them.

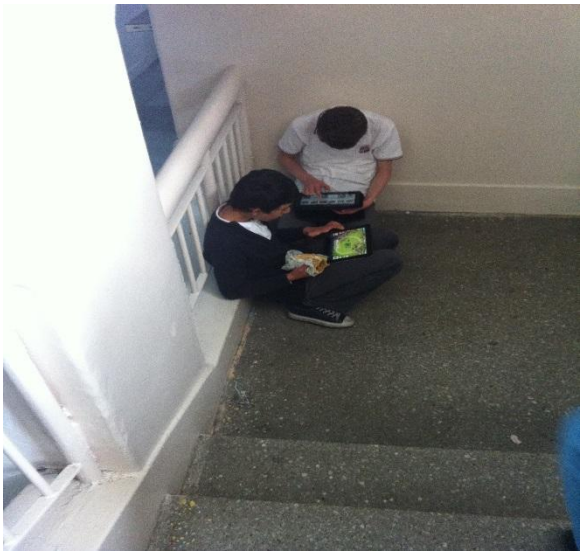


Image 9

These two students might be a bit loyal but it just shows how important games are for young people and how devoted they could be when a task draws their interest. Norman (1993) asked the question that has lately been a topic of interest for many researchers more than two decades ago:

> When I watch children playing video games at home or in the arcades, I am impressed with the energy and enthusiasm they devote to the task. … Why can't we get the same devotion to school lessons as people naturally apply to the things that interest them? (p.38)

It was perhaps this question or similar others that ignited researchers interest in learning with games. Games have been embraced lately as an alternative to traditional teaching/learning settings and methods. Advancement and ubiquity of digital technologies have made the research more meaningful and needed more than ever. This deserves a study on it is own and is beyond the scope of this research. However, briefly, there have been several studies with promising results showing that games, in fact, games could be 'educational' if designed accordingly (Squire

& Jenkins, 2003). Rose and Nicholl (1998 as cited in Prensky, 2002) stated, "In simple terms a brain enjoying itself is functioning more efficiently…When we enjoy learning, we learn better" (p.30). My observations and conversations with teachers and students suggested a similar tendency. Even though many games, including Minecraft, have now selection of languages, not everything in the games were translated. Most of the time students used the original English words while playing rather than their Turkish translation, such as "survival mode" which would be translated as "hayatta kalma modu". Whilst students could move swiftly among foreign 'words', and different 'worlds' spending hours playing games like Minecraft, their language teachers seemed to have a hard time attracting students' attention and teaching even very basic words. In fact, Burnett and Bailey (2014), looked at the ways children belong to both online and offline communities through Minecraft and found that children's' identities multiplied by their simultaneous presence in both material and virtual worlds, and in the online and offline communities within these worlds. In these worlds, they involved in a series of decision-making processes both individually and as a group, thus developed a "complex and multi-layered" (Burnett, 2015, p.5) notion of collaboration. Their effortless simultaneous existence in material and virtual worlds blurred the boundaries thereby "…turn singularity into multiplicity, or better into fractionality" (Law, 2004, p.70). Law (2004) defines '*fractionality'* as a "…world that is more than one and less than many. Somewhere in between" (p.62). That is, "incidents, individuals, objects or places are not completely in either the material or virtual world, and nor do they jump between" (Burnett & Merchant, 2014). In the end, all of these tie to the idea of Web 2.0 in the sense of what the students were excited and teachers were frustrated about, which is breaking down the boundaries of the classroom by linking with other people (Davies & Merchant, 2009; Willamson & Facer, 2004) and getting emotionally involved in their (students)

own learning. This translates in to education as a sign of a need for change because students are ready and capable of using the multiplicity of things as a source for their learning either through communities or peers. They are ready to involve, collaborate, make decisions, take actions and learn from them while teaching each other which, for them, seems to be more natural than traditional settings, practices and fixed times (Gee, 2004). Similarly, proponents of games as educational tools, like Prensky, argue that games teach young people the skills that they need in their life unlike the traditional teaching methods in which the new "Next Generation" or "digital natives" cannot engage (Van Eck, 2006, p.1).

> …the real (though unspoken) reason kids play computer and video games is that they're learning. And it's by playing these games that our kids are, unconsciously, preparing themselves for their coming life in the 21st century! (Prensky, 2006, p.1)

> …instead of considering online games (…) as a waste of time or even restricting using them, both parents and teachers could encourage a wider array of child-centred activities on the internet, to stimulate interest and self-directed learning. (Livingstone & Haddon. 2009, p.25)

While more research is needed to understand whether games could provide new avenues for learning, this research suggests that, with the right guidance, they might have a potential to be used as a tool in teaching subjects like English.

5.3.2.5. TRAINING

This theme came to light after the analysis of both teacher and student data as it sits in the intersection of both teachers and students' discourses. Elsewhere I presented teachers complaints about inadequate training, but here I present students' opinions about teacher training and how these correspond to teachers' discourses.

As explained earlier, teachers stated the need for more and better training to use the new technologies implemented in their schools, and articulated the problems with the sessions. And even Efe, the school principal, admitted that "teachers' ICT skills fall behind that of students".

This issue with training was discussed during student focus groups and students came up with an interesting demand: *"Teachers should be trained"* said a student, Arzu. Her comment sparked off the discussion and I realized that even though students usually did not talk about it explicitly or at least to me, it was possible to discern differences between the teachers' and students' discourses. Teachers always said they needed more training while the students' attitude was more like 'we will just hack into it'. They had more confidence in their computing skills and more resourceful about how they would learn more independently. In a sense, they knew, if they needed anything they could learn it autonomously or through their peers. This suggests that while teachers waited for training to come from above, students were ready to take control of their own learning.

In this section, I presented, explained and discussed the themes that were emerged from the student focus groups. Conversations with students had revealed different perspectives on tablets and their existence in schools. Data showed that students had different priorities and expectations when it comes to technology. Unlike teachers, students seemed to be more confident in using tablets and completely in control of them. They had tried and tested their devices for various sorts of activities including schoolwork and pleasure activities. Similar to teachers, students

reported the problems with the tablets; nonetheless these seemed to be more of professional evaluation of the devices rather than complaints.

5.3.3. MERGING THE RESULTS: Discussion of Findings

In this chapter I presented the analysis, findings and discussion of both Qualitative and Quantitative parts of this research. Even though each part offers useful and interesting findings in itself, the main strength of this research comes from the combination of the two parts. Because "…quantitative approach is about breadth while the qualitative approach is about depth" (Kura, 2012, p.15), once combined, these two parts could *enrich*, *explain*, *confirm* or *challenge* each other's findings, thus creating a more comprehensive understanding of the matter at hand.

Considering the in depth nature of the qualitative data, it is rational to triangulate the quantitative data against it. Therefore, I start by explaining the findings of the quantitative research in relation to the qualitative part, first starting with the supported hypotheses.

This research found that, the hypotheses supported by the statistical analysis overall conform to the results of thematic analysis. In that sense, the model seems to give a hint of important factors in students' intentions. Here, I discuss the supported hypotheses H5, H8, H9 and H10 respectively.

Firstly, H5 suggests that the Facilitating Conditions (FC) have a medium to high effect on the Effort Expectancy (EE) which in turn suggests that the existence of support facilities such as technical support helps students to perceive that using tablets does not require much effort. Even though the statistical analysis yielded strong relation between the FC and EE, this tendency was not observed in the qualitative data. Students vocalized their problems about the lack of technical support and some reported deserting their tablets, however, this, as I will explain shortly in the

coming paragraphs, is a sign of the effect of the FC on students' intentions to use tablets rather than their effort expectancy. Students did not perceive tablets hard to use, such that they always found ways to go around the filters or unlock their devices, even though there were no support available for them. Thus, the findings of the qualitative and quantitative parts do not conform each other.

Secondly, H8 indicates that the students' Psychological Ownership (PO) has an effect on their Behavioural Intention to Use tablets. This, again, manifested itself during the focus group conversations as students explicitly and clearly indicated that they wanted to personalize the tablets, and thus 'own' them. Both the qualitative and quantitative data show that feeling of ownership/possession is an important factor in adopting a new technology which is also in line with the limited literature in educational context. In a Becta report Perry (2003) supports my findings and claims that ownership of a device creates a sense of 'belonging, comfort and commitment', and it is only then students engage with their devices to discover their real potential. Therefore, considering the findings and suggestions from the literature and the findings of this research, in planning a mobile device initiative, policy makers should consider providing devices to students rather than lending them, and should leave enough space and freedom for students to personalise their devices, therefore develop a feeling of ownership in order for devices to be used effectively for education purposes. Also research on the effect of the PO is limited, so this study adds to literature.

Thirdly, H9 implies that the students' feeling of Self-Efficacy directly affects their Behavioural Intention to Use the tablets. That is, the more a students feel competent in using technology, the

higher the chances of that student to form positive intentions to use a tablet for school. Again, this notion was indirectly supported by the qualitative data. That is, even though qualitative data does not explicitly suggest it, I argue that students' higher levels of competency in using technology had its effects on their overall positive feelings toward tablets regardless of the technical problems of the devices. It becomes more lucid when compared to teachers' total rejection of tablets. Among other factors, I argue that the lower levels of self-efficacy among teachers might have supported their negative feeling against tablets. Statistical analysis suggests that the effect of Self-Efficacy is small, but it is not one to be ignored. In ICT implementation, user competence should be taken into account for it to be successful, and if required, training and help should be provided.

Finally, H10 suggests that apart from it is effect on students' intentions Self-Efficacy also has an effect on their Effort Expectancy with a medium to large effect size. In other words, students that feel competent in technology use are likely to perceive tablet use free from effort. This finding is in harmony with the findings of qualitative data. Students, due to their higher levels of competency, found tablets easy to use and even found ways to challenge the government's security measures, while teachers felt the need for training and their lower levels of self-efficacy seemed to lead them to perceive technology as harder to use in comparison to their students. Thus, it is important for policy makers and educators to assess the students' technology competency and provide support if needed.

As much as they comply with each other in regards to the supported hypotheses, when looking at the non-supported hypotheses, the statistical analysis conflicts and the qualitative data produced

conflicting results. Qualitative data, for example, suggests that Hedonic Motivation (HM) was an important factor for students in using their tablets. They wanted to have access to the games, social media, front and rear camera. They watched movies during breaks or shot funny videos of themselves and so on. However, according to statistical analysis, Hedonic Motivation (HM) doesn't have a significant effect on students Behavioural Intentions to Use (BIU) their tablets. Literature, on the other hand, suggest positive effect of the HM on students' intention (Escobar-Rodríguez, Carvajal-Trujillo & Monge-Lozano, 2014; Masa'deh, Tarhini, Mohammed & Maqableh, 2016). However, hedonic motivation is criticised for its potential to wear off over time. That is, the positive change that is attributed to the Hedonic Motivation could simply be the result of the 'novelty effect' where students initially show interest in technology due to excitement. Another factor that might be taken into account is the 'Hawthorne effect', a case in which the participants in a research project behave differently to how they would have normally behaved as a response to being monitored. In the case of this study, only the students who had received their tablet minimum six months ago were selected. Even though there is no clear cut time frame for the HM to wear off, I would argue that by the time I conducted this research, I anticipated that the novelty effect had already done its part. Thus, hedonic motivation was prominent among students, therefore, in planning an ICT implementation, the audience should be taken account and technology should be designed to catch their interests.

Another example of contradicting points between qualitative and the quantitative data is the effect of the Facilitating Conditions (FC) on students' intentions as briefly mentioned above. Statistical analysis found no significant relationship between the FC and the BIU. However, qualitative data showed otherwise. Students were frustrated with the technical support they

received when there was a problem with their tablets they were not able to get help in many cases, and as presented in the student data, this put off some students and led them to abandon their devices. Literature also indicates a strong effect of the FC on the BIU in several contexts and it is pertinent in education too (Limayam & Hirt, 2000; Chang & Cheung, 2001; Teo, Lee & Chai, 2008). This suggests that, in order to successfully implement and benefit from technology in schools, quality of support should be a crucial part of the whole plan.

In another case, I found no statistically significant effect of the Performance Expectancy and Effort Expectancy on the Behavioural Intention to Use. This finding was surprising as the literature extensively suggests that these are the two most important factor on users' intentions (Davis, Bagozzi & Warshaw, 1989; Venkatesh et al., 2003; Gupta, Dasgupta & Gupta, 2008; Ghalandari, 2012; Akbar, 2013). An even more interesting part is that the finding of the qualitative data is consistent with the literature. As presented in the findings section, students' complaints on not being able to use their tablets for schoolwork, such as taking notes or storing information, due to the unstable nature of the tablets could be interpreted as their performance expectancy from the tablets. That is, students expected technology to improve their performance, and if it did not, they would stop using it, as it was the case in schools. However, statistical findings suggest no such relationship. In terms of the Effort Expectancy, focus groups revealed that even though students' higher levels of self-efficacy led them to feel using technology easier, having had to set up their tablets from the beginning and personalizing them after every repair or device update had put some students off because it required too much effort. Thus, feeling that use of a technology is not free from or does not reduce effort could create a barrier between the users and technology which in turn effects the overall success of an innovation.

Another unsupported hypothesis suggests that there is no significant relationship between the Social Influence and the Behavioural Intention to Use. Literature has varying findings on the effect of social influence. In their research, Chiu and Wang (2008), and Yoo, Hand and Huang, 2012 found no effect of Social Influence on the Behavioural Intention to Use whereas Maldonado, Khan, Moo and Rho (2010) found that Social Influence is an important factor on students' intention to use technology. Findings of this research suggests contradictory results in relation to each other such that the quantitative data shows no relationship while the findings of the qualitative research claim otherwise. Firstly, I argue that the impact of social influence on students' intention was evident in their use of tablets. They only used the tablets for leisure activities but not for schoolwork which I argue, is the result of their teachers' opinions of tablets. In fact, the European Parliament report (2015) suggested the same trend in schools, and emphasised the emotional effects they could have on students' behaviour. Moreover, students playing interactive multiplayer online games in groups is another sign of the social influence, or some of them even reported only bringing tablets to the school whenever they were to play games. Therefore, in this case, social influence has an impact on user behaviour.

Finally, analysis reveals that there is not a statistically significant relationship between the Habit and the Behavioural Intention to Use. Literature also suggests contradictory findings on the effects of the Habit (Polites, 2005; Huang & Kao, 2015). Further, the qualitative data has no reference to habit which, I believe, could be due to the fact that students did not have enough time to use their tablets except for gaming etc. at certain intervals to habitualise a use behaviour.

On the whole, the findings from the model and the interviews with students have some points in common while they are contradictory in others. The findings also do not conform to the literature on each point. Since the model works with the data from the self-reported questionnaires, there is always a chance of fallibility as self-reported data might not always reflect the complete truth but the participants' interpretation of it. On the other hand, even though focus groups might provide more detailed and intimate information due to direct personal contact with the participants, there is always a possibility that they might act or speak differently in an environment where they are being observed. Thus, the point I am trying to make here is that, every method has its shortcomings and one should not be considered superior to another. So the choice of which approach to select would depend on the research questions of any given project. The model approach could provide a quick overview of the important factors in students' or teachers' intention to use technology if time is a concern, but because the factors in the model are predefined, the information one could receive is limited. Therefore, Box's (1979) approach to the use of models explains this research's overall finding about the use of the UTAUT2 in a short sentence:

> *All models are wrong but some are useful* (p.2)

The qualitative approach, on the contrary, takes longer to collect information and analyse, however, it provides an open field to discover the students' and teachers' motives in detail with a possibility to find out things that were not anticipated by the policy makers. However, if success of a project is the priority, I argue that the results from a statistical approach should not be considered without a more in-depth approach.

