THE DEVELOPMENT OF A MODEL FOR TABLET PC USAGE IN EDUCATION: EXPECTATIONS TO REALITIES

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THE DEVELOPMENT OF A MODEL
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ABSTRACT

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This study aimed to explore current situation of Tablet PC usage in FATIH project from the instructional design perspective and also to propose an instructional design model suitable for Tablet PC usage in education. Considering these aims, expectations invested in Tablet PC usage in teaching and learning environment, advantages and disadvantages faced in utilizing Tablet PC in classroom and the necessary condition to be met in order to use this tool instructionally functional were investigated. The grounded theory method was conducted in order to construct the path to follow for data gathering and data analysis. Theoretical sampling was used to select participants, who were teachers in a pilot school and field experts. Literature, media and teachers' documents and materials were also consulted as a source for the study.

On the basis of the results of the study two different instructional design models were constructed. First one showed the teachers' current applications of Tablet PC usage, which is limited to displaying multimedia materials. This restricted usage was due to the unmet expectations of teachers related with FATIH project, and the disadvantages experienced because of the lack of necessary conditions. The second model was shaped considering the case where the conditions would be optimal to use this technology more advantageously.

Consequently, more systematic planning, including the revision of curriculum, Tablet PC distribution system and technology education in schools was recommended for the decision makers.

Key words: Tablet PC in Education, Instructional Design, FATIH Project, Grounded Theory

ÖZ

EĞİTİMDE TABLET BİLGİSAYAR KULLANIMI İÇİN BİR MODEL GELİŞTİRME: BEKLENTİLERDEN GERÇEKLİKLERE

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Bu çalışma FATIH projesi ile sunulan Tablet bilgisayar kullanımını öğretim tasarımı boyutundan incelemeyi ve eğitimdeki Tablet bilgisayar kullanımına uygun bir model sunmayı hedeflemektedir. Bu amaçlar kapsamında, Tablet bilgisayardan beklentiler, Tablet bilgisayarın sınıfta kullanımı ile karşılaşılan avantajlar ve dezavantajlar, ve aynı zamanda bu aracın işlevsel olarak kullanılmasını sağlayacak gerekli koşullar incelenmiştir. Veri toplamada ve analizinde takip edilecek yolu oluşturmak için kuram oluşturma (grounded theory) yöntemi kullanılmıştır. Kuramsal örneklem (theoretical sampling) ile bir pilot okuldaki öğretmenler ve alan uzmanları katılımcı olarak seçilmiştir. Çalışmanın diğer veri kaynaklarını, alan yazın, medya ve öğretmenlerin dokümanları ile materyalleri oluşturmaktadır.

Çalışmanın sonuçlarından yola çıkarak, iki farklı öğretim tasarımı modeli oluşturulmuştur. Birinci model, öğretmenlerin halihazırda çoklu ortam materyalleri ile sınırlı olan Tablet bilgisayar uygulamalarını göstermektedir. Bu sınırlı kullanımın sebebi, FATIH projesi kapsamında öğretmenlerin karşılanmamış beklentileri ve gerekli koşulların sağlanmamasından dolayı yaşanan olumsuzluklardır. İkinci model ise uygun koşulların sağlanması durumunda bu teknolojinin daha faydalı bir şekilde kullanımı için şekillendirilmiştir.

Sonuç olarak, karar mercilerine, eğitim programının, Tablet bilgisayar dağıtımı sisteminin ve teknoloji eğitiminin gözden geçirilerek daha sistemli bir planlamaya gidilmesi önerilmektedir.

Anahtar Sözcükler: Eğitimde Tablet Bilgisayar, Öğretim Tasarımı, FATİH Projesi, Kuram Oluşturma Yöntemi

To all lonely souls

trembling

in front of technological screens

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LIST OF ABBREVIATIONS

ID	Instructional Design
TPC	Tablet Personal Computer
OCPC	One Computer per Child
OLPC	One Laptop per Child
OTPC	One Tablet per Child
GLP	Global Learning Portal
BYOD	Bring Your Own Device
ADDIE	Analysis, Design, Development, Implementation, Evaluation
IWB	Interactive Whiteboard
FATIH	Movement of Enhancing Opportunities and Improving Technology
MoNE	Ministry of National Education
EBA	Education and Informatics Network
ITV	Instructional Television
TRT	Turkish Radio and Television
WAN	Wide Area Network
LAN	Local Area Network
IT	Information Technology
ICT	Information and Communication Technologies
GT	Grounded Theory
GTM	Grounded Theory Method

CHAPTER I

INTRODUCTION

This introductory chapter addressed the issues that underlie the background of the study and the statement of the problem in light of these background issues; purpose and significance of the study; the research questions investigated throughout the study; and lastly, definition of the terms that were used in the study.

1.1 Background of the Study

The real problem is not whether machines think
but whether men do.
(B. F. Skinner, 1969, Contingencies of Reinforcement)

The meaning of technology as a term has changed rapidly over the centuries, especially after the 20th century (Schatzberg, 2006). Although the dictionaries and encyclopedias have a general agreement on the modern Latin term technologia (which is based on Greek etymology, which combined logos –discourse- with techne -skill or art-), in this study, it is taken into consideration that the discussion about history of term imported from German discourse of “Tecknik” into the English terminology (Schatzberg, 2006). That created some shifts in the meaning, as well. However, here, technology will be mainly taken into consideration as any kind of application of a scientific tool, which can be viewed as an agent that forms a culture or changes the culture toward technology (Borgmann, 2006).

This change in culture has also been reflected into the education and with the effect of the neoliberal ideas; technology became an important agent to shape the schools, as well. Through the new role of schooling, which has emphasized to raise winners in competitive new capitalist market and to prepare individuals in a qualified learning environment with business-inspired improvements, the effects of the technology were experienced rapidly and imprecisely in education (Cuban, 2001). For example, if we look at the history, one of the great inventions, Abacus, which came to the world's scene in 2700 BC, has been used in education for centuries; in Persian schools (5^{th} BC), Ancient Greece (5^{th}-4^{th} BC), Roman schools (1^{st} BC), Medieval Europe (till 15 AD) (Lepi, 2012). However, between the invention of mechanical calculator (1642) and electronic calculator (1960), there are only few centuries. This gap between new technologies has decreased to few years, when the calendars hit 20^{th} century. Although personal computers had been introduced in the beginning of 20^{th} century, only in the second part of the same century, most people all over the world possessed this machine on their tables. And, people were few decades away from having portable computers in their bags with the Laptop, and then in their hands with the Tablet Computer (Tablet PC or TPC). Parallel with this speed, every new technological tool has been changing the discourse of technology in education through the enthusiastic efforts of adaptation of them into education. For instance, the project of One Laptop per Child (OLPC) has been introduced in the beginning of 2000s and now, only after 10 years, we are already evaluating the effects of One Tablet PC per Child (OTPC) Project.

This rapid and constant pace of change in technology is creating opportunities and challenges for schools. There is already an extensive proponent literature for integration of this new technological tool, Tablet PC, into education, which reached todays shape and functionality only in 2010s (Ogg, 2010; The Microsoft Tablet PC, n.d.). The main reason of this effort is the perception toward technology like a beacon of hope, which may create solutions for deep-rooted problems of education. In general, the primary expectation from integration of technology into teaching and learning is the belief that it supports students in exploring and articulating thoughts, knowledge construction and theory building (Scardamalia & Berieter, 1991);

collaboration, negotiation of meanings, reflection, meaningful learning through accessing authentic information and immersing themselves in complex and contextualized learning situations (Jonassen, Peck & Wilson, 1999). The expectation that technology can have positive impact on student learning has spawned a proliferation of studies, most of which focus on attributing great value to the usage of Tablet PC technology in the classrooms in order to seek for solutions, new ways, and develop alternative approaches for problems in the past decade. The results of the researches are extended from creating more effective learning environment (Carruthers, 2010) to fostering the attendance of students (Koile & Singer, 2008). Additionally, the findings of advantages of Tablet PC are listed as positive impact on students' cognitive (Carruthers, 2010; Linden, 2008), metacognitive, affective and social cultural learning (Enriquez, 2009; Li, Pow, Wong, & Fung, 2009), motivation to learn (Koile & Singer, 2008) and more engagement with course context (Amelink, Scales & Tront, 2012); increase in group interaction and note-taking ability (Carruthers, 2010); create enjoyable environment for students (Nugroho & Lonsdale, 2010). Despite the success expounded above, it is apparent that successful implementation of technology in school hinges on a number of key factors (Frank, Zhao & Borman, 2004; Levin & Wadmany 2008; Norris et al. 2003; Robertson et al. 2006; Wells 2007). Obviously, technology per se cannot create substantial difference in student learning, with only welcoming it to the educational environment. In fact, a number of articles (Hew & Brush, 2007; Wong & Li, 2006) have indicated that the success of ICT implementation in schools hinges on a number of factors, including (1) teachers' attitudes and beliefs, (2) skills and pedagogies, (3) assessment, (4) resources, (5) school culture, (6) professional development and (7) leadership. Furthermore, there are studies, which reveal the possible negative effects of the technology in classes. An evaluation on the project of One TPC per child project conducted in Thailand points out lack of some basic factors and proposes that Tablet PC technology in education is an unfit remedy to the educational problems of the education, cause to game addiction and attention disorder among children (One Tablet PC per Child: Education for All, n.d.). Moreover, several large studies undertaken had shown that technology usage in school has only a little or no correlation with students' test scores (Warschauer, 2008). Additionally, critical writers, who consider role of the teacher in technology-integrated classes, have been discussing effect, burden, and workload of the technology on teachers. For instance, an evaluation in Ethiopia reported that most teachers experienced trouble changing their teaching approach, which limited the use of the technology in the class (Nugroho & Lonsdale, 2010). Among the many difficulties related with technological device usage in education, Cuban (2001) presented the difficulty, a child would go through in low-tech tertiary education, after meeting technological classes in primary and secondary level.

The literature abounds with studies, which present the positive effects of the Tablet PC and also with studies, which emphasize misconceptions about using a new tool in education and insufficient holistic approach toward technology integration in the classes. In this point, it seems necessary to step forward toward a high-tech education through making use of the products of the technology, without ignoring the critical comprehensions in order to reach a more holistic and systematic view. This need has become more urgent for Turkey, where One Tablet PC per Child project has been introduced in 2010. After Thailand, Turkey’s Ministry of National Education attempted to achieve ICT integration into the education in classrooms through the Project of Movement of Enhancing Opportunities and Improving Technology, known as FATIH Project. This significant educational investment involves providing Interactive whiteboard (IWB), Tablet computer and Internet infrastructure to all schools in basic education (IWBs for all levels; pre-primary, primary, lower and upper secondary levels; Tablet PCs for lower and upper secondary levels) (“FATIH Project”, 2012.). The main goal of the project is to fill the economical and intellectual gaps between technology and masses. As it is known, the technological innovations over the last century have made more information more available to more people than at any other time in human history. However, at the same time, the cost of those technologies put barriers into the accessibility of information and technological tools by majority (Feather, 1998). The projects attempt to enhance equal opportunities in education and to improve ICT use in teaching and learning processes in schools. FATIH, announced as 8 billion-dollar projects, covers providing Wide Area Internet in 42.000 schools, Interactive Whiteboards in 570.000

classrooms, Tablet PCs for 11.000.000 students and for all teachers (Akgül, 2013). Although, from the economical perspective, it can be perceived that these large numbers which are getting even larger over the years are the most crucial part of the project, from educational perspective, it can be interpreted that setting up these hardware is considerably the simplest action among all goals of this innovative movement (Akgül, 2013). Educators and academicians highlight the importance of providing related software and e-content in line with the pedagogical perspective to be developed for effective applications (Bilici, 2011; Dursun, Kuzu, Kurt, Güllüpınar, & Gültekin, 2013; FATIH Projesi Akademisyenler Çalıştayı, 2012; Koparan & Güven, 2012; Kuzu, Kurt, Dursun, Güllüpınar, & Gültekin, 2013; Pamuk, Çakır, Ergun, Yılmaz, & Ayas, 2013). Only providing these components, high expectations from project may be achieved. In the scope of the project, Ministry of National Education (MoNE) has been promising equity, qualified teaching and learning, improved learning through techno-centric classrooms. These expectations shape the hopes of parents, students, teachers and whole nation as a broader perspective. However, there is not much emphasis on whether this machine and the infrastructure will be able to satisfy all the expectations? What can and cannot a technological machine provide in teaching learning environment? Which of the expectations can be met by integrating Tablet PC into the classroom? Investigating these questions can be helpful to determine reasonable expectations from technology-integrated classrooms that can lead to specify goals of the instruction.

The most challenging part of using technological tool in education is presented as a lack of holistic systematic models which contains all the elements of instruction, including subject, context, measurable learning gains, training and support activities (Cristia, 2013). As it is stated in the FATIH project report of Education Reform Initiative (ERG, 2013) the implementation model, which has been chosen among the examples of South America, the USA, Kazakhstan and Russia, does not seem sufficient considering the preliminary evaluation reports. The existing models disregard some important factors of technology integration, such as autonomy of teachers and students' ability to adapt themselves to the technology more quickly than teachers (ERG, 2013). As asserted in the same report that the design behind

OTPC approach and IWB usage in FATIH project are not well designed to satisfy the expectations of how technology improves the teaching and learning process. Thus, in implementation and delivery, technology usage falls behind even the basic expectations. In this regard, with the evolution of technology-integrated learning, it is necessary to make a larger set of interrelated decisions. For this study, Instructional Design is chosen to investigate the elements of learning environment. Dick and Carey (2005) explained the success behind the path of instructional design as to analyze the components of the instruction; to find out the interactions among them; and finally, to present them systematically in order to reach efficient education. In order to reach this efficient education, which can satisfy the expectations, a large range of questions should be asked from the delivery model till sustainability is achieved. For instance, What kind of a delivery model should be use: classroom, web-based, blended? What kind of a learning approach, planning and activities should be chosen? What are the components of Tablet PC integrated instruction; what are their roles; what is the interaction among them? What materials can be used, reused, adapted or built anew? How can the usability, sustainability and affordability of the instruction be met? (Paquette, 2013). These questions are very important in order to adapt a new technological tool to the existing system, just like the attempt in FATIH Project. In Turkey, the national curriculum provides fixed-programs for the schools and teachers. With the beginning of this technological improvement act, the first attention was given to the supplement of hardware and teacher and formators (teachers who can guide the other teachers in the school) education (Akgül, 2013). However, in this process the curriculum was neglected; thus, there was no adaption in program in order to guide or direct teachers and students. Regarding this, in the scope of this study, it is perceived that to cope with all the decisions, a technology oriented instructional design methodology is needed more than ever to realize the dream of FATIH.

Using OTPC approaches all over the world as a base, this study attempts to investigate a systematic approach for Tablet PC usage in education. In the literature, as presented before, there is adequate evidence for effective usage of Tablet computers in classrooms to facilitate learning. However, there is a need to investigate these successful applications, while not ignoring the critical studies. In this study, in order to reach an effective design for Tablet PC-used instruction, two aspects of the phenomena will be searched. The first one is to scrutinize the expectations from this technological tool, in order to distinguish reasonable expectations from the mythical unreasonable ones. Determining what can or cannot be expected from integration of tablets, a road map can be drawn for a systematic instruction. Then, in the second step, the aim is to create a systematic instructional design model for Tablet PC integrated classrooms. In this phase, the field of instructional design and modeling theories will be consulted in order to reveal the possible components of TPC integrated instruction, the sequence and the interaction among them. As a result, this study aims to develop an instructional design model for TPC integrated instruction, which can match the expectations revealed throughout the study.

1.2. Purpose of the Study

Preliminary evaluations of FATIH Project show that there is a lack of systematized approach in Tablet PC integrated instructions (ERG, 2013; "FATIH project," 2012). In this sense, the purpose of the study is to establish a systematic approach toward this integration at the instructional level. To achieve this, two aspects of the Tablet PC usage have been selected: First, the expectations from the technology integration in classrooms; second, to create an Instructional Design Model for TPC usage in instruction. More precisely, the first purpose of this study is to reveal the expectations, which can be invested, in contemporary technology of Tablet PCs in the field of compulsory education. More specifically, the purposes in the first part of the study are:

a. To reveal the expectations from Tablet PC usage in education within prevailing educational discourse.
b. To find out teachers' expectations from Tablet PC technology in basic education.
c. To categorize advantages and disadvantages of Tablet PC usage in current system.

d. To explore the necessary conditions to use Tablet PC instructionally more functional and efficiently.

The second purpose of the study is to examine instructional design process of current applications of Tablet PC supported teaching and learning environment, and also to develop an Instructional Design Model, which can meet the educational expectations we are investing in the practice of introduction of Tablet PC technology into Turkish compulsory education. More specifically, the purposes in the second part of the study are:

a. To reveal the instructional design steps of teachers in current application of TPC usage in the classroom.
b. To study differences between Tablet PC-used instructions done by teachers.
c. To determine the supporting conditions, which should be met in order to make the usage of TPC integrated-Instructional Design Model instructionally functional and advantageous.
d. To find out the steps of the instructional design model suitable for Tablet PC used instruction offered in compulsory education.

1.3. Research Questions

As mentioned in the Purpose of the Study, this study focuses on the expectations from Tablet PC integration in education and the instructional design steps of a functional and advantageous instruction. In this respect, this research is formulated with following questions:

1. What kind of expectations is invested in contemporary technology of Tablet PCs in the field of compulsory education?
    1.1 What are the teachers' expectations related with introduction of Tablet PC in compulsory education in Turkey?
    1.2 Up to what degree does the usage of Tablet PC meet with the expectations in teachers' opinion?

1.3 What are the reasons behind the unmet expectations of Tablet PC usage in classrooms?

1.4 What can be considered as the advantages and disadvantages of Tablet PC usage in classrooms?

1.5 What conditions should be established in order to use Tablet PC instructionally functional and advantageously in teaching and learning process?

2. What Instructional Design Process should be followed in order to adapt instructionally functional and advantageous practice of Tablet PC usage in compulsory education?

2.1 What are the instructional design steps followed by teachers to use Tablet PC technology in current teaching and learning process?

2.2 What should be the steps of the instructional design, which is followed when the necessary conditions for using TPC in teaching and learning process have been met?

The relation between research questions, data gathering, and data analysis is presented in the Table of research questions and methodology (see Appendix A).

1.4. Significance of the Study

Skinner (1969) underlined one of the possible misunderstanding with respect to integration of technology into the education through stating that the real problem was not whether machines think but whether men do. Keeping this in mind, this study attempted to explore Tablet PC integrated instruction, considering the expectations and instructional design steps. Thus, the end product will be instructional design model for Tablet PC usage in classroom, which can satisfy the expectations found and discussed in the study. Therefore, the model will guide 9th grade teachers to revise their expectations and also to design their instruction. Consequently, this study is a scientific endeavor to explore instructional design steps of Tablet PC usage in classrooms systematically and explain the interaction of the instructional components from the perspective of instructional design through modeling in Turkey. Therefore, it will provide positive contribution to the field of technology integration in education and the field of curriculum and instruction. The study hoped to be significant not only for Turkey but also worldwide because it is also expected:

a. to discuss and analyze prevailing discourse in the literature about the expectations from technological tools in education.
b. to contribute to the literature in terms of which of the expectations are appropriate and in appropriate considering the Tablet PC usage in Turkish education system.
c. to contribute to the literature by establishing connection between instructional design modeling and Tablet PC use in education.
d. to guide future studies since preliminary research and the review of literature reveals few systematic studies on Tablet PC used instructions.

1.5. Delimitations and Limitations of the Study

This study was delimited to Tablet PC integration, rather than including all the elements of FATIH Project in Turkey. More specifically, the study is focused on one technological tool used in education, Tablet PCs, not technology usage in education as a whole. Although, in explanations and interpretations, the technology will be perceived as a whole and there will be no attempt to extricate tool from the technology itself, in order to draw the borders of the research. Also, participants of the study are defined as teachers from few pilot schools who are from different branches; experts from the field of instructional design and instructional technology; and also experts cooperating with Ministry of National Education in FATIH Project.