CHAPTER 6: CONCLUSION

6.1. Introduction

This study set out to explore students' and teachers' perceptions of tablets for their school related activities, and test a technology acceptance model, the UTAUT2, in order to see whether a model approach would be applicable in educational settings. Findings of the study were presented in previous chapters. This chapter aims to recap and crystallise the key findings of this work in relation to the research questions and related literature, highlight the implications for education and explain the limitations along with my reflexivity on this research. As Scholl indicates "Many students reach this stage of their careers having been focused for several years on 'trees'. This section of the dissertation provides an opportunity to revisit the 'forest'". Therefore, here I revisit the research questions that I presented in the very beginning and provide answers for them.

Research Question 1

What do teachers think of tablet integration into education? What are the motives behind their attitudes? How do they use the tablets in practice?

This study was originally designed on the assumption that the tablets were being used in schools. When I first identified the research questions for my work, I posed this question in the hope of offering explanations about the way in which teachers used the tablets, the benefits or drawbacks, and thus contribute to education literature, as tablets were new to schools. I did not expect to find teachers in complete harmony with the technology but a complete rejection was a total surprise. As I explained in earlier chapters, I had to adjust my plans and questions

depending on the situation in schools; however, I decided to keep the research questions as they were because contrary to the common practice especially in scientific research, I believe negative findings are still findings and they are worth presenting.

Thus, as it has been demonstrated throughout this thesis, the answer to this question is that teachers had negative opinions about tablets, and consequently they did not use them. Since it is not possible to offer any explanation on the ways the tablets would have been used, here, I expand the answer to this question by explaining why teachers chose not to use tablets. These findings are just as important as the positive results would have been because "Full integration of computers into the educational system is a distant goal unless there is reconciliation between teachers and computers. To understand how to achieve integration, we need to study teachers and what makes them use computers" (Marcinkiewicz, 1993, p.223), and knowing what makes them not use the technology is another way to improve our way to integration. In this regard, this study identified three main reasons behind teachers' rejection of tablets. These findings are consistent with the previous studies and complement their findings.

First, teachers developed resistance to the change which tablets offered. This is in line with the ICT literature. Becta (2004) report suggests that teacher resistance to technological changes is an inherent issue, and Leander (2009) argues that one of the main reactions of teachers when new digital literacy practices come into question is total resistance against using the new version. However, Bingimlas (2009) emphasizes that resistance to change is an indication or result of other underlying problems, and the meaning teachers attribute to change could affect their behaviours (Tye & Tye, 1992). Even though teachers did not explicitly state, their resistance was

reflected on their discourses and practices. For them, the word ‘change’ had a negative undertone. A deeper look into their statements revealed that teachers’ resistance was directly affected by the concerns they had about their professional identities; their authority inside the classroom; and their mindsets about how education should be. Ertmer (2005) indicates that teachers’ identities, beliefs and values should be studied in order to understand their instructional practices, and the ways teachers use the technology is affected by their beliefs about education (Hammond, 2011). Further, Buzelli and Johnston (2001) state that teachers exercise authority inside the classroom both by directing and controlling the classroom activities, and holding the knowledge that students need to obtain. By potentially losing the control over one or both of these practices, teachers feel that they lose part of their authorities (Cox, Preston & Cox, 1999; Vrolijk, 2014).

This result, however, was not surprising considering that teachers have traditionally been regarded as the gatekeepers of knowledge; and their practices have evolved in the direction to support and protect their position in the classroom. The traditional classroom settings and pedagogies have long been around and have decided teachers’ roles and responsibilities. Because tablets blur the line between teachers’ identity as the information providers and the facilitators, thus threaten their authority, teachers had to negotiate their position. As a result, they struggled to locate themselves in relation to tablets which in turn led them to resist the change that tablets offer inside the classroom. This was evident in their discourses about smartboards; teachers were happy to have them in classrooms, as they did not demand a radical change in teachers’ practices and classroom settings.

Moreover, interestingly, teachers' political identities played a role in their attitudes. Political allegiances might not be a direct determinant of teachers' attitudes but it had its place as a subsidiary factor. Teachers, in a sense, perceived the tablets as an agent of the government, and believed that tablets only exist in schools to help strengthen the current government's power in the eye of public. Previous research suggested similar results, however, they were mainly referring to the schools' political culture rather than the effects of political allegiances at the national level (Hjelle, 2001).

Secondly, one of the major reasons for teachers' technology rejection was the frustrations caused by the lack of support from the government along with the government filters and ban on YouTube. The effects of lack of support and training on teacher attitude have been demonstrated in numerous studies and my findings are in compliance with them (Bingimlas, 2009; Ely, 1990; Mirzajani, Mahmud, Ayub & Wong, 2016). The problems teachers face with the filters in school networks has also been identified by other research (Simmons, 2005; Finsness, 2008). However, the dependency teachers had on YouTube was an interesting finding, considering their negativity towards social media in schools. This might be the initial spark of possible change in teacher attitude as the generation changes because the majority of the participants of this research were in their thirties.

Finally, teachers associated the tablets with popular culture. They were not happy with students playing games all the time as, for them, games did not belong in school. Pastore and Falvo (2010) observed a similar trend in their study where they found that some teachers see the games as a source of distraction. This could be connected to their anxiety about not having control over

tablets. However, there are increasing numbers of studies showing that games could be a beneficial addition to education (Koh, Kin, Wadhwa & Lim, 2011; Razak, Connolly & Hainey, 2012; Can & Cagiltay, 2006). Moreover, some teachers had concerns about the possible health problems that could be caused by technology which in turn created an uneasy atmosphere for them inside the classroom.

Overall, teachers were not happy to have tablets around in schools, and did not find tablets as valuable addition to education. Consequently, tablets potential was undiscovered.

Research Question 2

What do students think of using tablets for their learning activities? What are the motives behind their attitudes? How do they use the tablets in practice?

Similar to the case in the previous question, students did not use their tablets for school related purposes. However, their situation was not decided *by* them rather it was decided *for* them by their teachers. This is another good example of the need to study teacher acceptance/rejection reasons as it has direct effect on students' use of technology. Yet we also need to "tune in to what pupils can tell us about their experiences and what they think will make a difference to their commitment to learning and, in turn, to their progress" (Rudduck & Flutter, 2000, p. 75).

As already mentioned, students did not have the chance to properly use their tablets for learning as part of their curriculum. However, they used their tablets for various 'non-school' activities as

explained in the findings sections. Unlike their teachers, students were positive about tablets, but overall negative about the unreliable and non-userfriendly nature of the devices.

They reported problems related to the software and hardware aspects of the devices, such as the disappearance of notes for no reason or easily broken-low quality manufacture of the devices, as well as the problems resulted in overzealous 'protection' acts of the Ministry such as internet filters or the system locks on devices to stop students accessing or downloading any 'unapproved' websites and content.

Some of these findings are in line with the literature. Davis (1993) argues that the quality of technology plays an important mediating role in individuals' technology use. Students want to be able to rely on technology if they are to adopt it. And Livingstone (2014) asserts that policy makers rarely take into account the needs of students while creating policies and students' rights in the digital age often go unrecognised.

When it comes to the restrictive nature of Internet filters, there seems to be a lack of research to explain the issue from the students' perspective. Existing research mainly focuses on the possible harm and the concerns around them. In that sense, this study is a valuable addition to the literature. Students demand free use of devices without restrictions, and considering how important the Internet is in their lives, tablets without access to social media or websites are redundant for them.

A very interesting and important finding of this study is the need students had for the personalization of their devices. Students want to 'own' their devices not only physically but also psychologically. In a way, they wanted to express themselves through their choices in customising the tablets. Traxler (2010) supports this finding "[mobile] devices express part or much of their owners' values, affiliations, identity and individuality through their choice and their use" (p.149). This is still a developing area in education literature with limited studies even though there exist numerous studies in the consumer context.

Even though students were unhappy with the problems stated here, they reported that they would have wanted to use tablets for their school work if these problems are resolved.

Research Question 3

To what extent could the UTAUT2 be suitable for educational context? How do the new factors affect the model and what other changes could be made?

In relation to the first part of the question, analysis of the UTAUT2 seems to provide some useful information in terms of the determinants of students' technology use intentions. However, the ability of the model is limited to the self-reported behaviours of the students' which might not be reliable all the time, or we might not exactly know the reason behind a specific answer and the reality could be a lot different than what it looks in the questionnaire. This, in fact, was evident in the qualitative data where the answers students provided during conversations did not match the finding of the quantitative analysis. Further, in many cases, my findings from the model

contradict with the findings of previous research. This is understandable considering that each research is unique in the sense that different context could yield different results. However, it is interesting to see that the data from the same research produces conflicting results. It is by no means my intention to go into details with the quality of the data obtained with each approach, but, when it comes to make decisions based on a research like this one, I believe, one should consider the findings of the qualitative research as it enables to see not only the results but also the reasons behind them. In light of these, my answer to the first question is that the model could provide some understanding of the students' intentions to use a certain technology. It can provide a quick look into the matter if time is constrained. Not least the model could be used as an assessment of an initiative in a manner that masks some of the important facts about implementation. For example, a government could use this kind of evaluation model as a way of highlighting some information and obscuring other things.

In response to the second part of the question, including new scales like Psychological Ownership and Self-Efficacy proven to be useful as these produced better statistical results which suggest these two factors might be more important for students in forming intentions than the original constructs in the model. Thus, depending on the context or the content of an initiative, the constructs should be amended.

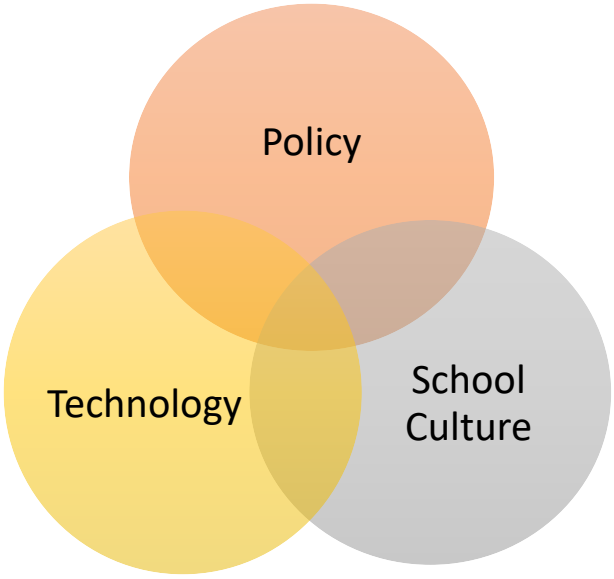
Overall, I conclude that this model could be useful tool with the right changes but it should be accompanied by a qualitative research as the model can only provide quantified results but not the reasons behind these results, and the facts that are not captured by the model could go undiscovered.

6.2. Summary of Findings

After providing discussion of the findings and answers to the research questions, I now provide a summary of the key research findings.

The main phenomenon which emerged from this research was that the tablets faced the same negative reaction as several other classroom technologies in schools, and their use was low to none with very low rates of informal use outside the school contexts. Earlier I identified and explained different themes reflecting the possible reasons behind this phenomenon; however, this negative reaction could be conceptualised as a consequence of interrelated casual factors which are displayed in Figure 20 below.

Figure 20: Interrelated Causal Factors



As I explained in the related data sections, there were strategies used by the teachers, students and policy makers which contributed to the non-use of tablets; resistance to new tools; the disorganised implementation of the project; technological problems, as well as cultural attitudes and beliefs were all contributors. Taken together, these gave way to missed opportunities, wasted resources and tension in the project schools.

Moreover, this research also found that in identifying the possible motives behind the reaction towards digital tools, the use of a technology acceptance model, the UTAUT2 in this case, could be useful to collect mass amount of information in a shorter period of time. However, it was also found that the results from a model should be considered carefully, and be accompanied by an in-depth qualitative study if understanding the real phenomenon is the purpose.

6.3. Implications and Limitations

In this section, I outline the implications of this research for policy makers and researchers as well as explaining the limitations.

This research was motivated by the Turkish government's decision to invest in a large scale ICT project, the Fatih project. Even though the findings could not be generalized to the other projects around the world, as explained earlier, lessons from a project could light the way for others, thus implications from this study could; first help the Turkish Ministry of National Education in their continuing efforts to make the Fatih project work. This research, in a sense, could help them understand the teachers' and students' expectations, and the problems they face. Second, it could

help other countries in planning a such project. The findings of this research suggested important factors playing role in teachers and students intentions to use tablets which should be taken into account while planning, and also, this study showed that a quantitative approach, even though useful, is limited in understanding the real motives behind technology use. Therefore, a more detailed qualitative study should accompany any quantitative approach in order to successfully implement technology in schools.

For researchers, this study could be used as a base for more extensive research in understanding the attitude towards tablets in schools, as well as the use of UTAUT2 in similar contexts. Further, this research adds to the literature where research on less developed countries is limited. As being the largest project of its kind to date with a considerable length of survival in comparison with the similar other projects, the Fatih project has not attracted the attention it deserves from the researchers. This study could only cover a part of the project but further research could examine the project from different aspects such as policy, pedagogy and so on.

However, this study had its limitations. First of all, the limited time frame for field work restricted the time I could spend on the field, and collect a more longitudinal data and observe the situation over a longer period of time to get a better understanding rather than solely relying on the accounts of the participants. Secondly, the numbers of participants both for the quantitative and qualitative research were limited. Future research could replicate the study with more participants to obtain variety in data. Moreover, majority of the participants of the focus groups were girls which could have biased the results. Finally, perhaps most importantly, this study only included three schools in the country's capital, Ankara. Even though the socio-

economical profiles of the schools varied, still, the results may not be representative. Future research might cover more economically challenged areas of the country as these areas could yield different results due to low access rate to technology, and infrastructure problems.

Keeping all the limitations in mind, the findings of this study offers a valuable insight into the situation in school when technology integration is in question.

6.4. Developing Reflexivity

Hennik, Hutter and Bailey (2011) define reflexivity as "a process that involves conscious self-reflection on the part of researcher to make explicit their potential influence on the research process" (p.19). In other words, it is a process of accepting the effect of the self on the research and recognizing that complete objectivity is not possible (Wellington, 2015). Even though they are commonly used interchangeably, for Wellington, 'reflexivity' and 'reflectivity' are different concepts, both require attention, but the latter being a vital part of any research while the former could be covered with short accounts such as the researchers' 'positionality'. He explains these two concepts as:

> Being 'reflexive' is part of a more general approach to research – being 'reflective'. The former is a subset of the latter. Being reflective involves thinking critically about the research process; how it was done and why, and how it could have been improved. Reflection is an important part at every stage, i.e. in formulating questions, deciding on methods, thinking about sampling, deciding on presentation, etc. (p. 101).

In that sense, any researcher should reflect on their research from the beginning to the end, carefully thinking and reasoning every stage. Therefore, this section is not for the reflection on this work; this is where I explain my reflexivity.

Earlier in the thesis I provided my positionality where I explained how I came to conduct this research. Here, I talk about my experiences during and after this research, in a sense looking back into last four years, what I have done and what I have learned. As Denzin explains, "Interpretive research begins and ends with the biography and self of the researcher" (1986, p. 12).