This study has also some limitation because of the characteristics of the research design followed and also the constraints about application of FATIH project, which is not implemented in schools with all components yet. Due to the fact that the study will be conducted with certain numbers of teachers and experts and the participants chosen purposefully, there is a risk of meeting external validity and external reliability. Moreover, this study is limited with one researcher. Especially, in the data gathering, describing and interpreting, the research could meet with the personal point of view of the researcher to some degree. Additionally, this project is limited by the present applications of the FATIH project, which is applied in some pilot schools without using all the elements including interactive features and limited materials, in the 9th grade secondary level.

1.6 Definition of Terms

Tablet Computer (Tablet PC or Tablet): Historically, the Tablet computers are rooted from pen computer technology, which extended over in 1888 (Hager & Burku, n.d.). “A type of notebook computer that has an LCD screen on which the user can write using a special-purpose pen, or stylus. The handwriting is digitized and can be converted to standard text through handwriting recognition, or it can remain as handwritten text.” (Webopedia, 2004).

Information and Communication Technologies (ICT): ICT refers to any form of computing and communication device and also systems that is used to create, store, transmit, manipulate, receive, and interpret information in its various formats. ICT covers both hardware such as computers, tablets, scanners; and also software such as systems software, databases, applications (Doyle, 2008).

FATIH Project: "Movement of Enhancing Opportunities and Improving Technology”, known as FATIH, is among the most significant educational investments of Turkey. FATIH Project proposes that “Smart Class” project is put into practice in all schools around Turkey. With this project, 42.000 schools and 570.000 classes will be equipped with the latest information technologies and will be transformed into computerized classes. In this project, it was aimed to provide ICT equipment to classes in order to achieve the ICT supported teaching until the end of 2013 in related to the goals of creating an information society and have been formed within the scope of the e-transformation of Turkey (MEB, 2012).

CHAPTER II

REVIEW OF THE LITERATURE

A review of the literature was undertaken for the purpose of gathering, presenting and summarizing most relevant information. In order to achieve this, Hegelian perspective of dialectic was tried to be followed to discuss both thesis and antithesis in the literature of technology integration in education. Considering the ultimate goal of reaching synthesis, it examined both the positive and negative sides of technology integration, and researches and theories of proponents and opponents of Tablet PC usage in education. Following this path, literature review was organized around two main themes about Tablet PC integration in education and its related terms in order to draw a comprehensive framework for the reader. The main theme were as follows: historical background of technology integration in education, the expectations from technology in education from both enthusiasts' and skeptics' view, advantages and disadvantages of Tablet PC integration, the field of instructional design (ID) and ID models, and finally, technology integration in instructional design.

2.1. Historical Evolution of Technology in Education

We shape our tools and afterwards our tools shape us
(from Marshall McLuhan's Understanding Media)

The human desire to be taught new knowledge and new skills has never changed throughout time, yet the way it is relayed to youngsters has markedly evolved (Lepi, 2012). One of the major factors, which have a great effect on education, is technology, involves the practical application of knowledge for a purpose

(Spector, 2012). Although this impact was very limited and slow in the first centuries of human existence, it gained acceleration throughout the centuries (as seen in Table 2.1 and Figure 2.2 & 2.3). And now, it is almost impossible to think of education without also thinking about the many different kinds of technology used to support education. Especially, at the beginning of 20th century, the impact of the speed in technology was seen in the literature of effects of technology usage in classrooms. That creates the field of educational technology, which involves the disciplinary application of knowledge for the purpose of improving learning, instruction and performance (Spector, 2012). In this part of the study, the historical touchstones of this endeavor of technology usage in education had been reviewed.

Archeological studies show that the prehistoric people had created their own technology in order to answer their preliminary needs to survive, eat and sleep (Çiğir-Dikyol, 2012). For instance, they used sharp stones for hunting and cave drawings, fire for cooking, paints (out of animal blood, fat) for rituals (Akurgal, 1993). And of course, these devices became part of the oral education, which is needed for transmitting the skills, such as cooking, hunting, tool-making; and knowledge such as the place of the wild animals and nice trees, or information about poisoned plants (Çiğir-Dikyol, 2012).

Figure 2.1. Hall of the Bulls, Lascaux Caves, France

Source: *Lascaux Caves*, France. (n.d.). Retrieved from www.lascaux.culture.fr

After the immigration from one place to another, human started to settle down and began growing their own food and building permanent homes, which later formed the first cities and then states. Around 4th-5th Century in Ancient Greece, academies were established by some philosophers and sophists in order to provide education for elites, in the topics of rhetoric, logic, geography, history and geometry (Ozmon & Craver, 2008). In these Academies, the main technology was wooden stylus on a waxed tablet and abacus (Dunn, 2011). In the same age, in Anatolia and East Anatolia, Akurgal (1993) explained the civilizations like Ionia, Hellens, where there is no systematic education but the traces of using some tablets, abacus and simple machines to transmit knowledge.

During the medieval time, extremely expensive books, bone or ivory stylus on wooden tablets with green or black wax coating, horn-book, which is a wooden paddle with printed letters (as shown in Figure 2.2), and abacus were the technologies used in the male-dominated classrooms (Lepi, 2012). In the same period, Anatolia was living through the same kind of education apart from the humanistic emphasis on religious training. In medrese education during the periods of Karahanlılar till Ottoman Empire, limited books in different languages (Persian, Arabic, Turkish), memorizing paddles, dip pen and inkwell are the known technologies used in classrooms (Somel, 2003).

Figure 2.2. The Horn-book

Source: Giner, J. A. (2007). *What's next: Innovations in newspapers.* Retrieved from http://www.innovationsinnewspapers.com/

Between 18^{th} and 19^{th} century, the classical vision of the world had begun to change toward the modernity, through which all aspects of the life experienced a transformation at a great pace. The act of compulsory school attendance and regulations about equality and free education for all increased the number of students in classrooms (Akyüz, 2010). In order to deal with the problems of this regulated public schooling, the search of creating more effective and qualified teaching-learning environment has been enhanced. One of the results of this quest was consulting more on technology, which accelerated with the industrial revolution. Via the effects of improvements in the technology, classrooms were introduced with different tools with the expectations of better education. Predominant tools represent technology integration in classroom can be listed as mechanical calculator, ferule, which is both a pointer and a corporal punishment device, modern pencil, black and chalkboard, typewriter, and ink wells and steel-nibbed pens for writing (Dunn, 2011; Lepi, 2012).

Table 2.1

Summary of Technology Use in Early Centuries

Period	Education	Technology in Education
50^{th}-40^{th} Century BC Caveman	Oral Tradition	Sharp knives for cave drawings Paints created from powdered minerals, animal blood and flint
5^{th}-4^{th} Century BC Ancient Greece	Education for intellectuals and richest people	Wooden stylus on a waxed tablet Abacus
11^{th}-15^{th} Century AD Medieval	Education for males. Woman from noble families were taught at home related with house-works.	Expensive books Ivory stylus on wooden tablets with green wax coating The Horn-Book Abacus
18^{th} -19^{th} Century The modern times	Public schooling became wider. Compulsory education for all children.	Ink wells and steel-nibbed pens for writing Mechanical calculator Ferule Modern pencil Chalkboard Typewriter

Although, classrooms faced with integration of different technological tools in 19th century (as summarized in Table 2.1), meaningful integration of technology in education can be traced back to the early part of the 20th century when audiovisual aids such as sound, films, pictures, and lanternslides were commonly used in public schools (Reiser & Dempsey, 2007). In chronological order; stereoscope, filmstrips, radio, ballpoint pen, overhead projector, videotapes, headphones, mimeograph, reading accelerator. Although, each tool brought several studies in its wake, among them radio gained a great deal of attention during this period and was popularized as an effective medium for facilitating education. In Turkey, the application of educational radio was seen both in formal education with the efforts of Radio Education Center, established in 1962 and also in wide public education with the programs of TRT (named Turkish Radio and Television Cooperation) (Özdil, 1985). However, contrary to the investments in radio, over next 20 years, radio had very little impact on instructional practices (Cuban, 2004). In 1957, Skinner's teaching machine was the tool of experiments to investigate the outcomes of the behaviorist theory. This mechanical device designed to surpass the usual classroom experience and to it has positive outcomes to improve methods for spelling, math, and other school subjects by using mechanical device (Hill, 1977). The integration of technology into the education had been proceeding by educational TV, the negative and positive effects of which on educational environment have still been studying by researcher, even though there is extensive number of such researches. While excessive and uncontrolled TV watch was deened to be inappropriate for students' cognitive and emotional development (Ball & Bogatz, 1970; Bogatz & Ball, 1971; Gerend, MacKinnon & Nohre, 2000; Kirkorian, Wartella, & Anderson, 2008; Ünlüsoy, 2007). Thakkar, Garrison & Christakis (2006) discussed the positive effect of TV on children's knowledge and imagination. Moreover, Instructional television (ITV) has come a long way since it was first introduced in 1950s and is seen by some districts as a solution for teacher shortage (Donaldson & Knupfer, 2002). This can be perceived as one of the important aspects of educational TV programs in Turkey, conducted mainly by TRT. With the goal of supporting the young republic and help to raise educated individuals, TRT established cooperation with Anadolu Univeristy and Ministry of Education starting from 1964 till end of 1990s (Demiray, Sağlık, Gürses, Özgür, & Candemir, 2000; "TRT Tarihçe," n.d.). Between these years, from students in different education levels to public or some special area workers (like, farmers, technicians) were supported through range of programs broadcasted by TRT channels in Turkey (Demiray et al., 2000).