People, especially those outside the academia, have the misconception that by the time you get your PhD, you have mastered your discipline. From their perspective it is understandable, but it is not possible to master the entire field of education in such a short period of time, it might even take a life time, if ever possible. For many of us, it is the expectations of the sponsors, to learn everything in our field and create something that no one has ever thought of before. However, for me, in reality, doing a PhD is nothing more than researching a grain of sand in a beach. It is a small topic in the literature yet heavily and densely researched. Thus, even though creating a document like a PhD thesis is an invaluable experience, yet it is the experience itself that develops us to become better researchers, not the information in the thesis. It is the *process* that triggers the *progress* in us, and by the time we get through it, many of us have squeezed a life time full of experiences into three to four years. I categorise my experiences during this research as: academic and personal since I have experienced, learned and developed skills on both levels.

On the academic level, from the beginning to the end, every stage of this work was a different experience. Perhaps, I saw the most influential effects in the methodological and ethical aspects. Before commencing this study, the only experience I had in research was limited to the coursework and projects. I had had some experience with statistical analysis at the very basic level, and never conducted a qualitative study before. While initially designing this research, my original thoughts were to conduct a quantitative study in order to understand students' intentions and organise the entire study around a positivist framework. My background had its part in this decision, but also, in some countries, including Turkey, quantitative studies are more favourable and considered more 'objective' and 'trustworthy'. With this preconception in mind, my focus was around conducting quantitative research which could eventually help me to improve myself on statistical analysis too. Things had changed over time and I decided to go for a mixed methods study. Frankly, I was not sure if this study was heavier on the quantitative or qualitative side until I went for data collection and started to get initial results. Theoretically I thought I knew them both well, but I realised that I needed the qualitative study, not just as a supplementary data to my survey but as one of the main collection methods.

Ethics wise, as I discussed it in the relevant section, I learned that guidelines might not always fit to the real life situations, and as the researcher, I might face situations where I need to make decisions which does not seem right by the book, yet feel the participants and myself more at ease. Additionally, as it was the case in ethical considerations, I learned that things might not always go as planned, and if I want to conduct research, I should be flexible and ready to adjust new situations while protecting the moral grounds behind my practice.

On the personal level, throughout this journey my time management skills and self-motivation abilities have been tested. I quite often failed to keep track of time and get things done on time, I felt the pangs of my conscience every so often and had episodes of feeling inadequate for a PhD. I also experienced moments exactly opposite when I felt like I could achieve lots of things; things that many people around world could not even dream of. All of these moments helped me to improve myself in allocating time for different requirements of life: PhD, family, personal time, unexpected events, social life, etc. Over time, I learned not to trap myself in the PhD bubble as many others do, and create time for new things, things that make me happy and want to keep going with my research without getting bored.

Having said that, if I were to do this research again, there are certain things I would consider and plan for ahead of time. First of all, I would visit the field before the data collection, and even before organising the entire study in order to avoid unexpected situations while in the field. I would definitely aim for a longer period of time to observe and understand the phenomenon that is being studied. Also, I would try to work more closely with the schools and management teams to work interview scheduling better. Even though I believe I collected enough information from teachers to understand the overall picture, if the interviews had taken in a more comfortable place at a more convenient time for both them and myself, I might have asked more detailed questions and receive more information. I would consider my skills before designing a study which requires deep analysis especially on the statistical side, and take my personal limits, availability of help and time issues into account.

In short, throughout this journey, I have stepped up to become a better researcher, and realised that there is no perfect research but there is always room for improvement for both the research and the researcher. I have also learned to step out of my comfort zone to cope with unexpected situations, or people with unexpected attitudes; to always put myself out there for a new adventure or challenge either academic or personal. Conducting a long research like a PhD should not consume the researcher's life, but the life of the researcher could enhance the research because their reflection is mutual on each other.

References

Aarts, H., Paulussen, T., & Schaalma, H. (1997). Physical exercise habit: On the conceptualization and formation of habitual health behaviours. *Health Education Research, 12*(3), 363-374.

Adler, Patricia A. & Adler, Peter (1994). Observation techniques. In Norman K. Denzin & Yvonna S. Lincoln (Eds.), *Handbook of qualitative research* (pp.377-392). Thousand Oaks, CA: Sage.

Admiraal, W., Lockhorst, D., Smit, B., & Weijers, S. (2013). The Integrative Model of Behavior Prediction to Explain Technology Use in Post-Graduate Teacher Education Programs in the Netherlands. *International Journal of Higher Education*, *2*(4), 172–178.

Agarwal, R., & Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. *Information Systems Research*, *9*(2), 204–215.

Aghaei, S., Nemahbakhsh, M.A. & Farsani, H.K. (2012). Evolution of the World Wide Web: From Web 1.0 to Web 4.0. *International Journal of Web & Semantic Technology*, *3*(1), 1-10. Retrieved from http://www.airccse.org/journal/ijwest/papers/3112ijwest01.pdf

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11- 39). Heidelberg: Springer.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Akbar, F. (2013). What affects students; acceptance and use of technology? (Senior Honour Thesis). Retrieved, August 17, 2016, from http://repository.cmu.edu/cgi/viewcontent.cgi?article=1168&context=hsshonors

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information Technology (IT) in Saudi Arabia: Culture and the Acceptance and Use of IT. *Information & Management, 44*, 681–691.

Alroaia, Y. V., Hemati, M., & Shahabi, A. (2011). Modeling of technology acceptance model based on system dynamics approach. *JM International Journal of IT*, 1(1).

Alvarez, C., Brown, C., & Nussbaum, M. (2011). Comparative study of netbooks and tablet PCs for fostering face-to-face collaborative learning. *Computers in Human Behavior, 27*(2), 834–844.

Alvesson, M., & Kärreman, D. (2007). Constructing Mystery: Emprical Matters in Theory Development. *The Academy of Management Review*, *32*(4), 1265–1281.

Amin, J.N. (2016). Redefining the Role of teachers in the Digital Era. *The International Journal of Indian Psychology*, *3*(3), 40-45.

Andale (2016, February 3). *Convergent Validity: Definition, Examples*. Retrieved from http://www.statisticshowto.com/convergent-validity/

Anderson, J.C. & Gerbing, D.W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin, 103*(3), 411-423. Retrieved from http://www.fdewb.unimaas.nl/meteor/EDEN/Mike Brady/Anderson and Gerbing 1988.pdf

Anderson, R., Anderson, R., Simon, B., Wolfman, S. A., VanDeGrift, T., & Yasuhara, K. (2004). Experiences with a Tablet PC Based Lecture Presentation System in Computer

Science Courses. In *Proceedings of the 35th SIGCSE technical symposium on Computer science education - SIGCSE '04* (p. 56). New York: ACM Press.

Arbaugh, J. B., Godfrey, M. R., Johnson, M., Pollack, B. L., Niendorf, B., & Wresch, W. (2009). Research in online and blended learning in the business disciplines: Key findings and possible future directions. *Internet and Higher Education, 12*(2), 71-87.

Attuquayefio, S. N., & Addo, H. (2014). Using the UTAUT model to Analyse Students' ICT Adoption. *International Journal of Education & Development using Information & Communication Technology, 10*(3), 75-86.

Aypay, A., Celik, H. C., Aypay, A., & Sever, M. (2012). Technology Acceptance in Education: A Study of Pre-Service Teachers in Turkey. *TOJET: The Turkish Online Journal of Educational Technology, 11*(4), 264–272.

Bagozzi, R. P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. *Journal of the Association for Information Systems, 8*(4), 244-254.

Bailey, J. (2008). First steps in qualitative data analysis: Transcribing. *Family Practice, 25*(2), 127-131.

Ball, M.S., Smith, G.W.H. (1992). The Use of Photographs in a Discipline of Words. In M.S.Ball & G.W.H. Smith (Eds.), *Analysing Visual Data* (pp. 6-21). Thousand Oaks, CA: Sage.

Banks, M. (1995). Visual Research Methods. *Social Research Update.* 11. Retrieved from http://sru.soc.surrey.ac.uk/SRU11/SRU11.html.

Banks, M. (2001). *Visual Methods in Social Research*. London: Sage.

Banks, M. (2007). *Using Visual Data in Qualitative Research*. London: Sage.

Bayne, S., Ross, J., Williamson, Z. (2009). Objects, subjects, bits and bytes: learning from the digital collections of the National Museums. *Museum and Society, 7*(2), 110-124.

Becta (2004). *A Review of the Research Literature On Barriers to The Uptake of ICT by Teachers.* Retrieved from Http://Dera.Ioe.Ac.Uk/1603/1/Becta_2004_Barrierstouptake_Litrev.Pdf

Beier, G., Spiekermann, S., Rothensee, M. (2006). Die Akzeptanz zuk nftiger Ubiquitous Computing Anwendungen. In: A. M. Heinecke, H. Paul (Eds.): Mensch & Computer 2006: Mensch und Computer im Struktur-Wandel. Oldenbourg Verlag, M nchen, Germany, pp. 145 - 154. Cited in Röcker, C. (2010). Why Traditional Technology Acceptance Models Won't Work for Future Information Technologies? *World Academy of Science, Engineering and Technology,* 199–205.

Belk, R. W. (1988). Possessions and the extended self. *Consumer Research, 15,* 139–168.

Benabou, R., & Tirole, J. (2003). Intrinsic and Extrinsic Motivation. *Review of Economic Studies, 70*(3), 489–520.

Bennett, S., & Maton, K. (2010). Beyond the "digital natives" debate: Towards a more nuanced understanding of students' technology experiences. *Journal of Computer Assisted Learning, 26*(5), 321-331.

Bennett, S., Maton, K., & Carrington, L. (2011). Understanding the complexity of technology acceptance by higher education students. In T. Teo (Eds.), *Technology Acceptance in Education* (pp. 63-77).

BERA (2011). *Ethical Guidelines for Educational Research*. Retrieved from https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf.

Berkovich, I. (2011). No we won't! Teachers' resistance to educational reform. *Journal of Educational Administration, 49*(5), 563 – 578. Retrieved from http://www.emeraldinsight.com/doi/full/10.1108/09578231111159548

Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science and Technology Education, 5*(3), 235-245.

Birch, A., & Irvine, V. (2009). Preservice teachers' acceptance of ICT integration in the classroom: applying the UTAUT model. *Educational Media International, 46*(4), 295-315.

Blackwell, C. K., Lauricella, A. R., Wartella, E., Robb, M., & Schomburg, R. (2013). Adoption and Use of Technology in Early Education. *Computers & Education, 69*, 310–319.

Blurton, C. (1999). New Directions of ICT-Use in Education. *UNESCO's World Communication and Information Report,* 1-51. Retrieved from http://www.unesco.org/education/educprog/lwf/dl/edict.pdf

Bohn, J. (2014). Turning Resistant Teachers into Resilient Teachers. *Building School Morale, 9*(10). Retrieved from http://www.ascd.org/ascd-express/vol9/910-bohn.aspx

Borg, W.R. & Gall, M.D. (1983). *Educational Research: An Introduction* (4th Ed.). New York, NY: Longman, Inc.

Boulesteix, A.L. & Strimmer, K. (2006). Partial least squares: a versatile tool for the analysis of high dimensional genomic data. *Briefings in Bioinformatics, 18(1),* 32- 44. Retrieved from http://bib.oxfordjournals.org/content/8/1/32.full.pdf+html.

Box, G. E. P. (1979). Robustness in the strategy of scientific model building. In Launer, R. L. & Wilkinson, G. N., *Robustness in Statistics (201-236).* Academic Press.

Boyatzis, R. E. (1998). *Transforming Qualitative Information Thematic Analysis and Code Development*. Thousand Oak, California: Sage.

Boyle, T., & Cook, J. (2004). Discussion Understanding and using technological affordances: A commentary on Conole and Dyke. *Alt-J*, *12*(3), 295–299.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3* (2), 77-101.

Brown, J. D. (1996). *Testing in language programs.* Upper Saddle River, NJ: Prentice Hall Regents.

Brown, J.D. (2000). Statistics Corner: Questions and answers about language testing statistics: What is construct validity? *Shiken: The Japan Association for Language Teaching Testing & Evaluation Special Interest Group Newsletter, 4*(2), 8-12.

Brown, S. A., & Venkatesh, V. (2005). Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle. *MIS Quarterly*, *29*(3), 399–426.

Bryman, A. (2012). *Social Research Methods* (4th. Ed.). Oxford: Oxford University Press.

Bryman, A. (2016). *Social Research Methods* (5th. Ed.). Oxford: Oxford University Press.

Buchanan, D. (2008). Visual Data Analysis. In R. Thorpe, & R. Holt (Eds.), *The SAGE Dictionary of Qualitative Management Research* (pp. 228-230). London: Sage.

Buckingham, D. (2007). *Beyond Technology: Children's Learning in the Age of Digital Media.* Cambridge: Polity Press.

Burden, K. (2012). *iPad Scotland Final Evaluation Report*. Retrieved February 12, 2016, from https://xmascotland.wufoo.eu/forms/scottish-mobile-personal-device-evaluation-2012/.

Burgess, R.G. (1989). The Ethics of Educational Research. In R.G. Burgess (Ed.), *The Ethics of educational Research* (pp. 1-9). London: Falmer Press.

Burnett, C. & Bailey, C. (2014). Conceptualising Collaboration in Hybrid Sites: Playing Minecraft Together and Apart in a Primary Classroom. In C. Burnett, J. Davies, G. Merchant & J. Rowsell, *New Literacies Around the Globe: Policy and Pedagogy,* (pp.50–51), Abingdon: Routledge.

Burnett, C. & Merchant, G. (2014). Points of view: reconceptualising literacies through exploration of adult and child interactions in a virtual world. *Journal of Research in Reading, 37(1),* 36-50. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/jrir.12006/epdf.

Burnett, C. (2015). Being together in classrooms at the interface of the physical and virtual: implications for collaboration in on/off-screen sites. *Learning, Media and Technology,* 1-24.

Buzzelli, C., & Johnston, B. (2001). Authority, power, and morality in classroom discourse. *Teaching and Teacher Education, 17*(8), 873-884.

Byron, T. (2010). *Do we have safer children in a digital world?* Review of progress since the 2008 Bryon Review. Nottingham: DCSF Publications.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait- multimethod matrix. *Psychological Bulletin, 56*(2), 81-105.

Can, G., & Cagiltay, K. (2006). Turkish prospective teachers' perceptions regarding the use of computer games with educational features. *Educational Technology & Society, 9* (1), 308-321.

Caruana, C. (2015, September 16). *Updated - Report says tablets not helping students*. Retrieved July 14, 2016, from http://www.timesofmalta.com/articles/view/20150916/local/updated-report-says-tablets-not-helping-students.584605.

Carr, N., (2010). What the Internet is doing to our brains – the Shallows. *RUSC. Universities and Knowledge Society Journal, 9*(1), 190.

Carver, R.P. (1993). The Case against Statistical Significance Testing, Revisited. *The Journal of Experimental Education*, *61*(4), 287-292. Retrieved from https://www.jstor.org/stable/20152382?seq=1#page_scan_tab_contents

Casas, I., Ochoa, S. F., & Puente, J. (2009). Using Tablet PCs and Pen-Based Technologies to Support Engineering Education. In *HCI International* (pp. 31–38).

Chang, M., & Cheung, W. (2001). Determinants of the intention to use Internet/WWW at work: A confirmatory study. *Information & Management, 39*(1), 1-14.

Chen, Y., Kao, T., & Sheu, J. (2003). A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning, 19*(3), 347-359.