After the usage of filmstrip viewer and hand-held calculator in education, an early study held on with PLATO (Programmed Logic for Automatic Teaching Operation) computer, which was used for the instruction in public schools in the US by providing one computer every (around) 100 students in 1980s (Van Meer, 2003). This was a signal for a totally different era, which can be called as Computer Age. Innovations in the microchip, digitization, and computer networking have enabled the creation of global flows of people, ideas, signs and images that have given form or substance to the global cultural education (Nixon, 2005). Before ending the 20th century, CD-ROM Drive, wide range usage of PC in education, Interactive Whiteboard, LAN (Local Area Network), WAN (Wide AREA Network) and finally Internet opened the door of more interactive and extensive approach toward instruction (20th century classroom technology has summarized in Figure 2.3).

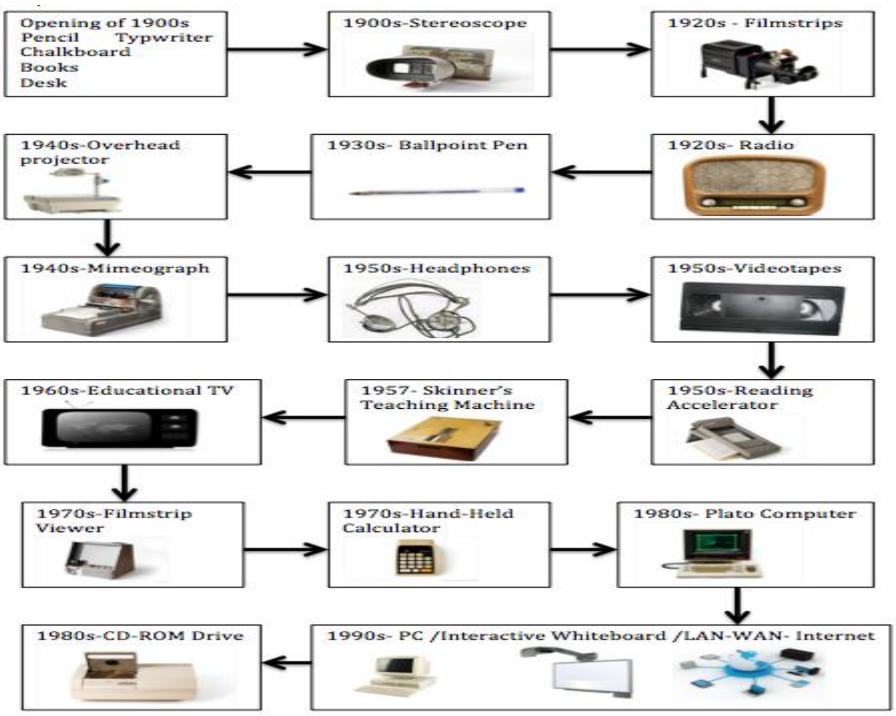

Figure 2.3. Some Important Devices in the Evolution of Educational Technology

Turkey was also one of the countries, which has tried to catch computer age through the endeavor of equipping the classrooms with PC technology since 1984. Computer Assisted Education Project (CAEP) was the first attempt to introduce classroom with computer-assisted education and also it was pioneering study to provide in-service education for teachers in order to teach them computer literacy and programming language (BASIC) (Akkoyunlu & İmer, 1998). These efforts continued in 1990s by providing computers to the schools, training formator teachers, and also supplying educational software, which could support the instruction in different field, like mathematic, physics, and chemistry. In 2000, with the Catching the Era in Education 2000 Project, a series of new development took place that was directed especially at the primary education system (1-8 grade). In the scope of this project, more concrete steps had been taken: Computer labs were established in schools, computer sciences course was introduced in curriculum, and in order to train teachers for this course, department of Computer Education and Instructional technologies had opened. Additionally, a compulsory computer course was introduced to the pre-service teachers in the faculties of education (Parlak-Yılmaz, 2011). In the meantime of these technological efforts to transform society, the standard chalkboard, chalks, and eraser morphed into the white board and markers; overhead projectors sit in inventory while digital projectors hang overhead in the classrooms.

Figure 2.4. 21st Century Technologies in Education

In the turn of 21st century, as it is seen in Figure 2.4, being introduced with the new devices in education gained an acceleration, and also interactivity became popularized with emphasizing software, social network and mobile applications. As a result, the efforts of integrating more interactive tools, like smart respond systems which enables teacher to assess students' understanding interactively and to evaluate students' progress quickly through handheld wireless remotes (or clickers), a receiver and assessment software, has increased (Lepi, 2012). This interactive feature of technology became more widespread with the mobilizing of personal computer, i.e. Laptops. With the support of the some companies, in different parts of the world, different aspect of the computer integration pilot projects was conducted. For example, one of the contemporary project conducted under the name of Korea Smart Learning Project, provides laptops for students. In this One Laptop Per Child (OLPC) strategy, the plan of government of Korea was to digitalize hardcopy textbooks, reference books, dictionaries and other teaching materials for elementary schools, through integrating laptops into the education. The other aspect of the project is to make students take lessons using digital-textbooks and online-based materials on computers, smartphones and tablets (Severin & Capota, 2011).

As the evolution of the technology in education considered, the digital devices like Tablet PC and smartphones are already perceived as an opportunity for teaching and learning. In last decade, tablets have already started to use in education, either with One Tablet Per Child (OTPC) projects or some less widen applications. Although, the literature contains positive effects of these interactive machines in education, Faure and Orthober (2011) discussed the love and hates relationship between today's technologies and education. Historically, no one was against the usage of pen, but mobile technologies in 2010s created their own opponents, who support ban of cell phones, smartphones and interactive devices in classrooms. However, the developments in technology showed that this technological era is not only limited with some devices but it mainly being characterized with interactive software, social media, YouTube, and other social networking sites, blogs, and also interactive mobile apps (as shown in Figure 2.4). Thus, it is not possible to disregard the interactional effect of technology in the classrooms. In todays, educational technologists are aware of that the emphasis on technology is shifting from device to the interactive software, mainly on Internet. As it is observed in Figure 2.3 & 2.4, the effect of interaction is enriching the items in the teaching-learning environment. Considering the speed in technology, it can be easily predicted that the educational environment will continue to be enhanced with newer innovations.

In this part of the study, the main aim was to present the efforts of technology integration in education, which is nearly as old as human beings and it is quite obvious, that technology cannot create magical effect in educational environment. However, it is known that technology is helping the field of education to provide devices, which facilitate, support or ease teaching and learning, but it is quite away from creating revolution (Cuban, 2001). In the scope of this study, the contemporary technological device, Tablet PC and its interactive utilities will be discussed considering the FATIH Project, an example for OTPC Project from Turkey. In order to take the advantage of this device in education, in the light of the earlier examples from horn-brook to Skinner's teaching machine, this integration will be investigated considering the vast knowledge of education, without being trapped by the excitement of an innovation. In the following part, before investigating of Tablet PC integration, FATIH Project will be presented with its components in general.

2.2. FATIH Project: An Example of Tablet PC Usage in Education

FATIH, Movement to Increase Opportunities and Improve Technology, is a project designed by Ministry of National Education (MoNE) and supported by Ministry of Transport, Maritime Affairs and Communications to provide IWBs, Tablet PC and Internet network infrastructure to all schools in basic education (ERG, 2013). After project announced in 2010, the pilot studies have started by preparing the necessary platforms, like establishing infrastructure, providing devices, organizing training and creating necessary programs, software. Before going further in explaining this project and the place of Tablet PC in project, it is preferred to present the current technologies in Turkish schooling system, in order to comprehend the school environment, which waits for meeting with the high technology proposed by FATIH.

2.2.1. Current technologies in Turkish schools. Before going on the details of this improvement, it is considered as crucial to present the current situation in Turkish classrooms. The basic material tools for schooling are paper, pens, books, pencils and chalk. The scope, sequence and content of the curriculum are captured in the textbook. Worksheets and exercises, which are copied with Photocopy machine in the school, provided by books, by website of Board of Education or some personal sites on Internet. Blackboards and overhead projectors supply cheap way of supporting teacher's lecture and sharing work. Although, from applying to the national examination to entering students' grades onto the digital system or to filling questionnaires/documents sent by ministry done by teachers using computers in the school, overall school coordination relies heavily on paper for records and communication. While mentioning the technologies in current schools, it shouldn't be skipped that the ever-present-loud speaker system, which still exists in one corner of the classrooms for school-wide announcements.

In addition to the technologies, mentioned above, in the history of technology integration process in the Turkish education system, computers have an important place. Through the earlier attempts, mentioned in the first part, schools had equipped with computers. Then, with second cycle of act, which began with the Catching the Era in Education 2000 project, computer laboratories set up in 1990s were replaced by 3188 IT classrooms. Moreover, WAN connection had provided in the IT classrooms with the goal of using Internet for teaching purposes (MEB, 2002 DPT, 2004). However, the unbalance between number of students and number of hardware resulted with only one-hour student-computer interaction per week (Özdemir & Kılıç, 2007). In 2008, the number of IT classroom set up with the support of domestic and foreign resources was 29,264 (MEB EĞİTEK, 2008). According to the statistics, the number of students per computer was 45, at the secondary level, it was 37 and in the field of vocational and technical education, it was 11 (MEB EĞİTEK, 2008). Parallel to this, the new goal set by the MoNE was to provide computer to every classroom at the primary education stage (Uyanıker, 2007) in order to increase teacher's skills and also to encourage students' interests. Although, the attempts to improve ICT in schooling system has continued, the emphasis was on curriculum, teacher training and software development rather than the number of the device in schools.

In addition to the IT classrooms, and some computer-integrated schools, it is important to present other side of the Turkish schooling system. Far from having IT classes, there are village schools without water or electricity supply (Muşovasi, 2011) and with old style heaters (MEB, 2013; MEB Personel, 2011) and also with the toilets out of school buildings (MEB, 2013). In such cases, it is even harder to talk about technologies in the classrooms apart from chalkboard, chalks, pen and books. Thus, it can be said that FATIH Project is waited by the schools which show variety considering the educational technologies used in the classrooms. In this sub-title, before investigating the features and promises of FATIH Project, it is tried to be presented from already highly technology adapted school to village schools who haven't met with the neither I nor T part of the high-tech education.