Cheung, W. S., & Hew, K. F. (2009). A review of research methodologies used in studies on mobile handheld devices in K-12 and higher education settings. *Australasian Journal of Educational Technology*, *25*(2), 153–183.

Chiangrai Times (2015, June 30). *Junta's Basic Education Commission wants One Million Tablets Returned from Children*. Retrieved August 2, 2016, from,

http://www.chiangraitimes.com/juntas-basic-education-commission-wants-one-million-tablets-returned-from-children.html.

Chin, W.W. (1998). The partial least squares approach to structural equation modelling. In G.A. Marcoulides (Ed.), *Modern Methods for Business Research* (295-336). Mahwah, NJ: Lawrence Erlbaum.

Chiu, C.M., & Wang, E.T.G. (2008). Understanding web-based learning continuance intention: The role of subjective task value. *Information & Management*, 45, 194-201.

Churchill, D., & Churchill, N. (2008). Educational affordances of PDAs: A study of a teacher's exploration of this technology. *Computers & Education*, *50*(4), 1439–1450.

Churchill, D., Fox, B., & King, M. (2012). Study of Affordances of iPads and Teachers' Private Theories. *International Journal of Information and Education Technology*, *2*(3), 251–254.

Clough, G., Jones, a. C., McAndrew, P., & Scanlon, E. (2008). Informal learning with PDAs and smartphones. *Journal of Computer Assisted Learning*, *24*(5), 359–371.

Clough, P., & Nutbrown, C. (2002). *A Student's Guide to Methodology*. Thousand Oaks, California: Sage.

Cobcroft, R. S., Towers, S., Smith, J. & Bruns, A. (2006) Mobile learning in review: Opportunities and challenges for learners, teachers, and institutions. In *Proceedings Online Learning and Teaching (OLT) Conference 2006,* pp. 21-30, Queensland University of Technology, Brisbane.

Cochrane, T., Narayan, V., & OldField, J. (2013). iPadagogy: appropriating the iPad within pedagogical contexts. *International Journal Mobile Learning and Organisation*, *7*(1), 48–65.

Cohen, J. 1988. *Statistical power analysis for the behavioral sciences*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education*. Canada: Routledge.

Compeau, D. R., & Higgins, C. A. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly*, *19*(2), 189–211.

Conole, G., & Dyke, M. (2004). What are the affordances of information and communication technologies? *Alt-J, Research in Learning Technology*, *12*(2), 113–124.

Cottrell, R. (2007, October 18). The Economist Debate Series: Education. *The Moderator's statement*. Retrieved February 9, 2014, from http://www.economist.com/node/10003313.

Couros, G. [gcouros] (2014, September 11). Technology will never replace great teachers, but technology in the hands of a great teacher can be transformational [Tweet]. Retrieved June 24, 2015, from https://twitter.com/gcouros/status/510094558320152576.

Cox, M., Preston, C., & Cox, K. (1999). What Factors Support or Prevent Teachers from Using ICT in their Classrooms? *British Educational Research Association,* (1997), 1-23.

Crescente, M.L., & Lee, D. (2011). Critical issues of M-Learning: design models, adoption processes, and future trends. *Journal of the Chinese Institute of Industrial Engineers 28* (2), 111–123.

Creswell, J. W. (2013). Steps in Conducting a Scholarly Mixed Methods Study. *DBER Speaker Series*. Paper 48. Retrieved from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1047&context=dberspeakers

Creswell, J. W. (2014). *Research Design Qualitative, Quantitative, and Mixed Methods Approaches* (4th Ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). Designing and conducting mixed methods research. (2nd Ed.). Thousand Oaks, CA: Sage.

Crompton, H. (2013). A historical overview of m-learning: Toward learner-centred education. *Handbook of mobile learning*, (January), 3-14.

Crook, C. (2012). The "digital native" in context: tensions associated with importing Web 2.0 practices into school contexts. *Oxford Review of Education, 38*(1),63-80.

Crossman, A. (2014, December 16). *Types of Scales: Types of Scales Used in Social Science Research and How to Construct Them*. Retrieved from http://sociology.about.com/od/Research-Tools/la/Scales.htm

Crow, G., Wiles, R., Heath, S., & Charles, V. (2006). Research ethics and data quality: The implications of informed consent. *International Journal of Social Research Methodology*, 9, 83–95.

Dahlstrom, E., Boor, T., Grunwald, P., & Vockley, M. (2011). National study of undergraduate students and information technology. *Educause Centre for Applied Research*, *October*, 35. Retrieved from http://www.educause.edu/Resources/ECARNationalStudyofUndergradua/238012

Das, G. (2015, April 22). *Regression Analysis: How Do I Interpret R-squared and assess the Goodness of Fit?* Retrieved September 20, 2016, from https://www.linkedin.com/pulse/regression-analysis-how-do-i-interpret-r-squared-assess-gaurhari-dass.

Davies, J. & Merchant, G. (2009) *Web 2.0 for Schools: Learning and Social Participation*. New York: Peter Lang.

Davies, J. & Merchant, G. (2009). *Web 2.0 for Schools: Learning and Social Participation.* New York: Peter Lang.

Davies, J. (2008). Talking 'bout a (digital) Revolution: New Literacies, New Practices for New Times. *Journal of Education and Development in the Caribbean, 10*(1), 33-56.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319–340.

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int. J. Man-Machine Studies*, (38), 475–487.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science, 35*(8), 982–1003.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology, 22*(14), 1111–1132.

Davis, J.B. (n.d.). *Social Cognitive Theory*. Retrieved July 18, 2014, from http://gavsappsychpersonalityjbd.weebly.com/social-cognitive-theory-and-its-criticisms.html.

Dawson, J. F. (in press). *Analysing Quantitative Survey Data for Business & Management Students*. London: Sage.

Deci, E. L. (1972). Intrinsic Motivation, Extrinsic Reinforcement, and Inequity. *Journal of Personality and Social Psychology, 22*(1), 113–120.

Denscombe, M. (2007). *The good research guide for small-scale research projects*. Berkshire: OUP.

Denzin, N. K. (1986). Interpretive Biography. Newbury park, CA: Sage.

Denzin, N. K. (1989). *The Research Act* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.

DeVellis, R. F. (2003). *Scale development: theory and applications*. Thousand Oaks, CA: Sage Publications.

Dhir, A., Gahwaji, N. M., & Nyman, G. (2013). The Role of the iPad in the Hands of the Learner. *Journal of Universal Computer Science, 19*(5), 707-727.

Diemer, T. T., Fernandez, E., & Streepey, J. W. (2012). Student Perceptions of Classroom Engagement and Learning using iPads. *Journal of Teaching and Learning with Technology, 1*(2), 13-25.

Dillon, A. (1992). Reading from paper versus screens: a critical review of the empirical literature. *Ergonomics, 35*(10), 1297-1326. Retrieved from https://www.ischool.utexas.edu/~adillon/Journals/Reading.htm.

Dilorio C.K. (2005). *Measurement in health behavior*. San Francisco: Jossey-Bass.

Dirks K.T., Cummings L.L. & Pierce J.L. (1996). Psychological Ownership in Organizations: Conditions Under Which Individuals Promote and Resist Change. In: Woodman RW, Pasmore W.A. (Eds), *Research in organizational change and development.* Greenwich, CT: JAI Press.

Dittmar, H. (1992). *The social psychology of material possessions: To have is to be*. New York: St. Martin's Press.

Donath, J. & Boyd, D. (2004). Public Displays of Connection. *BT Technology Journal*, 22(4), 71-82.

Downes, T. & Zammit, K. (2000). New literacies for connected learning in global classrooms: A Framework for the Future. In P. Hogenbrik & H. Taylor (Eds.), *The Bookmark of the School of the Future* (pp.113-128), Boston, MA: Kluwer Academic Publishers.

Duke, D. (2004). *The challenges of educational change*. Boston: Pearson Education.

E. A. Walters, (2011). *Will the iPad revolutionize education?* Retrieved September 5, 2011 from http://www.iste.org/Libraries/Leading_and_Learning_Docs/May-201 1-Point-Counterpoint.sflb.ashx

Edmunds, R., Thorpe, M., Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A Technology Acceptance model approach. *British Journal of Educational Technology*, *43*(1), 71-84. Retrieved from http://oro.open.ac.uk/26467/2/EdmundsThorpeConole_TAMICT_perceptions.pdf

Education.gov.mt (2014, March 25). *Tablets Pilot Project launched*. Retrieved July 14, 2016, from http://education.gov.mt/en/resources/News/Pages/News%20items/Tablets-Pilot-Project-launched.aspx.

El-Gayar, O., Moran, M., & Hawkes, M. (2011). Students' Acceptance of Tablet PCs and Implications for Educational Institutions. *Educational Technology & Society*, *14*(2), 58–70.

Elias, T. (2011). Universal Instructional Design Principles for Mobile Learning. *International Review of Research in Open and Distance Learning 12* (2), 143–156.

Elmore, R. (1995). Getting to Scale with Good Educational Practice. *Harvard Educational Review*, 66(1), 1-26.

Ely, D. P. (1990). Conditions that facilitate the implementation of educational technology innovations. *Journal of Research on Computing in Education, 23*(2), 298-305.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development,53*(4), 25-39.

Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors That Influence the Perceived Advantages and Relevance of Facebook as a Learning Tool: An Extension of the UTAUT. *Australasian Journal of Educational Technology, 30*(2), 136-151.

European Parliament (2015). *Innovative Schools: teaching and Learning in the Digital Age*. Workshop Documentation. Retrieved September 9, 2016, from http://www.europarl.europa.eu/RegData/etudes/STUD/2015/563389/IPOL_STU(2015)563389_EN.pdf

Evans, A. N., & Rooney, B.J. (2013). *Methods in Psychological Research* (3rd ed.). Thousand Oak, California: Sage.

Falk, R.F. & Miller, N.B. (1992). *A Primer for Soft Modelling*. Akron, OH: University of Akron Press.

Falloon, G. (2014). iPads in the Primary School: Emerging Research. Presented at the ACEC 2014, Adelaide.

Fichman, R. G. (1992). Information Technology Diffusion: A Review of Empirical Research. In *Proceedings of the Thirteenth International Conference on Information Systems*.

Field, A. (2009). *Discovering Statistics using SPSS*. London: Sage.

Finsness, L. S. (2008). *The implication of Internet content filters in secondary schools*. ProQuest Dissertations and Theses. University of Minnesota. Retrieved from http://search.proquest.com/docview/194016366?accountid=14744\nhttp://fama.us.es/search*spi/i?SEARCH=\nhttp://pibserver.us.es/gtb/usuario_acceso.php?centro=$USEG&centro=%24USEG&d=1

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research (JMR), 18*(1), 39-50.

Forrest, M., & Andersen, B. (1986). Ordinal scale and statistics in medical research. *British medical journal (Clinical research ed.), 292(6519),* 537-538. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3081161

Forte, M.C. (2002). Is it Real? Problems and Prospects of Research in "the Real World" Review Essay, Colin Robson. Real World Research. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, 3*(4), Art 47, Retrieved from http://nbn-resolving.de/urn:nbn:de:0114-fqs0204471.

French, J. R. P. & Raven, B. (1959). The Bases of Social Power, in *Studies in Social Power,* D. Cardwright (ed.), Institute for Social Research, Ann Arbor, MI, 150-167.

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education, 50*(3), 906-914.

Froese, A. D., Carpenter, C. N., Inman, D. A., Schooley, J. R., Barnes, R. B., Brecht, P. W., & Chacon, J. D. (2012). Effects of Classroom Cell Phone Use on Expected and Actual Learning. *College Student Journal, 46* (2), 323-332.

Fulbright (n.d.). *Turkish Education System*. Retrieved August 28, 2016, from http://fulbright.org.tr/en/about-turkey/turkish-education-system/

Fullan, M. (1991). *The New Meaning of Educational Change*. New York, NY: Teachers College Press.

Fullan, M. (2001). Leading in A Culture of Change. San Francisco: Jossey-Bass.

Furió, D., Juan, M.-C., Seguí, I., & Vivó, R. (2015). Mobile learning vs. traditional classroom lessons: a comparative study. *Journal of Computer Assisted Learning, 31*(3), 189-201.

Gall, M., Borg, W., Gall, J. (2007). *Educational Research: An Introduction* (7th Ed.). Longman Publishing.

Gartner (2015, January 5). *Gartner Says Tablet Sales Continue to Be Slow in 2015*. Retrieved July 13, 2016, from http://www.gartner.com/newsroom/id/2954317.

Gaver, William. (1991). Technology affordances. *Proceedings of the SIGCHI conference on Human factors in computing systems Reaching through technology - CHI '91, 1991*(January), 79-84.

Gee, J.P. (2004). *Situated Language and Learning: A critique of traditional schooling*. New York: Routledge.

Georgiev, T., Georgieva, E., & Smrikarov, A. (2004). M-Learning - a New Stage of - Learning. *International Conference on Computer Systems and Technologies-CompSysTech* (pp.1-5).

Gerstein, J. (2013, March 22). User generated Education [Blog post]. Retrieved July 17, 2016, from https://usergeneratededucation.wordpress.com/2013/03/22/schools-are-doing-education-1-0-talking-about-doing-education-2-0-when-they-should-be-planning-education-3-0/.

Ghalandari, K. (2012). The Effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on Acceptance of E-Banking Services in Iran: The Moderating Role of Age and Gender. *Middle-East Journal of Scientific Research 12* (6), 801-807.

Gibilisco, S. (2014, July). Statistical Analysis. Retrieved August 31, 2016, from http://whatis.techtarget.com/definition/statistical-analysis.

Gibson, J. (1977), The Theory of Affordances. In R. Shaw & J.Bransford (Eds.), *Perceiving, Acting, and Knowing: Toward an ecological Psychology* (pp. 67-82). Hillsdale, NJ: Erlbaum.

Gibson, J.J. (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Glanz, K., Rimer, B.K. & Lewis, F.M. (2002). *Health Behavior and Health Education. Theory, Research and Practice.*San Fransisco: Wiley & Sons.

Gliksman, S. (2014, November 6). *The LAUSD iPad Initiative: 5 Critical Technology Integration Lessons.* Retrieved July 15, 2016 from http://www.edutopia.org/blog/lausd-ipad-technology-integration-lessons-sam-gliksman.

globalEdge (n.d.). *Introduction: Turkey*. Retrieved August 28, 2016, from http://globaledge.msu.edu/countries/turkey

Göğüş, A., Nistor, N., & Lerche, T. (2012). Educational Technology Acceptance Across Cultures: A Validation of the Unified Theory of Acceptance and Use of Technology in the Context of Turkish National Culture. *TOJET: The Turkish Online Journal of Educational Technology, 11*(4), 394–408.

Goldstein, B.M. (2007). All Photos Lie. In Gregory Stanczak (Ed.) *Visual Research Methods: Image, Society and Representation*. Thousand Oaks, CA: Sage.

Goundar, S. (2011). What is the Potential Impact of Using Mobile Devices in Education? *SIG GlobDev*, *4*(December), 1-30.

Granberg, E., & Witte, J. (2005). Teaching with laptops for the first time: Lessons from a social science classroom. *New Directions for Teaching and Learning*, (101), 51-59.

Gray, L. 2011. Small size, big potential: Mobile learning devices in school. *CoSN Compendium, 9*(3).

Greene, J. C., & Caracelli, V. J. (1997). Defining and Describing the Paradigm Issue in Mixed-Method Evaluation. In J. C. Greene & V. J. Caracelli (Eds.), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms* (pp. 5-17). (New Directions for Evaluation, No. 74). San Francisco: Jossey-Bass.

Griffiths, M.D. & Davies, M.N.O. (2002). Excessive Online Computer Gaming: Implicationg for Education. *Journal of Computer Assisted Learning*, 18, 379-381.

Griffiths, M.D. (1995). Technological addictions. *Clinical Psychology Forum, 76,* 14-19.

Groves, M. M., & Zemel, P. C. (2000). Instructional technology adoption in higher education: An action research case study. *International Journal of Instructional Media*, *27*(1), 57–65.

GSMA, & Orange. (2012). *Introducing "Always Connected" Tablets into French Schools,* Project (pp. 1–3). Retrieved December 7, 2013, from http://www.gsma.com/connectedliving/wpcontent/uploads/2012/10/mEducation_orange_09_121.pdf

Guba, E. G., Lincoln, Y. S. (1994). Competing Paradigms in Qualitative Research. In N. K. Denzin & Y. S. Lincoln (Eds), *Handbook of Qualitative Research* (pp. 105 – 117). Thousand Oaks, CA: Sage.

Guba, E.G. & Lincoln, Y.S. (2005). Paradigmatic controversies, contradictions, and emerging confluences. In N.K Denzin & Y.S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (3rd ed., pp 191-215). Thousand oaks, CA: Sage.

Gubacs-Collins, K., & Juniu, S. (2009). The Mobile Gymnasium: Using Tablet PCs in Physical Education. *Journal of Physical Education, Recreation & Dance*, *80*(2), 24–31.

Guerrero, L. a., Ochoa, S. F., Pino, J. a., & Collazos, C. a. (2006). Selecting Computing Devices to Support Mobile Collaboration. *Group Decision and Negotiation, 15*(3), 243–271.

Guest, G., MacQueen, K. M., & Namey, E. E. (2012). Introduction to applied thematic analysis. In *Applied thematic analysis*. (pp. 3-21). Thousand Oaks, CA: Sage.

Gupta, B., Dasgupta, S., & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. *Journal of Strategic Information and Information Systems, 17*, 140-154.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Englewood Cliffs: Prentice Hall.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2006). *Multivariate data analysis* (6th ed.). New Jersey: Pearson Educational International.

Hall, A. S., & Parsons, J. (2001). Internet Addiction: College Student Case Study Using Best Practices in Cognitive Behavior Therapy. *Journal of Mental Health Counseling, 23*(4), 312-327.

Halpern, S. (2010). *The iPad revolution*. Retrieved March 24, 2015, from http://courses.washington.edu/com201/COM%20201%20readings/Halpern-The%20iPad%20revolution.pdf

Hammond, M. (2009). What is an affordance and can it help us understand the use of ICT in education? *Education and Information Technologies, 15*(3), 205–217.

Hammond, M. (2010) What is an affordance and can it help us understand the use of ICT in education? *Education and Information Technologies, 15*(3), 205-217.

Hammond, M. (2011). Beliefs and ICT: what can we learn from experienced educators? *Technology, Pedagogy and Education, 20*(3) 289 – 300.

Hammond, M. (2013). *Researching Teacher Take-up of ICT: Past Perspectives and Present Day Challenges.* Paper presented at X World Conference on Computers in Education July 2-5, 2013; Toruń, Poland.

Hammond, M. (2013). Introducing ICT in schools in England: Rationale and consequences. *British Journal of Educational Technology*, *45*(2), 191-201.

Hammond, M., & Wellington, J. (2013). *Research methods: The Key Concepts*. Routledge.

Hartwick, J., & Barki, H. (1994). Explaining the Role of User Participation in Information System Use. *Management Science*, *40*(4), 440–465.

Haßler, B., Major, L., & Hennessy, S. (2015). Tablet use in schools: A critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning*, *32*(2), 139-156.

Hatch, J. A. (2002). *Doing qualitative research in education settings.* New York: State University of New York.

Haymes, T. (2008). The Three E-Strategy for Overcoming Resistance to Technological Change. *Educause Quarterly*, (4), 67-69.

Heinrich, P. (2012). The iPad as a Tool for Education: A Study of the Introduction of iPads at Longfield Academy, Kent. *Nottingham: NAACE*: The ICT Association.

Hennink, M., Hutter, I. & Bailey, A. (2011). Qualitative Research Methods. London: Sage.

Henny, L. (1986). Trend Report: Theory and Practice of Visual Sociology. In J. Hughes (Ed.), *SAGE Visual Methods* (pp. 1-65). London: Sage.

Henseler, J., Hubona, G. & Ray, P.A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems, 116(1)*, 2 – 20. Retrieved from http://dx.doi.org/10.1108/IMDS-09-2015-0382.

Hess, T. J., Joshi, K., & McNab, A. L. (2010). An Alternative Lens for Understanding Technology Acceptance: An Equity Comparison Perspective. *Journal of Organizational Computing and Electronic Commerce, 20*(2), 123–154.

Hjelle, P. F. (2001). *Reading Between the Lines: Teacher resistance to Change* (Doctoral thesis, The University of Pennsylvania, Philadelphia, PA).

Hockly, N. (2013). *Designer learning: The teacher as designer of mobile-based classroom learning experiences.* Monterey, CA: The International Research Foundation for English Language Education. Retrieved from http://www.tirfonline.org/english-in-the-workforce/mobile-assisted-language- learning/

Howe, K. R. (1992). Getting over the Quantitative-Qualitative Debate. *American Journal of Education, 100*(2), 236.

Hoyle. H. R, Harris J. M., & Judd M.C. (2002). *Research Methods in Social Relations*. USA: Wadsworth.

Hu, P. J., Chau, P. Y. K., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the Technology

Acceptance Model Using Physician Acceptance of Telemedicine Technology. *Journal of Management Information Systems*, *16*(2), 91–112.

Hu, P. J.H., Clark, T. H. K., & Ma, W. W. (2003). Examining Technology Acceptance by School Teachers: A Longitudinal Study. *Information & Management*, *41*(2), 227–241.

Huang, C. & Kao, Y. (2015). UTAUT2 Based Predictions of Factors Influencing the Technology Acceptance of Phablets by DNP. *Mathematical Problems in Engineering 2015* (2015), Article ID 603747.

Hypothesis and Hypothesis Testing (2016). International Encyclopedia of the Social Sciences. Retrieved November 28, 2016 from Encyclopedia.com: http://www.encyclopedia.com/social-sciences/applied-and-social-sciences-magazines/hypothesis-and-hypothesis-testing

Ifenthaler, D., & Schweinbenz, V. (2013). The Acceptance of Tablet-PCs in Classroom Instruction: The Teachers' Perspectives. *Computers in Human Behavior*, *29*(3), 525–534.

Igbaria, M., & Iivari, J. (1995). The Effects of Self-efficacy on Computer Usage. *OMEGA - The International Journal of Management Science*, *23*(6), 587–605.

Internet Society (2012). *Children and the Internet*. Retrieved February 6, 2014, from http://www.internetsociety.org/children-and-internet

Iyer, R. & Luke, C. (2010). Multimodal, multiliteracies: Texts and literacies for the 21st Century. In Pullen, D.L., & Cole, D. (Eds.), *Multiliteracies and technology enhanced education: Social practice and the global classroom* (pp.18-34). Hershey, PA: IGI Global.

Jackson, E. (2013). Choosing a Methodology: Philosophical Underpinning. *Practitioner Research in Higher Education*, *7*(October), 49–62.

Jairak, K., Praneetpolgrang, P., & Mekhabunchakij, K. (2009). An Acceptance of Mobile Learning for Higher Education Students in Thailand. *Special Issue of the International Journal of the Computer, the Internet and Management, 17*(SP3), 36.1–36.8.

James W. (1980). *The principles of psychology*. New York: Holt. Cited in Pare`, G., Sicotte, C. & Jacques, H. (2006). The Effects of Creating Psychological Ownership on Physicians' Acceptance of Clinical Information Systems. *Journal of American Medical Informatics Association, 13(2), 197-205.*

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical Education, 38*, 1212–1218. Retrieved from http://medicina.udd.cl/ode/files/2010/07/jamieson_ME_2486.pdf.

Jan, A. U., & Contreras, V. (2011). Technology acceptance model for the use of information technology in universities. *Computers in Human Behavior*, 27(2), 845–851.

Jeng, Y.-lin, Wu, T.-ting, Huang, Y.-min, Tan, Q., & Yang, S. J. H. (2010). The Add-on Impact of Mobile Applications in Learning Strategies: A Review *Study*. *Educational Technology & Society, 13*(3), 3-11.

Jenkins, H., & Squires, K. (2003). Harnessing the power of games in education. *Insight, 3*.

Jewitt, C. (2006). *Technology, Literacy and Learning: A multimodal approach*. New York, NY: Routledge.

JISC (2015). Mobile Learning: A practical guide for educational organisation planning to implement a mobile learning initiative. Retrieved July 21, 2016, from https://www.jisc.ac.uk/full-guide/mobile-learning.

Johns, G. (2006). The Essential Impact of Context On Organizational Behavior. *The Academy of Management Review, 31*(2), 386–408.

Johnson, B. & McElroy, T. M. (n.d.). *The Changing Role of the Teacher in the 21st century.* Retrieved September 9, 2016, from http://suny-shanghai-wiki.wikispaces.com/file/view/606Day2eChangingRoleArticle.pdf

Johnson, L., Smith, R., Willis, H., Levine, A., and Haywood, K., (2011). *The 2011 Horizon Report*. Austin, Texas: The New Media Consortium.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher, 33*(7), 14-26.

Jolliffe, I.T. (1986). *Principal Component Analysis*. Springer, New York.

Jones, J. W. (1989). Personality and epistemology: Cognitive social learning theory as a philosophy of science. *Zygon, 24*(1), 23-38.

Kaiser, H.F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*(1), 141-151.

Kam, M., Wang, J., Iles, A., Tse, E., Chiu, J., Glaser, D., … Hall, S. (2005). Livenotes: A System for Cooperative and Augmented Note-Taking in Lectures. In *Conference on Human Factors in Computing Systems*.

Kandell, J. J. (1998). Internet Addiction on Campus: The Vulnerability of College Students. *CyberPsychology & Behavior, 1* (1), 11-17. Retrieved from http://online.liebertpub.com/doi/abs/10.1089/cpb.1998.1.11

Karimi, L., & Meyer, D. (2014). Structural Equation Modeling in Psychology: The History, Development and Current Challenges. *International Journal of Psychological Studies, 6(4),* 123-133.

Kawulich, B. B. (2005). Participant Observation as a Data Collection Method. *Forum: Qualitative Social Research, 6*(2), Art 43.

Kay, A. C., & Goldberg, A. (2001). Personal dynamic media. In R. Packer & J. Jordan (Eds.), *Multimedia: From Wagner to virtual reality* (pp. 167–178). London: W. W. Norton & Company. (Original work published 1977).

Kay, R. (2012). Exploring the Benefits and Challenges of Using Laptops in Higher Education Classrooms. *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2012* (pp. 630-635). Association for the Advancement of Computing in Education (AACE).

Kay, R. H., & Lauricella, S. (2011). Unstructured vs. Structured Use of Laptops in Higher Education. *Journal of Information Technology Education, 10*, IIP33-IIP42.

Kim, K.-J., & Frick, T. W. (2011). Changes in Student Motivation during Online Learning. *Journal of Educational Computing Research, 44*(1), 1-23.

Kim, S. S., Malhotra, N. K., & Narasimhan, S. (2005). Two Competing Perspectives on Automatic Use: A Theoretical and Empirical Comparison. *Information Systems Research 16*(4), 418-432.

Kirschner P. A. (2002). Can we support CCSL? Educational, social and technological affordances for learning. In: *Three worlds of CSCL: Can we support CSCL?* (pp. 7-34). The Open Universiteit Nederland.

Kline R.B. (2004). *Beyond Significance Testing: Reforming Data Analysis Methods in Behavioral Research*. Washington DC: American Psychological Association.

Kline RB. (2004). *Beyond Significance Testing: Reforming Data Analysis Methods in Behavioral Research*. Washington DC: American Psychological Association.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental Detectives: PDAs as a window into a virtual simulated world. *Proceedings - IEEE International Workshop on Wireless and Mobile Technologies in Education, WMTE 2002* (pp. 95-98).

Koh, E., Kin. Y. G., Wadhwa, B., & Lim, J. (2011). Teacher perceptions of games in Singapore schools. *Simulation & Gaming, 42*(4), 1-16.

Kress, G. & van Leeuwen, T. (2001). *Multimodal Discourse: The modes and Media of Contemporary Communication*. London: Edward Arnold.

Kress, G. (2009). What is mode? In Jewitt, C., *The Routledge Handbook of Multimodal Analysis*. London: Routledge, 54-67.

Kress, G. (2010) Multimodality: A Social Semiotic Approach to Contemporary Communication, London: Routledge.

Krueger, R.A. (1988). *Focus Groups: A Practical Guide for Applied Research*. Newbury Park: California: Sage.

Krueger, R.A., & Casey, M.A. (2000) *Focus Groups: A Practical Guide for Applied Research* (3rd ed.). Thousand Oaks, CA: Sage

Kukulska-Hulme, A. (2009). Will mobile learning change language learning? *ReCALL, 21*(2), 157–165.

Kura, S.Y.B. (2012). Qualitative and Quantitative Approaches to the Study of Poverty: Taming the Tensions and Appreciating the Complementarities. *The Qualitative Report, 17*, Article 34, 1-19.

Kuznekoff, J. H., Munz, S., & Titsworth, S. (2015). Mobile Phones in the Classroom: Examining the Effects of Texting, Twitter, and Message Content on Student Learning. *Communication Education, 4523*(December), p. 1-22.

Lance, J. & Kitchin, P. (2007). Promoting the Individual Learning Styles of Masters StudentsStudying Marketing-related Modules through the Use of YouTube VideoClips. *Investigations in university teaching and learning*, *4*(2), 111-125.

Lankshear, C. & Knobel, M. (2007). Sampling "the New" in New Literacies. In M. Knobel & C.Lankshear (Eds.), *A New Literacies Sampler* (1-24). NY, New York: Peter Lang.

Lankshear, C. & Knobel, M. (2010). *New Literacies: everyday practices and social learning* (3rd ed.) Maidenhead: Open University Press.

Lapowsky, I. (2015, August 5). What schools must learn from LA's IPad Debacle [Blog post]. Retrieved June 5, 2016, from http://radar.oreilly.com/2007/10/todays-web-30-nonsense-blogsto.html.

Latent variable. (n.d.). In *Wikipedia*. Retrieved April 28, 2016, from https://en.wikipedia.org/wiki/Latent_variable.

Law, J. (2004). *After method: Mess in social science research*. London: Routledge.

Leadbeater, C. (2008). *We think: Mass innovation, not mass production.* London, UK: Profile.

Leander, K. (2009). Composing with Old and New Media: Toward a Parallel Pedagogy, In Carrington, V. & Robinson, M. (Eds), *Digital Literacies: Social Learning and Classroom Practices* (pp. 147-65). London: Sage.

Lee, D. Y. (2000). Retail bargaining behaviour of American and Chinese customer. *European Journal of Marketing, 34(1/2)*, 190-206. Retrieved from http://www.emeraldinsight.com/doi/pdfplus/10.1108/03090560010306287

Lee, J. J. & Hammer, J. (2011). Gamification in Education: What, How, Why Bother? *Academic Exchange Quarterly, 15*(2).