2.2.2. FATIH project: From 2010 till today. The main goal of the FATIH project has announced as to enhance equality of opportunity in education and to improve ICT use in teaching and learning process in schools in order to catch the technology age. FATIH was introduced in 2010 as a 3 year-project with the goal of setting up WAN in 42.000 schools, IWBs in 570.000 classrooms and Tablet PCs for 11.000.000 students in lower and upper secondary level and for all teachers ("FATIH project," 2012). In the project, addition to the hardware, software and in-service training were promised with presenting five main components:

1. Providing equipment and software
2. Providing educational e-content and management of e-content
3. Effective usage of the ICT in teaching programs
4. In-service training of the teachers
5. Conscious, manageable and measurable ICT usage ("FATIH Project," 2012).

In 2012, the pilot studies started in 52 schools in 17 different cities, and this number increased in 2013 with distributing of Tablet PC to 36.000 6th and 9th grade level students and 13.000 teachers (in 350 schools), establishing 100.000 IWB and WAN in 3362 schools (Akgül, 201). This followed with establishing of 110 distance learning centers in 81 provinces, which will facilitate teacher access in the future e-learning centers all over the country. Moreover, in-service trainings for teachers were started by providing 30-hours education on ICT use in education and 25-hour on preparatory education. Moreover, in order to answer the need of e-content in different subject fields, a website (eba.gov.tr) was constructed. In fall semester of 2013, number of the schools having IWB and Tablet PC increased equipping 271 more schools (Akgül, 2013).

The preliminary results of the evaluations showed the main insufficient aspects of the project:

1. The short-term, medium-term and long-term goals of the project have not been well defined (Akgül, 2013).
2. Project has lack of leader (Akgül, 2013) and also local autonomy seems important to provide room for innovation and encourage local ownership (ERG, 2013). On the other hand, FATIH is allowing for flexibility in implementation, which results with insufficient applications. It shows need for providing support and guidance for teachers (ERG, 2013).
3. In the project, the disabled students were disregarded. In Turkey, there are 103.758 disabled students in primary level; 14.792 in secondary level. There are 303 schools in primary level and 102 schools in secondary level for different groups of disability: deaf-blindness, deafness, visual impairment, orthopedic impairment, autism, developmental delay, hearing impairment, intellectual disability, specific learning disability (Karabacak, 2012).
4. In an assessment based system, providing a technological tool serves mainly for reproduction of the same system, like answering more multiple-choice questions. Considering the goals presented in project, applications fall behind the expectations (FATIH Projesi Akademisyenler Çalıştayı, 2012).
5. Not consulting on the theories, experts and instructional designers resulted with insufficient efforts to integrate e-content and tools into the classroom. That can be overcome through designing instruction for technology integrated teaching and

learning environment (FATIH Projesi Akademisyenler Çalıştayı, 2012).

6. There are not enough e-sources to support technology-integrated lessons. It seems important to reach open sources and educational materials and also to connect Internet to enrich teaching-learning environment (FATIH Projesi Akademisyenler Çalıştayı, 2012). Apart from the website provided by MoNE, students and teachers should be able to reach interactive sources, and to create their own content or applications (Akgül, 2013).

2.2.3. Economic aspects of the FATIH project. It can be overlooked that this kind of highly popular 20th and 21st century technology investments in education are economic projects in disguise. Up to today, a considerable amount of countries announced technology usage in their classrooms. The shape and budget of these projects showed variety according to the technology of the time. Staring from 2000s, up to now, some projects, which require big budgets, were conducted under the varieties of names: Bring Your Own Device (BYOD) in the USA, One Laptop per Child (OLPC) in the US, Rwanda, Peru, Uruguay, Ethiopia Italy, Nigeria, Ghana, and in Portugal (Apple's Project) other 40 countries (Camfield, Kobulsky & Paris, 2007; OLPC, 2007), One Tablet per Child (OTPC) in Thailand (Viriyapong & Harfield, 2013), in the US (New York City), in Ethiopia, India, Netherland (One IPAD per Child), (King, 2013); and Global Learning Portal (GLP) for teachers and educational administrators in Afghanistan, Brazil, Egypt, Kenya, Mexico and the Phillippines (Camfield, Kobulsky & Paris, 2007); UNESCO's "combat the digital divide" Project in Lebanon, Beirut, France (UNESCO, 2002); and Smart Education in Korea (Jeong-ju, 2012).

One of the main points of consideration in all these projects is the budget discussion. In order to provide ICT device to each student either in few schools, or in a region necessitate a considerable amount of budget arrangement in governmental level (Camfield, Kobulsky & Paris, 2007) if there is no sponsor to cover all the expense like Apple's projects conducted in the US, Netherland, Portugal and so on. In this vein, FATIH project, hitting the road with the slogan of "Capturing Our Tomorrow Starting from Today" (MEB Projects, 2010, p. 2), has also huge economical aspect hitting the budget of the Ministry of National Education. Although the budget of the project was announced as 7-8 billion dollars by Deputy Prime Minister Ali Babacan (“Fatih projesinde maaliyet,” 2012), Republican People’s Party (CHP) İzmir deputy Erdal Aksünger predicted the cost more than 40 billion dollars in 10 years (Baransu & Çelik, 2012). In 2012, the first bidding was conducted and it is decided on that the first batch of Tablet PCs, which was around 4000, be provided by General Mobile through offering 599 TRY per device. Meantime, Vestel won the bidding process for 84.921 IWBs by offering 339.6 million TRY (Kustur, 2012). The second tender resulted in the distribution of 49.000 Tablet PCs provided by Vestel. The third round of bidding done in November 2013 and as result, Telpa A.Ş. (distributor of Samsung) was awarded for 675.000 Tablet PC for the price of 409 million TRY; Vestel for 347.367 IWBs with the budget of 999.7 million TRY and OYTEK for 13.645 A3 printers, 28.351 A4 printers with the budget of 96.5 million TRY (Kustur, 2012).

As it is seen the three tenders have been held for supplying hardware as part of the FATIH project, it is not very easy to underestimate the budget within this investment. Additionally, it should be considered that these numbers have only covered the hardware needs (even, not all of them) of the project. As the early evaluation of the project show that in order to achieve the goals of FATIH, it looks important to do a remarkable budget estimation for supporting software, enriching e-content, creating applications and improving in-service education. In this regard, one of the plausible objectives of this investment can also be presented as economic transformation.

There is a significant amount of evidence suggesting that economic transformation is a key driver for the choice of IWBs and Tablet PCs in FATIH (Kozma, 2005). The great amount of IWBs have been provided by a Turkish companies, Vestel, Telpa, OYTEK and a local operating system has being promoted to use. In this regard, although feasibility is questionable, it can be said that inner economy has been tried to be promoted (ERG, 2013).

Although the economic aspects of the project cannot be ignored, in order to turn to this investment into a real opportunity for improving ICT integration in Turkish education, a budget should be done regarding all aspects of the project. For realizing this process, as it is seen in other examples, it is important to design the educational components, including curriculum, instructional design, software, e-content and e-materials (Severin & Capota, 2011). As Steve Jobs stated in wired interview, “what’s wrong with education cannot be fixed by technology” (Wolf, 1996, p.2) Thus, only bringing technology into the classroom cannot solve the complications, but it can support and enrich the teaching-learning environment with a careful planning, and without forgetting the basics of instruction. A successful education cannot be handle without considering all the main elements of instruction, planning, development, interaction among factors, assessment and evaluation (Dick, Carey & Carey, 2005). Consequently, if FATIH project, which close its eye to the main factors of the field of the education, can easily end up with failure (ERG, 2013) and the investment done for the project can go under risk. So, there is a great need to turn this significant financial project into a shining educational improvement for our country. However, in order to develop reasonable solutions, it is necessary to understand the triggers for the effort of technology integration in education more deeply. In the scope of this study, apart from the economic reasons presented in this part, “big expectations” will be discussed as one of the significant prompts. In the following part of the study, the endeavor of technological tool use in education will be investigated from the perspective of expectation. In order to develop more eclectic approach toward technology integration, first, the arguments of technology enthusiasts, who are supporting technology usage in classroom and showing the positive sides of the field, will be presented and this will be followed by the ideas of skeptics, who scrutinize the thesis proposed by the enthusiasts in order to see different aspects of the topic.

2.3. Expectations from Technology: Enthusiasts’ Arguments

Technological developments have always found a critical place in the center of social and institutional change. Enthusiasts predict that these technological changes in the world must also transform into the education system. The justification behind the investment of time, energy and cost in the integration of technology into the classrooms was explained by some expectations throughout the literature (Culp, Honey, & Mandinach, 2003; Collins & Halverson, 2009). These expectations can be categorized under three main titles. The first group of expectations invested in the technology integration in education perceives technology as a change agent and as a means to maintain economic competitiveness. They defend their perspective that world is facing with rapid change through technology and it is possible to prepare individuals for this world by only adapting schooling into it. The second is using of technology as a means to address difficulties in teaching and learning. According to this perspective, technology provides enriched capabilities for educating learners, and that schools can embrace these capabilities to reshape education (Collins & Halverson, 2009). The third group is that technology presents varieties of solution in the different worlds like business, physical sciences and entertainment, and this creates expectation to find answer for the rooted problems of education. Thus, the enthusiasts, who can be categorized under this last group, create an expectation to find solution for the issues dating back to centuries ago.

2.3.1 First group of expectations: Technology as a change agent and maintaining economic competitiveness. The first group of expectations is related with the contemporary definition of the role of the school, which is preparing individuals for the rapidly changing, technologically adapted and competitive sectors (Cuban, 2001). 21st century created its own discourse through rapid shifts in the world of economy, which have dictated the need for many individuals to obtain, maintain and enhance their skills with technology. The continuous implementation and adaption of technology in different sectors requires a workforce that understands the need to constantly learn and upgrade their skills (Newby, Stepich, Lehman, & Russell, 2006). In this regard, the definition of competent adult, worker or citizen has become more dependent on computer skills, and it requires mastery in computer tools to accomplish the necessary tasks (Brown, 2007). Today, the Internet is perceived as the main source to search for information or to complete some works. Thus, it is expected from an individual to find required information on web, evaluate its usefulness and quality, and to synthesize the information gathered and come up with a new understanding (Collins & Halverson, 2009). If we think about daily life to business life, computer and information age has changed the way we function; calculating has already moved from pen-and-paper computation to designing spreadsheets, managing complex databases, and using statistical analysis programs; or some simple daily life activities like making airline reservations or check-in, shopping, transferring money and even chatting with a friend have already taken its place on Internet. To prepare students to communicate in this emerging world requires not simply traditional reading and writing but learning how to communicate using different media (Brown, 2007). Technology enthusiasts want schools to embrace possibilities of new technologies in many ways. In the scope of schooling, it is expected that students efficiently operate a range of educational technology functions and applications for creating, communicating, inquiring and for the management, storage and retrieval of information and data (Curriculum Corporation, 2006). And also, to be prepared for the future market, where they will be involved, using technology in process of inquiry and research is anticipated. In order to be ready for life, they should identify information and data needs and plan actions to locate, access and retrieve information and data; organize, manipulate, structure and refine information to improve their interpretations and construct new understandings; and finally judge the quality of the sources they use (ASIJ, 2012)

Thus, it is expected from technology integration to raise individuals who can adapt themselves this ever-changing world and to make schools agent of this change, as it is drawn in FATIH Project. This common perception has also taken its place in the scope of the project by highlighting the role of the school to become the center of e-transformation of Turkey in order to prepare children for their leading roles in the global knowledge economy. In this framework, the goals listed as to upskilled children “the ability to use the basic information and communication technologies,” to make children get “benefit from e-education facilities through effective usage of Internet” and other ICT tools (“FATIH project,” 2012). The main purpose of the project “prepare the future generation from today” has shown parallelism with the expectation from technology in school by being change agent for whole society.

2.3.2 Second group of expectations: Technology as a means to address difficulties in teaching and learning. The second group of expectations, which has been supported by researches in the field, is that technology can enhance the teaching and learning processes and provide more effective education addressing difficulties in teaching and learning (Newby, Stepich, Lehman & Russell, 2006). It is expected that new technologies will force schools to adjust and incorporate new methods into the core practice of teaching and learning (Collins & Halverson, 2009). Some capabilities of technology, like providing interactive learning environment, addresses several senses at a time, speed of reaching information, customization, emphasis on learner control, scaffolding, multimedia, easy reflection, advance communications has been increased the expectation of evolving educational standards through technology (Collins & Halverson, 2009; Cuban, 2001, McCabe, 1998; Kalogiannakis, 2008). More specifically, it enhances active learning and collaboration, since technology medium facilities information exchange (McCabe, 1998) and also grants students success to facts, ideas and primary sources (Cuban, 2001). Technology has a positive impact on improvement of literacy development, language learning, learning a content and recognition level, problem solving, and self-esteem (Boster, Meyer, Roberto & Inge, 2002; Simonson & Maushak, 2001; Dunleavy & Heinecke, 2007; Lewis, 2004; Maushak, Chen, & Lau, 2001; Sivin-Kachala, 1998; Tracey & Young, 2006). Moreover, enthusiasts justify that technology supports more thoughtful participation due to the text-based, asynchronous nature of interaction that shifts the control from teacher to a more democratic group orientation and distributes the power to the participants (McCabe, 1998; Scardamalia & Berieter, 1991). This shift in control enhance communication; they share, interact, develop relationships and apply educational technology to present information and data, engage with audience and collaborate in meaningful ways, like face-to-face, remotely with individuals or with local and global communities (ASIJ, 2012). Moreover, literature of enthusiast abound with the positive effect of technology in schooling through enhancing motivation and creating opportunities for activities and projects, which help students engage more with the schooling efforts (Abowd, 2000; Amelink, Scales & Tront, 2012; Ayersman, 1996; Becker, 2000; Chen & McGrath, 2003; Kadiyala & Crynes, 1998; Sivin-Kachala &

Bialo, 2000). Cuban (2001) underlines the importance of motivational effect of technology, especially for whom "would not otherwise be engaged" (p. 70). As a summary, under this second group, considerably great expectation has been created with the positive results of these studies, which show positive effect of technology usage in teaching and learning process and school environment. In the past few decades, the importance of these expectations was observed in governmental or private efforts in technology integration in different countries. With the same line of the projects from the US, Thailand, Netherland, Nigeria, Turkey has been trying to get benefit form technology in order to achieve betterment in education. The goals of FATIH Project, "acquiring knowledge using more sensory organs, participate and take responsibility more due to self-confidence from knowledge acquisition, shaped his/her own life path" are attributed to the possible opportunities of technology in education.

2.3.3 Third group of expectations: Technology as an answer to the rooted problems of education. The third group of expectations is perceived as the application of technological processes and tools, which can be used to solve problems of education (Seels & Richey, 1994). Enthusiasts believed that technology integration in education could create fundamental change in classroom practice (Cuban, 2001). It is perceived as technology has a power to create revolution effect in education. This increases the expectations from technology integration, regarding some aspects of schooling system. One of the main issues is equity, highlighted in wide technology projects: OLPC (Camfield, Kobulsky & Paris, 2007; OLPC, 2007), OTPC (King, 2013; Viriyapong & Harfiedl, 2013), Korean Smart Education Project (Jeong-ju, 2012). In Similar with presented studies, FATIH project, one of the main promises is about equity ("FATIH project," 2012). Today, public expect from government, ensuring equal opportunities and equal quality of education for all children attending school system. This also gives clue about the social shift that shaped parents' perception about their children and the schooling. Before the free-compulsory public acts, parents' desire related with their children was to follow in their footsteps. And so the education they expected for their children was the same education they had acquired. For example, if they were farmers, the children were expected to learn to be farmers like their parents. If they were engaged in music, their children were expected to get music education (Camfield, Kobulsky & Paris, 2007). Thus the goal was to raise children with same skills their parents had. When, it is considered from social theories, it can be said that these expectations supported reproduction of class differences. There was a little space for social mobility that would allow children to advance themselves by getting a good education (Collins & Halverson, 2009). However, with the foundation of republic in Turkey, there were attempts to provide common and equal compulsory education for all. In order to achieve this, some widespread regulations in education were done: education for girls, free and compulsory education in public schools, regional boarding primary education schools (YIBO, Yatılı Bölge Okulları), Village Institutes (köy enstitüleri), or bussed primary education (taşımalı eğitim) (Akyüz, 2010). These acts has changed also the perception of education and, unlike the old perception, parents begin to expect their children have a good education in a common school system in order to take advantage of social mobility. Over the time, technology has gained an important role to sustain this equity. It is accepted that technology can increase the effectiveness of instruction by reaching those students who may have been previously inhibited geographically, physically, or even socially (Rogers, 2003). Moreover, some proponents suggested that technology integration could bring everyone up to a common and high level of success (Collins & Halverson, 2009). With FATIH Project, the same expectation has aroused in order to solve equity problem in Turkey. It is proposed in the scope of the project that equity in education will be improved through supporting classrooms from east to west with technology integration, and appropriate e-learning facilities.

In addition to equity, modern school system tries to emphasize autonomous learning and life-long learning, because future requires a continuous learning process, expertise in information technologies and also skills to learn by your own (Cuban, 2001; Jonassen, Peck & Wilson, 1999). Rather than the imperatives of previous age like uniformity, didacticism and teacher control, this new age emphasizes customization, interaction and user-control (Collins & Halverson, 2009). Technology integration in education can support individuals through teaching how to access knowledge, how to develop abilities of using information technologies, how to pursue their own interests and goals, how to control their own act, communication and even who they are (Collins & Halverson, 2009). Considering this, through FATIH Project a lifelong learning approach has tried to be established by developing "the proper structures in which all individuals can improve themselves through e-learning, and development of the e-content" ("FATIH project," 2012). Additionally, autonomy has also emphasized in the attainments of project that students will "shape their future based on their own purpose" and they will take their own control ("FATIH project," 2012).

Although it is clear from the literature that expectations related with technology usage or integration in education is very high, the skeptics' literature, which are producing anti-thesis nearly all flattered aspects of the technology, should not be disregarded. In the scope of this study, in order to reach a synthesis, it is preferred to present both thesis and anti-thesis related with the topic without drifting apart from the focus. In this vein, the following title will investigate skeptics' arguments related with the technology integration in the classrooms.

2.4. Expectations from Technology: Skeptics' Arguments

There has been great amount of expectations invested into the reforms of technology integration in education with the hope of betterment in schooling. As shown under the title of enthusiasts' perception, different kinds of expectations from minor to major were drawn through the long history of educational technology. However, during these efforts, for thoughts, idea and finding excited about the possibility of how technology integration in education can create change in education, there has been shaped a skeptical idea, which questioned the attributed value of technology in the schooling system. Proponents of technology integration predict great revolutions in schooling as a result of technological innovations (Collins & Halverson, 2009; Hew & Brush 2007). However, skeptics have already begun to discuss the reasons of fail in educational reforms because "lately, many reformers have been frustrated with the seemingly stubborn refusal of school to change" (Collins & Halverson, 2009, p.

35). There are some skeptics, like Cuban (2001), who summarized innovations like radio, TV, filmstrips, computers had little effect to change schooling, or Collins and Halverson (2009), who argued that new technologies has never been central of schooling, just as earlier technologies, such as television, laptop, were never adapted in schools in the ways enthusiasts envisioned. Considering this, in this part of the study, skeptics' opinions have been discussed, considering the arguments presented in previous title of "2.3. Expectations from technology: Enthusiasts' Arguments", in order to distinguish the unreasonable expectations from the reasonable ones and also to detect necessary conditions to meet with the potentials of technology. In this regard, this part has limited with the theories of skeptics, which can be encountered with the expectations drawn above.