Lehmann E.L. (1992). Introduction to Neyman and Pearson (1933) On the Problem of the Most Efficient Tests of Statistical Hypotheses. In Kotz, S., Johnson, N.L. (Eds.), *Breakthroughs in Statistics, Volume 1*. Springer-Verlag.

Levin, D., & Arafeh, S. (2002). *The Digital Disconnect, Pew Internet and American Life Project*. Washington, DC.

Lezin, N. (n.d.). Theories & Approaches: Theory of Reasoned Action. Retrieved February 21, 2014, from http://recapp.etr.org/recapp/index.cfm?fuseaction=pages.TheoriesDetail&PageID=517.

Li, L. (2010). *A critical review of technology acceptance literature. Southwest Decision Sciences Institute, 22.*

Liaw, S.-S., Hatala, M., & Huang, H.-M. (2010). Investigating acceptance toward mobile learning to assist individual knowledge management: Based on activity theory approach. *Computers & Education*, *54*(2), 446–454.

Limayem, M. & Hirt, S.G. (2000). Internet-Based Teaching: How to Encourage University Students to Adopt Advanced Internet-Based Technologies? *Proceedings of the 33rd Hawaii International Conference on System Science, Maui,* 1-9.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How Habit Limits the Predictive Power Intention: The Case of Information Systems Continuance. *MIS Quarterly*, *31*(4), 705–737.

Lin, S., Zimmer, J. C., & Lee, V. (2013). Podcasting Acceptance on Campus: The Differing Perspectives of Teachers and Students. *Computers & Education*, *68*, 416–428.

Livingston, A.K. (2009, March 26). The Revolution No One Noticed: Mobile Phones and Multimobile Services in Higher Education. *EDUCAUSEreview*. Retrieved May 25, 2016, from http://er.educause.edu/articles/2009/3/the-revolution-no-one-noticed-mobile-phones-and-multimobile-services-in-higher-education.

Livingstone, S & Haddon, L. (2009). EU Kids Online: Final Report. LSE, London. Retrieved from http://www.lse.ac.uk/media@lse/research/EUKidsOnline/EU%20Kids%20I%20(2006-9)/EU%20Kids%20Online%20I%20Reports/EUKidsOnlineFinalReport.pdf.

Livingstone, S. (2003). *The Changing Nature and Uses of Media Literacy*. Working paper. Retrieved November 13, 2014, from http://eprints.lse.ac.uk/13476/.

Livingstone, S. (2014, September 12). *Digital Media and Children's Rights*. Retrieved August 29, 2016, from http://blogs.lse.ac.uk/mediapolicyproject/2014/09/12/sonia-livingstone-digital-media-and-childrens-rights/.

Livingstone, S. (2016, May 18). Beyond digital immigrants? Rethinking the role of parents in a digital age [Blog post]. Retrieved August 18, 2016, from http://blogs.lse.ac.uk/parenting4digitalfuture/2016/05/18/beyond-digital-immigrants-rethinking-the-role-of-parents-in-a-digital-age/.

Loehlin, J. C. (2004). *Latent variable models: An introduction to factor, path, and structural equation analysis (4th ed.)*. Mahwah, NJ: Lawrence Erlbaum.

Lofland, J. & Lofland, L.H. (1984). *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Belmont, CA: Wadsworth Publishing Company. Cited in Peek, L., & Fothergill, A. (2009). Using Focus Groups: Lessons from Studying Daycare

Centers, 9/11, and Hurricane Katrina. *Qualitative Research*, *9*(1), 31–59.

Looi, C.-K., & Chen, W. (2010). Community-based individual knowledge construction in the classroom: a process-oriented account. *Journal of Computer Assisted Learning*, *26*(3), 202–213.

Lord, F. M. (1953). On the Statistical Treatment of Football Numbers. *American Psychologist, 8*(12),750-751.

Lorenzi N.M. & Riley R.T. (2000). Managing Change: An Overview. *Journal of American Medical Informatics Association, 7, 116–24*.

Luanrattana, R., Win, K. T., & Fulcher, J. (2007). Use of Personal Digital Assistants (PDAs) in Medical Education. *Twentieth IEEE International Symposium on Computer-Based Medical Systems (CBMS'07)* (pp. 307-12). IEEE. Retrieved from http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=4262667.

Lucas, S. B. (2005). *Who am I? The Influence of Teacher Beliefs on the Incorporation of Instructional Technology by Higher Education Faculty* (Doctoral Thesis, The University of Alabama, Tuscaloosa, Alabama). Retrieved January 27, 2014, from http://susanlucas.com/dissertation.pdf.

Luke, C. (2003). Pedagogy, connectivity, multimodality, and interdisciplinarity. *Reading Research Quarterly, 38*(3), 397-403.

Lyytinen, K., & Damsgaard, J. (2001). What' s Wrong with the diffusion of innovation theory? The case of a complex and networked technology. *Reports Aalborg University Department of Computer Science R985010*, 187, 1-20.

Magid, L. (2015, June 26). Let's not use 21st century technology with 19th century pedagogy [Blog post]. Retrieved June 21, 2016, from http://www.connectsafely.org/lets-not-use-21st-century-technology-with-19th-century-pedagogy/.

Maldonado, U.P.T., Khan, G.F., Moon, J., Rho, J. J. (2010). E-learning motivation and educational portal acceptance in developing countries. *Online Information Review, 35*(1), 66-85.

Marcinkiewicz, H. R. (1993). Computers and teachers: factors influencing computer use in the classroom. *Journal of research in Computing in Education, 26*, 220-237

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education,56*(2), 429-440.

Marques, B. P., Villate, J. E., & Carvalho, C. V. (2011). Applying the UTAUT model in Engineering Higher Education: Teacher's Technology Adoption. In *Information Systems and Technologies* (pp. 1–6).

Marsh, J. & Millard, E. (2000). *Literacy and Popular Culture: Using Children's Culture in the Classroom*. London: Paul Chapman.

Masa'deh, R., Tarhini, A., Mohammed, A. B., & Maqableh, M. (2016). Modeling Factors Affecting Student's Usage Behaviour of E-Learning Systems in Lebanon. *International Journal of Business and Management, 11*(2), 299-312.

McCambridge (n.d.). Drill and Practice. Retrieved 16 July, 2016, from http://public.callutheran.edu/~mccamb/drillpractice.htm.

McDonald, K. K. & Hannafin, R. D. (2003). Using web-based computer games to meet the demands of today's high-stakes testing: A mixed method inquiry. *Journal of Technology in Teacher Education, 35*(4) 459 - 472.

McFarlane, A., Triggs, P. and Yee, W. 2008. Researching mobile learning: Interim report to BECTA. Retrieved from http://www.cblt.soton.ac.uk/multimedia/PDFsMM09/mobile_learning%20research%20findings%20Becta.pdf.

McGrenere, J. & Ho, W. (2000). Affordances: Clarifying and Evolving a Concept. In: Proceedings of Graphics Interface 2000, Montreal, Quebec, Canada.

Medlin, B. D. (2001). *The factors that may influence a faculty member's Decision to adopt electronic technologies in Instruction. Thesis.* Retrieved July 23, 2016, from https://theses.lib.vt.edu/theses/available/etd-09282001-155044/unrestricted/NewCOMPLETE2.pdf

Merchant, G. (2012). Mobile practices in everyday life: Popular digital technologies and schooling revisited. *British Journal of Educational Technology, 43*(5), 770-782.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative Research: A Guide to Design and Implementation* (4th Ed.). San Francisco, CA: Jossey-Bass.

Miller, C., & Doering, A. (Eds.). (2014). *The new landscape of mobile learning: Redesigning education in an app-based world* (1st ed.). New York: Routledge.

Miltgen, C. L., Popovič, A., & Oliveira, T. (2013). Determinants of end-user acceptance of biometrics: Integrating the "Big 3" of technology acceptance with privacy context. *Decision Support Systems*, 56, 103–114.

Mirzajani, H., Mahmud, R., Fauzi Mohd Ayub, A., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education, 24*(1), 26-40.

Moeller, S., Powers, E., & Roberts, J. (2012). «The World Unplugged» and «24 Hours without Media»: Media Literacy to Develop Self-Awareness Regarding Media. *Scientific Journal of Media Education, 20(39), 45-52.*

Moore, D.M., Hunt, T.C. (1980). The Nature of Resistance to the Use of Instructional Media. *British Journal of Educational Technology. 11*(2), 141-147.

Morgan, D. (1997). Focus Groups as Qualitative Research (2nd Edition). Thousand Oaks, CA: Sage.

Murdock, E.E. (n.d.). *History, the History of Computers, and the History of Computers in Education*. Retrieved 12 July, 2016, from http://web.csulb.edu/~murdock/histofcs.html

National Centre for Technology in Education. (2008a). *Personal Digital Assistants*. Retrieved February 26, 2014, from http://www.pdsttechnologyineducation.ie/en/Technology/Advice-Sheets/PDAs.pdf.

National Centre for Technology in Education. (2008b). *Laptops*. Retrieved February 26, 2014, from http://www.pdsttechnologyineducation.ie/en/Technology/Advice-Sheets/Laptops.pdf.

National Centre for Technology in Education. (2008c). *Mobile Phones*. Retrieved February 26, 2014, from http://www.pdsttechnologyineducation.ie/en/Technology/Advice-Sheets/Mobilephones.pdf.

Nebil, F.S. (2016). *2016 başında Fatih Projesi'nde neredeyiz?* Retrieved July 21, 2016, from http://t24.com.tr/yazarlar/fusun-sarp-nebil/2016-basinda-fatih-projesinde-neredeyiz,13640.

Nester, M. R. (1996). An Applied Statistician's Creed. *Journal of the Royal Statistical Society, 45*(4), 401-410.

Nguyen, L., Barton, S. M., & Nguyen, L. T. (2015). iPads in higher education—Hype and hope. *British Journal of Educational Technology*, *46*(1), 190–203.

Nistor, N., Baltes, B., Dascălu, M., Mihăilă, D., Smeaton, G., & Trăuşan-Matu, Ş. (2013). Participation in Virtual Academic Communities of Practice Under the Influence of Technology Acceptance and Community Factors. A Learning Analytics Application. *Computers in Human Behavior, 34,* 339-344.

Norman, D. (1988) *The Psychology of Everyday Things.* New York: Basic Books.

Norman, D.A. (1993). *Things that Make Us Smart: Defending Human Attributes in the Age of the Machine.* New York: Addison-Wesley.

Nunnally, J.C. & Bernstein, I.H. (1994). *Psychometric Theory*. London: McGraw-Hill.

Nye, S.B., (2010). Tablet PCs: A physical educators new clipboard.pdf. *Strategies: A Journal for Physical and Sport Educators, 23*(4), 21–23.

O'Malley, C., Vavoula, G., Glew, J.P., Taylor, J., Sharples, M. & Lefrere, P. (2003) *Guidelines for learning/teaching/tutoring in a mobile environment. Mobilearn project deliverable.* Retrieved from http://www.mobilearn.org/download/results/guidelines.pdf.

O'Reilly (2007, October 4). *Today's Web 3.0 Nonsense Blogstorm*. Retrieved July 17, 2016, from http://radar.oreilly.com/2007/10/todays-web-30-nonsense-blogsto.html.

Ofsted (2010). The safe use of new technologies. Retrieved from http://webarchive.nationalarchives.gov.uk/20120408131156/http:/www.ofsted.gov.uk/resources/safe-use-of-new-technologies.

Oliver, M. (2005). The Problem with Affordance. *E-Learning, 2*(4), 402-413.

OpenLearn (n.d.). *Reading visual images: The immediacy of the still photograph.* Retrieved October 4, 2015 from http://www.open.edu/openlearn/society/politics-policy-people/sociology/reading-visual-images/content-section-1.2.

Oppenheim, A.N. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. London: Pinter.

Osman, M., El-Hussein, M., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. Educational Technology and Society, 13(3), 12-21.

Owen-Jackson, G. & Fasciato, M. (2012). *Learning to teach design and technology in university or in school: is emerging teacher identity shaped by where you study?* Paper presented at PATT26 - Technology Education in the 21st Century, Stockholm, Sweden. Retrieved from http://oro.open.ac.uk/33997/.

Özdemir, S. (2010). Supporting printed books with multimedia: a new way to use mobile technology for learning. *British Journal of Educational Technology, 41*(6), E135–E138.

Pachler, N. Bachmair, B., & Cook, J. (2010). *Mobile learning: Structures, agency, practices*. New York: Springer.

Pajares, F. (1996). Self-Efficacy Beliefs and Mathematical Problem-Solving of Gifted Students. *Contemporary Educational Psychology, 21*, 325–344.

Palfrey, J., & Gasser, U. (2008). *Born Digital: Understanding the First Generation of Digital Natives*. New York: Basic.

Palmer, S. (2006). *Toxic Childhood: How the Modern World is Damaging Our Children and What We Can Do about It*. London: Orion.

Paraskeva, F., Mysirlaki, S. & Papgianni, A. (2010). Multiplayer online games as educational tools: Facing new challenges in learning. *Computers and Education, 54(2), 498-505.* Retrieved from http://www.sciencedirect.com/science/article/pii/S0360131509002413.

Pare`, G., Sicotte, C. & Jacques, H. (2006). The Effects of Creating Psychological Ownership on Physicians' Acceptance of Clinical Information Systems. *Journal of American Medical Informatics Association, 13(2), 197-205.*

Park, J., Parsons, D., & Ryu, H. (2010). To Flow and Not to Freeze: Applying Flow Experience to Mobile Learning. *IEEE Transactions On Learning Technologies, 3*(1), 56–67.

Pastore, R.S., & Falvo, D.A. (2010). Video Games in the Classroom: Pre- and in-service teachers' perceptions of games in the K-12 classroom. *International Journal of Instructional Technology and Distance Learning, 7*(12), 49-57.

Patten, B., Arnedillo Sánchez, I., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & Education, 46*(3), 294–308.

Patton, M. Q. (1990). *Qualitative evaluation and research methods*. London: Sage.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (4th Ed.). Thousand Oak, California: Sage.

Pauwels, L. (2010). Visual Sociology Reframed: An Analytical Synthesis and Discussion of Visual Methods in Social and Cultural Research. In J. Hughes (Ed.), *SAGE Visual Methods.* (pp.193-227). London: Sage.

Pedró, F., (2010). Introduction: The need for a systemic approach to technology-based innovations, in OECD, *Inspired by Technology, Driven by Pedagogy: A systematic Approach to Technology-Based School Innovations,* OECD Publishing.

Pedro´, F. (2007). The new millennium learners. *Nordic Journal of Digital Literacy, 2*(4), 244-64.

Peek, L., & Fothergill, A. (2009). Using Focus Groups: Lessons from Studying Daycare Centers, 9/11, and Hurricane Katrina. *Qualitative Research, 9*(1), 31–59.

Pegrum, M. (2014). *Mobile Learning: Languages, Literacies and Cultures*. Palgrave Macmillan.

Perrin, N. (2011, December). US digital media use: A snapshot of 2012. Retrieved June 13, 2016, from: http://www.scribd.com/doc/79910462/eMarketer-US-Digital-MediaUsage-A-Snapshot-of-2012.

Perry, D. (2003). *Handheld Computers (PDAs) in Schools.* Becta ICT Research. Retrieved from http://dera.ioe.ac.uk/1644/7/becta_2003_handhelds_report_Redacted.pdf

Peters, K. (2007). m-Learning: Positioning educators for a mobile, connected future. *The International Review of Research in Open and Distance Learning, 8*(2). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/350/894.