2.4.1 First group of expectations: Technology as a change agent and maintaining economic competitiveness. The first expectation presented previously was school being change agent through technology integration. Literature abounds with the studies; it is believed that school can play a central role to reform toward technologized world (Berman & McLaughlin, 1975; Desimone, 2002; Firestone & Corbett, 1988; Fullan, 1991). The common aspect of these studies is their welcoming sentence: For example, Education needs to catch 21st century… Raising citizens for the future… Effects of the rapid change in technology in education… transformation of constant change in technology into education.., The need of transforming education for future global knowledge economy… (Berman & McLaughlin, 1975; Desimone, 2002; Facer, 2011; Firestone & Corbett, 1988; Fullan, 1991) These repeating wordings have become popular entrance for the articles, investigations or writings in the field of educational technology. The repeating pattern of these lines have already created a discourse in the technology integration, which shows using the newest technologies in the classroom as an inevitable and the only way to make schools to compete with the rapidly changing global knowledge economy. However, during this mind mapping, some important aspects of schooling system have been skipped. In many field of education, it is investigated how the school system stubbornly resists changes to its core practices. Collins and Halverson (2009) explained, "It is not that schools never change. It's that schools change very slowly!"

(p.30). The main reason of this phenomenon is the interlocking and self-sustaining characteristics of school system, which David (2009) named as jigsaw puzzle. In addition to the relation between existing pieces, new parts needs to fit only into the gaps and pattern shaped by previous practices. For example, OLPC and OTPC projects tried to reshape current goals in curriculum, prevailing instruction, assessment and curricular practices. This requires a well-structured teacher training, which may result with students' fail till to satisfy all needs of teachers. The possible quake in teachers' and curriculum adaptation process, parents, who witness the failure of their students and teachers, can start to complain. Besides, all these components related with the experts and the accountable persons in minister. Hence, a highly evolved, complex institutional system can be locked in place and it can be very difficult to change. Especially, in such complicated system, the technologies that guide a system can be as difficult to change as the practices they guide. As Cohen (1988) stated that the flexibility of technology determined the degree of adaptation into the institution. Therefore, it is very important to plan the integration of technology into the existing schooling system in order to struggle less with the resistance and also to prevent technology be ignored or relegated to the periphery, as it is experienced in computer labs established in 1990s with the project of computer-supported education held by Turkish Ministry of Education (Akkoyunlu & İmer, 1998). In order to not repeat the previous failures, in FATIH Project, it is important to make provision against the static and hard-to-change nature of schooling as a whole. In this regard, it seems crucial to consider all the components of the educational institutions and schooling, including the all the characteristics of the system and people involved in different mechanism.

The other aspect related with school being as a change agent in order to maintain economic competitiveness for students is to introduce children with technology and prepare them for the game of global world and its needs. Schools are perceived as center to prepare individuals for competitive global and capital economy, and this discourse has already accepted without overthink. However, in this conventional speech, the historic civic idealism and broad social purposes of education serve in a democracy seem to remain forgotten (Cuban, 2001). It is taken into consideration how efficient the schools are as an instrument for global economy rather than the value of schooling for public good, which prizes civic duties and democratic virtues (Putnam, 1995). For the critics, Putnam (1995) and Portes (1998), pointed out the decrease in social capital because of the shift in the role of schools that created loose connection between individual and society, and the connection between building trust and cooperation in a society so that keeping democracy vital.

In addition to the social aspect of changing the role of schooling in order to prepare individuals for technology integrated economic life, there is another important aspect, which should not be forgotten, that students today have always been around technology (McGee & Diaz, 2007). Prensky (2001, p.1) called them as "digital natives," who have known no time when computers were not in existence. They are "native speakers of the digital language of computers, video games, Internet" (p.1). According to the results of studies, conducted by Turkish Statistical Institute, (TurkStat, 2013) computer use started at the age of 8 and Internet use started at the age of 9 on the average. Although only 24.4% of children have their own PC, 60.5% of the children use computer almost every day between the ages of 6 to 15. Additionally, information and communication technology (ICT) usage survey on households and individuals (TurkStat, 2013) shows that the rate of computer and internet usage at home is increasing and recent data displays that nearly half of the population has broadband connection in their house and they possess at least one device (PC, laptop, tablet, smartphone) to connect the Internet. In addition to have technological device and Internet at home, children are accessing Internet through devices of their peers or computers in Internet Café in order to do homework, play interactive game, use social media, chat with friends, and so on.

In this regard, as Collins and Halverson (2009) argued, children are learning more outside of school through technology. That creates inconsistency between technology and schooling. Because, as it is shown in previous part, the discourse which emphasizes raising up individuals for ever-changing world created by enthusiasts of technology integration underlines the importance of making children get familiar with information technology. However, considerable number of children, as digital natives, is already meeting with technology out of school doors. Considering this, it could be necessary to rethink education both inside and outside of school context (Collins & Halverson, 2009; Cuban, 2001). Moreover, it is crucial to consider the teacher's case in front of these digital natives. As Prensky (2001) explains students, who are already adapted to technology, has shaping their desires and expectations from their teachers, who are generally "digital immigrants." It means that most teachers like immigrants, try to adapt technology into their life rather than a full acceptation, as a result, they always retain some degree. For example, they prefer to print out a documents rather than reading in the digital form. Thus, digital native students perceive technology as an integral part of their life, whereas their teachers see it simply as technology (Dziuban, Moskal, Bradford, Brophy-Ellison, & Groff, 2007). This significant difference creates a disconnection, which create some challenges for both teachers and students. Thus, while investing expectations on the perspective of School as an Agent, the presented confliction between students and teachers should not be ignored. That brings this study to the point where the expectations from teacher and their actual circumstances should be scrutinized in detail.

Almost each of new technological innovation creates high expectations for reforming schools, rich promotional rhetoric, and new policies that encouraged brad availability of the device, "yet resulted in limited classrooms use" (Cuban, 2001, p. 137). The main reason of that is presented as teacher factor; because international experience have shown that teachers play a key role in utilizing the educational potential of technology (Niederhauser & Stoddart, 2001). As many studies pointed out that the expectation of improving education through technology is mainly dependent on teachers: their acceptance level, attitude, beliefs, knowledge, capability, and their total being of digital immigrants (Cuban, 2001; Dziuban et al., 2010; Harris, Mishra & Koehler, 2009; Kabakçı-Yurdakul, 2011; Mishra & Koehler, 2006; Niederhauser & Stoddart, 2001; Roblyer, 2006; Sheingold & Hadley, 1990; Smith, 1995; Teo, 2009a; Teo, 2009b; Usluel & Demiraslan, 2005; Varank & Tozoğlu, 2006). First of all, literature shows that teachers perceive the technology integration into the classroom as a complex and challenging procedure. Cuban (2001) presented one of the main reasons behind was the expected shift in teachers' and students' role, the social organization of the classroom and power relationships between teacher and students. Technology integration expect a lot from teacher to adapt themselves totally different teaching-learning environment, which requires teacher play a considerable different role. Teachers are expert in their respective disciplines, but confronting new and unfamiliar technologies can quickly turn them into novice position (Dziuban et al., 2010; Papachristos et al., 2010). Also, "It is difficult for teachers to implement substantially changed programs when they already have dedicated years adapting to what the traditional system of school offers" (Collins & Halverson, 2009, p. 36). As a result, teachers realize that their students know much more about specific technologies and adapt themselves to new schooling system better than they do. In such cases, this new situation threats the balance of power relationship between teacher and students and creates new patterns. In this point, teachers begin to play a key role in utilizing or ignoring the educational potential of technology in classrooms (Kalogiannakis, 2008). Their knowledge, attitudes, beliefs and skills affect the way technological innovation applied in education, because teachers decide whether the promise of technology is fulfilled or not (Niederhauser & Stoddart, 2001). Considering this fact, it should not be expected from every teacher to use technology at the same level due to his or her varying levels of readiness, enthusiasm, knowledge and competency. As Rogers' (2003) diffusion of innovations model, depicted in Figure 2.5, suggested that members of an organization cannot be homogenously engaged with an innovation. Innovators, who have advanced technical skills, are forerunners to experiment with a new concept or tool and put it in use. These are followed by early adapters, who move innovation to the mainstream; then early and late adopt innovation to their applications. The final category is laggards, who are stubborn to give up their traditional beliefs and practices (Rogers, 2003). In this model, early adapters and traditional resisters are important for managing the diffusion of innovation is that each group can either help accelerate or become obstacle to successful change. In this regard, first group of teachers can be used as in-house advocates or trainers in order provide peer-support among teacher community and also in order to break down organizational top down hierarchy (Spector, 2012). It is also important to detect resisters and develop strategy for them. For example, as Spector (2012, p. 115) suggested that “it may be wise to leave those most likely to resist until the end of the process so that it will be clear to them that the technology has gained traction within and throughout organization.” In this regard, at least early adapter should be included into decision making processes and also, a systematic an comprehensive training (both as an in-service and pre-service) should be provided in order to meet with different needs and attitudes of teachers (Becker, 2000; Cuban, 2001; Dziuban et al., 2010; Knupfer, 1987; Willis & Mehlinger, 1996; Niederhauser & Stoddart, 2001). As a result, it is probable that without effective and systematic teacher support and teacher training, the expected change and desired reform will fall into disgrace.

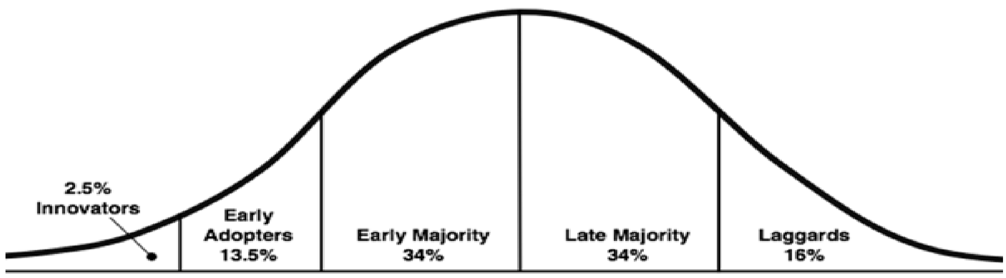

Figure 2.5. Diffusion of Innovations Model
Source: Rogers, E. M. (2003). *Diffusion of innovations.* New York: Free Press.