Pettigrew, A.M. (1977). Strategy formulation as a political process. *International Studies of Management and Organizations, 7*(2), 78-87.

Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Toward a theory of psychological ownership in organizations. *Academy of Management Review, 26*(2), 298-310.

Pinch, T. (2008). Technology and institutions: Living in a material world. *Theory and Society,* 37(5), 461–483. Retrieved from http://link.springer.com/article/10.1007%2Fs11186-008-9069-x

Pink, S. (2006). Visual Methods. In V. Jupp (Ed.), *The SAGE Dictionary of Social Research Methods* (pp. 321-323). London: Sage.

Pink, S. (2007). *Doing Visual Ethnography* (2nd ed.). London: Sage.

Player-Koro, C. (2013). Hype, Hope and ICT in Teacher Education: A Bernsteinian Perspective. Learning, Media and Technology, 38(1), 26-40.

Polites, G. (2005). Counterintentional Habit as an Inhibitor of Technology Acceptance. *SAIS 2005 Proceedings*. Paper 47.

Poster, M. (1998). *What is the matter with the Internet?* Retrieved from www.cddc.vt.edu/lol/pdf/vpi.pdf

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon,* 9(5), 1-6.

Prensky, M. (2002). The Motivation of Gameplay. *On the Horizon,* 10(1). Retrieved from http://www.marcprensky.com/writing/Prensky%20-%20The%20Motivation%20of%20Gameplay-OTH%2010-1.pdf

Prensky, M. (2006). *Don't bother me, Mom, I'm learning! How computer and video games are preparing your kids for 21st century success and how you can help*. St. Paul: Paragon House.

Prosser, J. & Loxley, A. (2008). *Introducing Visual Methods* (Working Paper No: 420). Retrieved January 7, 2014, from National Centre for Research Methods website http://eprints.ncrm.ac.uk/420/.

Prosser, J. & Schwartz, D. (1998). Photographs within the Sociological Research Process. In J. Prosser (Ed.), *Image-based Research: A Sourcebook for Qualitative Researchers* (pp. 115-130). London: Falmer.

Prosser, J. (1998). *Image-based Research: A Sourcebook for Qualitative Researchers*. London: Falmer.

Prosser, J. (2006). *Researching with visual images: Some guidance notes and a glossary for beginners (*Working Paper No: 481). Retrieved from National Centre for Research Methods website http://eprints.ncrm.ac.uk/481/.

Rabkin, A. (2012, June 18). *How The Failed Aakash Tablet Is an Object Lesson in India's Long Road Ahead to Tech Innovation*. Retrieved July 14, 2016, from http://www.fastcompany.com/1839297/how-failed-aakash-tablet-object-lesson-indias-long-road-ahead-tech-innovation.

Raman, A., & Don, Y. (2013). Preservice Teachers' Acceptance of Learning Management Software: An Application of the UTAUT2 Model. *International Education Studies*, *6*(7), 157–164.

Raschka, S. (2015, January 27). *Principal Component Analysis in 3 Simple steps*. Retrieved, May 24, 2015, from http://sebastianraschka.com/Articles/2015_pca_in_3_steps.html

Ray, B. (2002). *PDAs in the Classroom: Integration Strategies for K-12 Educators.* Retrieved from http://ascilite.org.au/ajet/ijet/v3n1/ray/.

Razak, A. A., Connolly, T.M., & Hainey, T. (2012). Teachers' views on the approach of digital games-based learning within the Curriculum for Excellence. *International Journal of Game-Based Learning, 2* (1), 33-51.

Resta, P. & Carroll, T. (n.d.). Redefining Teacher Education for Digital-Age Learners. Retrieved September 10, 2016, from http://redefineteachered.org/sites/default/files/SummitReport.pdf?q=summitreport.

Reynolds, D., Treharne, D., & Tripp, H. (2003). ICT - The hopes and the reality. *British Journal of Educational Technology, 34*(2), 151-167.

Rideout, V., & Hammel, E. (2006). The Media Family: Electronic Media in the Lives of infants, Toddlers, Preschoolers and their Parents. *Kaiser Family Foundation*, 1-33. Retrieved from https://kaiserfamilyfoundation.files.wordpress.com/2013/01/7500.pdf

Rideout, V., Roberts, D. & Foehr, U. (2005). Generation M: Media in the Lives of 8-18 Year-Olds, *Kaiser Family Foundation,* 1-140. Retrieved from https://kaiserfamilyfoundation.files.wordpress.com/2013/01/generation-m-media-in-the-lives-of-8-18-year-olds-report.pdf

Robson, C., & McCartan, K. (2016). *Real World Research* (4th ed.). London: John Wiley.

Rocco, T. S., Bliss, L. A., Gallagher, S., & Perez-Prado, A. (2003). Taking the Next Step: Mixed Methods Research in Organizational Systems. *Information Technology, Learning and Performance Journal, 21*(1), 19–29.

Rogers, E. M. (2007). Diffusion and Innovations, in *Knowledge and Innovation Management.* (pp. 37–50).

Rogers, E.M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.

Rose, G. (2001). *Visual Methodologies: An Introduction to the Interpretation of Visual Materials*. London: Sage.

Rudduck, J. & Flutter, J. (2000). Pupil participation and pupil perspective: carving a new order of experience. *Cambridge Journal of Education, 30*(1),75-89.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology, 25*(1), 54–67.

Sachs, J. (2005). Teacher education and the development of professional identity: Learning to be a teacher. In Denicolo, P. and Kompf, M. (Eds.) *Connecting policy and practice: Challenges for teaching and learning in schools and universities.* Oxford: Routledge.

Sahin, I. (2006). Detailed Review of Rogers' Diffusion of Innovations Theory and Educational Technology-Related Studies Based on Rogers' Theory. *The Turkish Online Journal of Educational Technology*, *5*(2), 14–23.

Salcito, A. (2013, June 7). Most governments make investments in education because they see the long-term economic benefits of improving their education systems." – James Bernard, USA. [Blog post]. Retrieved March 7, 2014, from http://www.dailyedventures.com/index.php/2013/06/07/bernard/.

Sauro, J. & Lewis, J.R. (2012). *Quantifying the User Experience: Practical Statistics for User Research*. Waltham, MA: Elsevier.

Savaş, P. (2014). Tablet PCs as Instructional Tools in English as A Foreign. *TOJET: The Turkish Online Journal of Educational Technology*, *13*(1), 217–222.

Savill-Smith, C., Attewell, J. & Stead, G. (2006). Mobile learning in practice: Piloting a mobile learning teachers' toolkit in further education colleges. Retrieved September 13, 2016, from http://gmo-enteacher.ru/materials/062526.pdf

Schunk, D. H., & Zimmerman, B. J. (1994). *Self-Regulation of Learning and Performance: Issues and Educational Applications*. New Jersey: Lawrence Erlbaum.

Schunk, D. H., & Zimmerman, B. J. (1997). Social Origins of Self-Regulatory Competence. *Educational Psychologist*, *32*(4), 195–208.

Schwandt, T.A. (2000). Three epistemological stances for qualitative inquiry: Interpretivism, hermeneutics and social constructivism. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 189-214). Thousand Oaks, CA: Sage.

Scrimshaw, P. (2004). Enabling Teachers to Make Successful Use of ICT. Retrieved from *https://core.ac.uk/download/pdf/4151892.pdf*

Selwyn, N. (2009). The digital native – myth and reality. *Aslib Proceedings, 61*(4), 364 – 379.

Selwyn, N., & Facer, K. (2014). The sociology of education and digital technology: Past, present and future. *Oxford Review of Education, 40*(4), 482-496.

Sharma, S.K., Chandel, J. (2013). Technology acceptance model for the use of learning through websites among students in Oman. *International Arab Journal of Information Technology, 3*(1), 44-49.

Sharpe, R., Beetham, H., Benfield, G., DeCicco, E. & Lessner, E. (2009). *Learners Experiences of E-learning Synthesis Report: Explaining Learner Differences*.

Sharples, M. (2005). Learning as conversation: Transforming education in the mobile age. *In Proceeding of Conference on Seeing, Understanding, Learning in the Mobile Age* (pp.147-152). Budapest, Hungary.

Sharples, M., Lonsdale, P., Meek, J., Rudman, P., & Vavoula, G. N. (2007). An Evaluation of MyArtSpace: A Mobile Learning Service for School Museum Trips. *Proceedings of 6th Annual Conference on Mobile Learning, mLearn 2007* (pp. 238-244).

Sharples, M. & Pea, R. (2014). Mobile Learning. In K. Sawyer (Ed.) *The Cambridge Handbook of the Learning Sciences: Second Edition*. New York, NY: Cambridge University Press, pp. 501-521.

Sharples, M., Taylor, J., & Vavoula, G. (2007). A Theory of Learning for the Mobile Age. Learning, 85(3), 221-247. Retrieved from http://telearn.noe-kaleidoscope.org/warehouse/Sharples_et_al_Theory_of_Mobile_Learning_preprint.pdf.

Shin, D. H. (2009). Towards an understanding of the consumer acceptance of mobile wallet. *Computers in Human Behavior, 25*, 1343-1354.

Sikes, P. (2004). Methodology, Procedures and Ethical Considerations In C. Opie (Ed.), *Doing Educational Research: A Guide to First-time Researchers* (pp. 15-33). London: Sage.

Silverman D. (2013). *Doing Qualitative Research: a practical handbook* (4th ed). London: Sage.

Sim, J. (1998). Collecting and analyzing qualitative data: Issues raised by the focus group. *Journal of Advanced Nursing, 28*, 345–352.

Simmons, D.G. (2005). Internet Filtering: The Effects in a Middle and High School Setting. *Meridian: A Middle School Computer Technologies Journal, 8.*

Siozos, P., Palaigeorgiou, G., Triantafyllakos, G., & Despotakis, T. (2009). Computer based testing using “digital ink”: Participatory design of a Tablet PC based assessment application for secondary education. *Computers & Education, 52*(4), 811–819.

Smith, J. (1995). Semi-structured interviewing and qualitative analysis. In J. Smith, R. Harre, & L. Langenhove, *Rethinking methods in psychology* (pp. 9-26). London: Sage.

Soloway, E. & Pryor, A. (1996). The next generation in human-computer interaction. *Communications of the ACM, 39*(4), 16-18.

Song, Y. & Fox, R. (2008). Affordances of PDAs: Undergraduate Student Perceptions. *Journal of the Research Center for Educational Technology, 4*(1), 19-38.

Song, Y. (2011). Investigating Undergraduate Student Mobile Device Use in Context. In A. Kitchenham (Ed.), *Models for Interdisciplinary Mobile Learning: Delivering Information to Students* (pp. 120-136). Hershey, PA: Information Science Reference.

Song, Y., & Fox, R. (2008). Affordances of PDAs: Undergraduate Students Perception. *Journal of the Research Center for Educational Technology (RCET), 4*(1).

Spencer, S. (2010). *Visual Research Methods in the Social Sciences: Awakening Visions.* London: Routledge. Retrieved from https://www.dawsonera.com/abstract/9780203883860

Stanczak, G.C. (2007). *Visual Research Methods*. Thousand Oaks, CA: Sage.

Steimle, J., Brdiczka, O., & Mühlhäuser, M. (2008). CoScribe: Using Paper for Collaborative Annotations in Lectures. In *2008 Eighth IEEE International Conference on Advanced Learning Technologies* (pp. 306–310).

Stenberg, K. (2010). 'Identity work as a tool for promoting the professional development of student teachers. *Reflective Practice, 11*(3), 331-346. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/14623943.2010.490698.

Stevens, S.S. (1946). On the theory of scales of measurement. *Science, 103,* 677–680.

Stockburger, D.W. (1998). HYPOTHESIS TESTING. Retrieved August 13, 2016, from http://www.psychstat.missouristate.edu/introbook/sbk18.htm.

Stoffregen, T. A., (2003). Affordances as properties of the animal-environment system, *Ecological Psychology*, 15(2): 115-34.

Straub, E. T. (2009). Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research, 79*(2), 625–649.

Structural Equation Modelling. (n.d.). In *Wikipedia*. Retrieved April 28, 2016, from https://en.wikipedia.org/wiki/Structural_equation_modeling.

Stylianou, A. C., & Jackson, P. J. (2007). A Comparative Examination of Individual Differences and Beliefs On Technology Usage: Gauging The Role of IT. *Journal of Computer Information Systems*, 11–18.

Sullivan, G. M., & Feinn, R. (2012). Using Effect Size - or Why the P Value Is Not Enough. *Journal of graduate medical education, 4*(3), 279-82. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3444174/.

Sultan, F., & Chan, L. (2000). The Adoption of New Technology: The Case of Object-Oriented Computing in Software Companies. *IEEE Transactions on Engineering Management*, *47*(1), 106–126.

Sumner, W.L. (1956). Visual Methods in Education (2nd ed.). Oxford: Basil Blackwell.

Swanson, E.B. (1974). Management Information System: Appreciation and Involvement. *Management Sci*., *21, 178-188*. Cited in Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003.

Tamim, R.M., Borokhovski, E. pickup, D., & Bernard, R.M. (2015). *Large-Scale, Government-Supported Educational Tablet Initiatives*. Commonwealth of Learning: Burnaby.

Tapscott, D., & Williams, A. (2008). *Wikinomics: How Mass Collaboration Changes Everything*. New York, NY: Atlantic.

Tatsuki, D. (2006). *What is authenticity?* Paper presented at 5th Annual JALT Pan-SIG Conference, Shizuoka, Japan: Tokai University. Retrieved from https://jalt.org/pansig/2006/HTML/Tatsuki.htm.

Taylor, C. & Gibbs, G. R. (2010, February 19). *How and what to code*. Retrieved from http://onlineqda.hud.ac.uk/Intro_QDA/how_what_to_code.php.

Taylor, R. (2012). Messing about with metaphor: multimodal aspects to children's creative meaning making. *Literacy, 46*(3), 156–166. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1741-4369.2012.00658.x/abstract.

Taylor, S., & Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, *6*(2), 144–176.

Teo, T. & Khine, M.S. (2009). Modeling Educational Research: The Way Forward. In T. Teo and M.S. Khine (Eds.), *Structural Equation Modeling in Educational Research: Concepts and Applications*, (3–10). Rotterdam, The Netherlands, Sense Publishers.

Teo, *T. (2011).* Factors Influencing Teachers' Intention to Use Technology: Model Development and Test. *Computers & Education*, *57*(4), 2432–2440.

Teo, T. (2012). An Empirical Study to Validate the Technology Acceptance Model (TAM) in Explaining the Intention to Use Technology among Educational Users. *International Journal of Information and Communication Technology Education*, *6*(4), 1-12.

Teo, T., Lee, C.B. & Chai, C.S. (2008). Understanding pre-service teachers' computer attitudes: applying and extending the technology acceptance model. *Journal of Computer Assisted Learning*, *22*(2), 128-143.

The World Bank (2014). *Internet Users (per 100 people)*. Retrieved February 14, 2014 from http://data.worldbank.org/indicator/IT.NET.USER.P2?page=2.

The World Factbook (2016, August 19). *Middle East: Turkey*. Retrieved August 28, 2016, from https://www.cia.gov/library/publications/the-world-factbook/geos/tu.html.

Theory of Reasoned Action (2006). In *Edutechwiki*. Retrieved January 18, 2014, from http://edutechwiki.unige.ch/en/Theory_of_reasoned_action.

Thomas, K. M., & Mcgee, C. D. (2012). The Only Thing We Have to Fear is...120 Characters. *TechTrends*, *56*(1), 19–33.

Thomas, T., Singh, L., & Gaffar, K. (2013). The utility of the UTAUT model in explaining mobile learning adoption in higher education in Guyana. *International Journal of Education and Development Using Information and Communication Technology, 9*(3), 71-85.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, *15*(1), 125–143.

Thong, J. Y. L., Hong, S.-J., & Tam, K. Y. (2006). The Effects of Post-Adoption Beliefs On the Expectation-Confirmation Model for Information Technology Continuance. *International Journal of Human-Computer Studies*, *64*(9), 799–810.

Thurstone, L. L. (1947). Multiple-factor analysis. Chicago: University of Chicago Press.

Timor, T. (2014). Teachers' Role in The Technological Era of The 21st Century. *EDULEARN14 Proceedings: 6th International Conference On Education and New Learning Technologies*, 4322-4330.

Traxler, J. (2005). Defining mobile learning. *IADIS International Conference Mobile Learning*, (September 2004), 261-266.

Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having writ... *International Review of Research in Open and Distance Learning, 8*(2), 1-12.

Traxler, J. (2008). Learning in a Mobile Age. *International Journal of Mobile and Blended Learning, 1*(1), 1-12.

Traxler, J. (2009). Current state of mobile learning. In M. Ally (Ed.), Mobile Learning Transforming the Delivery of Education and Training (pp. 9 - 24). AU Press, Athabasca University.

Traxler, J. (2010). Students and mobile devices. *ALTJ Research in Learning Technology, 18*(2), 149-160.

Traxler, J. (2010). Will Student Devices Deliver Innovation, Inclusion, and Transformation? *Journal of the Research Centre for Educational Technology, 6*(1), 3-15.

Traxler, J. (2011). Introduction. In J. Traxler & J. Wishart (Eds.), *Making Mobile Learning Work: Case studies of practice (pp. 4-12).* The Higher Education Academy.

Traxler, J. (2016a, February 26). *What killed the mobile learning dream?* Retrieved August 28, 2016, from https://www.jisc.ac.uk/news/what-killed-the-mobile-learning-dream-26-feb-2016.

Traxler, J. (2016b). Inclusion in an age of mobility. *Research in Learning Technology, 24*, 1-18.

Triandis, H.C. (1971). *Attitude and Attitude Change*. John Wiley and Sons, Inc., New York, NY.

Trucano, M. (2013, July 31). Big Educational Laptop and Tablet Projects – Ten Countries to Learn from. Retrieved July 5, 2016, from http://blogs.worldbank.org/edutech/big-educational-laptop-and-tablet-projects-ten-countries.

Trucano, M. (2015, July 28). Tablets in education. Retrieved July 12, 2016, from http://blogs.worldbank.org/edutech/tablets-education.

TUIK (n.d.). *Statistics by theme*. Retrieved 28 August, 2016, from http://www.turkstat.gov.tr/UstMenu.do?metod=kategorist.

Twining, P., Evans, D., Cook, D., Ralston, J., Selwood, I., Jones, A., Underwood, J., Dillon, G., Scanlon, E., Heppell, S., Kukulska-Hulme, A., McAndrew, P. & Sheehy, K. (2005). *Tablet PCs in schools: Case study report: A report for Becta by the Open University*. Becta, Coventry, UK.

Tye, B. & Tye, K. (1992). *Global education: A study of school change.* Albany: State University of New York Press.

Tyldum, G. (2012). Ethics or access? Balancing informed consent against the application of institutional, economic or emotional pressures in recruiting respondents for research. *International Journal of Social Research Methodology, 15*, 199–210.

UNESCO (2012). *Turning on Mobile Learning in North America* (Working paper series on mobile learning). Paris, France: United Nations Educational, Scientific and Cultural Organization.

UNESCO (n.d.). *Making Technology Work for Education*. Retrieved March 4, 2014, from http://www.unesco.org/new/en/unesco/themes/icts/single-view/news/making_technology_work_for_education/#.UssAZGRdXNB.

University of Twente (n.d.). *Social Cognitive Theory*. Retrieved March 10, 2014, from http://www.utwente.nl/cw/theorieenoverzicht/Theory%20clusters/Health%20Communication/Social_cognitive_theory.doc/.

USCLibraries (2016, September 20). *Organizing Your Social Sciences Research Paper: Types of Research Designs*. Retrieved July 2, 2016, from http://libguides.usc.edu/writingguide/purpose

Valdivia, R., & Nussbaum, M. (2007). Face-to-Face Collaborative Learning in Computer Science Classes. *International Journal of Engineering Education, 23*(3), 434-440.

Van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless... *Educase Review, 41(2),* 1-16. Retrieved from https://net.educause.edu/ir/library/pdf/erm0620.pdf

Van Raaij, E. M., & Schepers, J. J. L. (2008). The acceptance and use of a virtual learning environment in China. *Computers & Education, 50*(3), 838-852.

Van Wyck, W. F. (1971). Reducing Teacher Resistance to Innovation. *Audiovisual Instruction, 16*(3), 90-1.

VanWyck, W.F. (1976). Reducing Teacher Resistance to Innovation - An Updated Perspective. In P.J. Sleeman & D.M. Rockwell (Eds). *Instructional Media and Technology*. (pp. 291-296). Stroudsburg, PA: Dowden, Huthcinson, and Ross.

Van, D. L., & Pierce, J. L. (2004). Psychological ownership and feelings of possession: three field studies predicting employee attitudes and organizational citizenship behavior. *Journal of Organizational Behavior, 25*(4), 439-459.

Vandewater, E., Rideout, V., Wartella, E., Huang, X., Lee, J. and Shim, M. (2007). Digital childhood. *Pediatrics, 119*(5), 1006-15.

Vavoula, G., & Sharples, M. (2002). KLeOS: *A personal, mobile, knowledge and learning organization system*. Paper presented at the IEEE International Workshop on Mobile and Wireless Technologies in Education, Vaxjo, Sweden.

Veen, W., & Vrakking, B. (2006). *Homo Zappiens: Growing up in a Digital Age*. London: Network Continuum.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward A Unified View. *MIS Quarterly, 27*(3), 425–478.

Venkatesh, V., Thong, J., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending The Unified Theory of Acceptance and Use of Technology. *MIS Quarterly, 36*(1), 157–178.

Viriyapong, R., & Harfield, A. (2013). Facing the challenges of the One-Tablet-Per-Child policy in Thai primary school education. *International Journal of Advanced Computer Sciences and Applications, 4*(9), 176-184.

Vrolijk, A.H. (2014). *Modern Technologies in the Classroom and the Authority of the Teacher: A study about the influence of computers, iPads and digital textbooks on the authority of the teacher in Dutch primary schools* (Master thesis). Retrieved from https://openaccess.leidenuniv.nl/handle/1887/28969.

Wahl, A. (2003). Mightier than the mouse. *Canadian Business, 76*(24), 107–107. Cited in Ozok, A. A., Benson, D., Chakraborty, J., & Norcio, A. F. (2008). A Comparative Study Between Tablet and Laptop PCs: User Satisfaction and Preferences. *International Journal of Human-Computer Interaction*, *24*(3), 329–352.

Walker, R. (1985a). *Doing Research: A Handbook for Teachers*. London: Methuen. Cited in Wellington, J. (2015). *Educational Research: Contemporary Issues and Practical Approaches* (2nd Ed.). London: Bloomsbury.

Wallace, P. (2011). M-learning: Promises, perils, and challenges for K-12 education. *New Horizons for Learning, 4*(1).

Walters, E. A, & Baum, M. (2011). Will the iPad revolutionize education? *Learning & Leading with Technology, 38*(7), 6-7.

Wang, R., Wiesemes, R., & Gibbons, C. (2012). Developing digital fluency through ubiquitous mobile devices: Findings from a small-scale study. *Computers & Education, 58*(1), 570–578.

Warschauer, M. (2011). *Eventually Tablets Will Facilitate More Personalized and Interactive Learning*. Retrieved February 2, 2014 from https://edutechdebate.org/tablet-computers-in-education/eventually-tablets-will-facilitate-more-personalized-and-interactive-learning/.

Warshaw, P. R. (1980). A New Model for Predicting Behavioral Intentions: An Alternative to Fishbein. *Journal of Marketing Research, 17*(2), 153–172.

Weiser, M. (1999). The computer for the 21st century. *ACM SIGMOBILE Mobile Computing and Communications Review, 3*(3), 3–11.

Wellington, J. (2015). *Educational Research: Contemporary Issues and Practical Approaches* (2nd Ed.). Bloomsbury.

Wellington, J., & Szczerbinski, M. (2007). *Research methods for the Social Sciences*. Continuum.

Wellington, J., Bathmaker, A., Hunt, C., McCulloch, G. & Sikes, P. (2005). Doing Research: Reflecting on Methods, Methodology and Ethics In *Succeeding with Your Doctorate.* (pp. 96-112). London, England: Sage.

WHO (2014). Electromagnetic fields and public health: mobile phones. Retrieved from http://www.who.int/mediacentre/factsheets/fs193/en/

Wild, M. (1995) Pre-service teacher education programmes for information technology: an effective education? *Journal of Information Technology for Teacher Education, 4* (1), 7-20. Retrieved from http://www.tandfonline.com/doi/pdf/10.1080/0962029950040102

Williams, P. (2002). The learning Web: The development, implementation and evaluation of Internet-based undergraduate materials for the teaching of key skills. *Active Learning in Higher Education, 3*(1), 40–53.

Williamson, B. & Facer, K. (2004). More Than 'Just a Game': the implications for schools of children's computer games communities. *Education, Communication & Information, 4(2/3),* 255-270.

Williamson, B. (2005, May). *What are multimodality, multisemiotics and multiliteracies?* Retrieved from http://archive.futurelab.org.uk/resources/publications-reports-articles/web-articles/Web-Article532

Williamson, R. & Blackburn, B. (2010). *Rigorous schools and classrooms: Leading the way*. Larchmont, NY: Eye On Education.

Winters, N. (2006). What is Mobile Learning? In M. Sharples (Ed.), *Big Issues in Mobile Learning Report of a Workshop by the Kaleidoscope Network of Excellence* (pp. 5-9). University of Nottingham. Retrieved from http://hal.archives-ouvertes.fr/docs/00/19/02/54/PDF/Sharples_Big_Issues.pdf.

Wood, R., & Bandura, A. (1989). Social Cognitive Theory of Organizational Management. *The Academy of Management Review*, *14*(3), 361–384.

Wright, S., & Parchoma, G. (2011). Technologies for learning? An actor-network theory critique of "affordances" in research on mobile learning. *Research in Learning Technology*, *19*(3), 247–258.

Xiang, W., Goh, S.C., Pather, S., Maxwell, A.D., Wang, H., Ku, H.S. (2009). Use of wireless tablet PCs as an effective learning and teaching enhancement tool. In: *EDUCAUSE Australasia Conference 2009, 3-6 May 2009*, Perth, Western Australia.

Yates, B. L. (2001). Applying Diffusion Theory: Adoption of Media Literacy Programs in Schools. In *International Communication Association Conference.*

Yoo, S.J., Han, S.H., Huang, W.B. (2012). The roles of intrinsic motivators and extrinsic motivators in promoting e-learning in the workplace: A case from South Korea. *Computers in Human Behavior*, 28, 942-950.

Zimmerman, J. (2009). Why Some Teachers Resist Change and What Principals Can Do About It. *NASSP Bulletin, 90*(3), 238-249. Retrieved from https://larrycuban.files.wordpress.com/2011/04/whysometeachersresistchange-zimmerman-2006-1.pdf.

Appendix

Appendix 1:Ethical Approval Letter

The University Of Sheffield.

The School Of Education.

Tugba Mutlu
PhD Programme

Head of School
Professor Cathy Nutbrown

School of Education
388 Glossop Road
Sheffield
S10 2JA

Telephone: +44 (0)114 222 8096
Email: mphil-phd@sheffield.ac.uk

4 April 2014

Dear Tugba

ETHICAL APPROVAL LETTER

Understanding Students' and Teachers' Approaches to Tablet Use in a Turkish Secondary School: A Model Based Approach

Thank you for submitting your ethics application. I am writing to confirm that your application has now been approved, and you can proceed with your research.

This letter is evidence that your application has been approved and should be included as an Appendix in your final submission.

Good luck with your research.

Yours sincerely

Professor Dan Goodley
Chair of the School of Education Ethics Review Panel

CC Dr Julia Davies

Appendix 2: Questionnaire Used for Data Collection

TECHNOLOGY ACCEPTANCE SURVEY

The University Of Sheffield.

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
Performance Expectancy (PE)							
Using the tablet enables me to accomplish tasks more quickly							
Using the tablet improves my school performance							
Using the tablet increases my productivity making me do more school work							
Using the tablet enhances my effectiveness.							
Effort Expectancy (EE)							
Learning to use the tablet is easy for me							
I find it easy to use the tablet to do what I want to do							
My interaction with the tablet does not require much effort							
It is easy for me to become skilful at using the tablet							
I find the tablet easy to use							
Social Influence (SI)							
People who influence my behaviour (parents, teachers, friends etc.) think that I should use the tablet.							
People who are important to me think that I should use the tablet							
Facilitating conditions (FC)							
When I encounter difficulties in using the tablet, a specific person is available to provide assistance							
When I encounter difficulties in using the tablet, I know where to seek assistance							
When I encounter difficulties in using the tablet, I am helped straight away.							
Hedonic Motivation (HM)							
Using the tablet is fun.							
Using the tablet is enjoyable.							
Using the tablet is very entertaining.							

Habit (HT)							
The use of tablet has become a habit for me							
I am addicted to using my tablet.							
I must use my tablet.							
Self-efficacy (SE)							
I could complete a job or homework using the tablet…							
If there was no one around to tell me what to do as I go.							
If I could call someone for help if I got stuck							
If I had a lot of time to complete the work for which the software was provided							
If I had just the built-in help facility for assistance							
Psychological Ownership (PO)							
I am happy to take the responsibility for my tablet							
I personalized the tablet. This is my tablet							
I am proud of having a tablet.							
I have a feeling that this tablet is mine. It belongs to me							
In using the tablet, I have the feeling I could handle difficult situations							
Behavioural intention to Use (BIU)							
I intend to continue to use a tablet in the future.							
I expect that I would use a tablet in the future							
I plan to use a tablet in the future							

Appendix 3: Sample Theme Generation

Codes	Underlying Themes	Organising Themes	Sub Themes	Main Theme
No use of tablets	•Power related concerns •Identity related concerns •Mindsets about education •Political reasons	Power	Resistance to Change	**Resistance**
Praising Smartboards and projectors	•Power related concerns •Mindsets about education			
Traditional classroom design/ central control from the front	•Power related concerns •Mindsets about education	Identity		
Tension in classroom	•Power related concerns •Identity related concerns •Mindsets about education			
Discrepancy between discourses and practice	•Power related concerns •Identity related concerns •Mindsets about education			
Banning, Collecting tablets	•Power related concerns •Identity related concerns	Mindsets		
Considering tablets against human nature	•Mindsets about education			
Concerns around not being able to control student devices	•Power related concerns •Identity related concerns •Mindsets about education	Political Reasons	Resistance to Government	
Considering tablets non-educational	•Mindsets about education •Political reasons			
Concerns around tablets being governments' agent	•Political reasons			