Up to now, the arguments of skeptics related with school’s role as an agent was discussed. However, it is also found central, parallel with the expectations of enthusiasts’ part, to examine the definition of knowledge, ability and character that children need in order to orient them to the global economy world waiting them. When the role of the school redefined as preparing individuals for the rapidly changing world, which is technology-adapted and includes competitive global business sectors, education has started to change the description of “competent individual,” as well (Newby, et al., 2006). As Prensky (2001) stated that it was not easy to predict what would our children face with in some few decades time, but it was still important to support their personality in different aspects. Especially, after computer technologies introduced in schools, every domains of education from cognitive skills (Jonassen & Reeves, 1996; Li & Liu, 2008) like problem solving, performing queries, organizing, sorting and constructing knowledge, to affective skills (Kalogiannakis, 2008) like communication, attitude development and motivation have been attributed to technology. However, McCaslin (1995) affirmed that technology has a passivation effect on children. Nowadays, the number of children who are playing out in a park with their peers, who are sitting around dinner table to communicate with parents or who are spending time without a smart-machine in their palms has dramatically decreased. Considering this, rather than to lay all aspects of personal development on technology, skeptics agreed that some other disciplines and methodologies can be invoked. For instance, McCaslin (1995) offered to use drama method to activate children for their own life and develop their life skills. Fulghum (1989) suggested decades ago that there were some skills which can never be learned through computers like sharing everything, do not hit people, put things back where you found them, clean up your own mess, wash your hands before you eat. Although, there is a great attempt to teach everything on digital life through games and videos, skeptics agree that teachers bring many things to learning environment that technology can never match (Collins & Halverson, 2009). Apart from some sectors, which require people working in front of the computer throughout their life, most business still require and will require advance communication skills, expertise in face-to-face interaction, impress people, present leadership skills, and so on. However, Collins and Halverson (2009) criticized the sufficiency of technology to raise fully developed individual only sitting in front of a device. Thus, they proposed the future classroom dominated by technology should be reconsidered.

2.4.2 Second group of expectations: Technology as a means to address difficulties in teaching and learning. The second group of expectations is explained before as the role of technology to facilitate learning and its positive effects on teaching and learning environment. As it is mentioned previously, there is a substantial history of educational technologists promising that the integration and use of a particular technology would yield dramatic improvements in learning and instruction (Spector & Anderson, 2000). However, within the context of technology integration, it is worth mentioning the value of skeptical predisposition with regard to application of educational technology to improve learning and performance. In this study, it is accepted that the general intention to use technology in education is for the good of one or more persons, but this should be categorized whether this effect coming from technology itself or from other factors, like teacher's teaching and appropriateness of methodology. In the scope of the study, these two different aspects will be categorized as objective feature of the technological device and subjective factors.

There are varieties of capabilities that technology integration can bring to education that schools cannot easily provide. These capabilities will be investigated under objective feature of the technology. For example, computer technologies offer accessing to more and faster information, customization in data, learner control, interactivity, individual learning through games and simulations, multimedia for communicating information, sharing the products with all people around the world and having immediate feedback not only from teacher and peers but from wider environment (Collins & Halverson, 2009). These are the features, which can be facilitated by using technological device and Internet in the classroom. On the other hand, literature pointed out some other factors, which affect usage of technology in teaching and learning environment. Here, these are subjective factors, playing an important role in order to achieve or fail in technology integration. Meta-analysis and reviews have shown that the level of effectiveness of educational technology is influenced by some factors: the difference in student population in the classroom (Mann, Shakeshaft, Becker, & Kottkamp, 1999; Scardamalia & Bereiter, 1996; Sivin-Kachala, 1998), the features of hardware and the software design (Empirica, 2006; Korte & Husing, 2007; Pelgrum, 2001), the teachers' role, teaching, expertise and adaptation (Becta, 2004; Cuban, 2001; Lim & Khine, 2006; Sivin-Kachala, 1998) and the level of student access to technology (Sivin-Kachala, 1998), the quality of instruction and appropriateness of methodology (Baker, Gearthart & Herman, 1994; Mann et al., 1999).

One of the enduring difficulties about technology and education is that "a lot of people think about the technology first and the education later" (Schachter, 1999). However, mere presence of technology will not improve school-level outcomes

(ERG, 2012). In order to achieve a successful and effective technology integration, it is necessary to realize the subjective factors behind the technology in classroom, because perceiving the subjective factors as objective features of technology can guide educators and policy makers in a wrong path and it can be a significant threat for the success of the endeavors. For example, one of the objective features of the technology, which is to access more and faster information creates the illusion that students will become more knowledgeable (Cuban, 2001; Motorola-White Paper, 2010). However, only reaching to information is not enough to turn knowledge into wisdom. One of the principles of techno-realism, which is the field of criticizing the big expectations from the technology, is that information doesn't equal to knowledge ("Principles of technorealism", 1998). Critical awareness, reasoning, and judgment are the skills, which are necessary to transform information into knowledge (Holmes, 2003). Another popular misconception in technology integration is the positive effect of technology on students' motivation. Actually, motivation is more depend on the educational features than the technology itself. In the literature, there is evidence that students are motivated by and can benefit educationally from using technology in their learning (Ayersman, 1996; Chen & McGrath, 2003). However, as (Newby et al., 2006) stated that motivation resulted only from device was limited with the few introductory classes. After students get familiar with the device or software, when the effect of being "unknown" vanishes, the excitement, curiosity and enthusiasm start to decrease (Newby et al., 2006) It will not be that much wrong to explain the possible motivation created by bringing a hardcopy textbook in future classroom, where students are getting education only with digital technology. Children's time spent in front of a very old car in technology museums can also be explained as discovery of the unknown. Unknown fosters the need of discovering and knowing (Deci, Vallerand, Pelletier & Ryan, 1991). However, after things started to be more and more known in classroom environment, we need motivation to create feeling that drive students to continue investigation. In this point, it should not be missed that advance structuring and planning is important to keep the excitement up, because students are motivated in well-developed projects, carefully designed instructional planning and structured learning environment (Newby et al., 2006).

The other main point of discussion is the positive effect of technology in learning and knowledge acquisition. Unlike the proponent studies (Amelink & Tront, 2012; Enriquez, 2009; Fister & McCarthy, 2008), the link between test score improvements and computer availability and use is still contested (Cuban, 2001; Gibbs, 1997; Kirkpatrick & Cuban, 1998; Landauer, 1995; Sichel, 1997). It is accepted objective features of a technological device can create opportunities to access information faster, link images and concepts to sound or movie, to address more sensory organs, to provide multimedia environment for learning. However, even the effects objective features are limited with the teachers' instruction (Schachter, 1999). As it is listed in principles of technorealism (1998; Holmes, 2003), the art of teaching cannot be replaced by technological device or facilities: "These tools can, of course, augment an already high-quality educational experience. But to rely on them as any sort of panacea would be a costly mistake" (Holmes, 2003). So, technology can provide some capabilities that school or basic classroom environment cannot easily provide, but the main focus should be the instruction itself to create an effective and high-quality learning environment. Without any doubt, instructional designers and teachers play important role in creating this learning environment. Thus, to achieve a successful and effective technology usage in classroom, as mentioned before, teachers' classroom experiences, expertise, adaption level, motivation, interests, attitude, beliefs, and constrained choices that teachers face should not be disregarded. Additionally, a specialized design for instruction can be useful to acquire quality knowledge, enhance effective applications and reach outcomes.

Considering all these arguments of skeptics, the aims of FATIH can be reconsidered. First, of all main target of FATIH was announced as e-transformation of Turkey and being information society ("FATIH project," 2012). However, as Stone Wiske (in Schachter, 1999) stated that "a lot of people think technology first, and education later" (p.10). However, as it is discussed, simply putting a technological tool, computer or Tablet PC, into school, as in the 1980s and 1990s, did not produce revolution, more sophisticated implementation planning, such as the design of interactive learning environments is important (Collins & Halverson, 2009). Unfortunately, the same situation has been observed in FATIH regarding the efforts in last 4 years: where mainly the problem of hardware infrastructure and setting up schools with the necessary equipment have been issued more than the e-content, trainings, curriculum and instruction (Bilici, 2011; Dursun et al., 2013; Koparan & Güven, 2012; Kuzu et al., 2013; Pamuk et al., 2013). The preliminary evaluations and researches related FATIH shows that the main hesitation of teachers' not using Tablet PCs in their classes is not having enough and appropriate e-content (Bilici, 2011; Dursun et al., 2013; Kuzu et al., 2013). Although, production of e-content efforts have been supported in last year, still the e-content provided in EBA (Eğitim Bilişim Ağı, Education and Informatics Network) website is far from being sufficient for every course. The other main issue underlined in literature was teacher training, which could be a biggest obstacle in effective usage of technology in schooling. FATIH proposed teacher training as one of the main component of the project. However, studies on teachers in project showed the insufficiency of these in-service trainings, which do not focus enough on instruction, and teaching methodologies in technology integrated classroom in order to satisfy the needs of teachers (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Cengiz & Coskunoglu, 2013; Çiftçi, Taşkaya, & Alemdar, 2013; Gürol, Donmuş, & Arslan, 2012; Kayaduman, Sırakaya, & Seferoğlu, 2011). Also, one of the main complaints of teachers was having in-service trainings without Tablet PC in their palm. These problems in trainings could create even more anxiety on the teachers, who are digital immigrants and who are not using this kind of smart device in their daily life. The last main components, curriculum and instruction, are the most ignored ones in project by not spending any effort for adapting technology in curriculum and designing instruction suitable for interactive environment created by technology in classrooms.

In this regard, in order to achieve the goal of the project, more eclectic and cooperative attitude is required including all the components and stakeholders: from teachers to students, parents to external stakeholders, school administrators to curriculum designers. FATIH promises a change in the approach of schooling, which requires flexible and interactive education environment. However, studies and the result of the other projects conducted all over the world shows that without a careful planning-implementation-evaluation cycle and cooperation in constituents, it is difficult to create the proposed change. However, the results of pilot studies present the confliction of forbidding the mobiles and allowing Tablet PC in the classroom. If enhancing the extended and increased flexibility of technology in classroom is in concern, with more sophisticated approach, apart from teachers, schools and students' role can also be re-discussed. As Jenkins (2006) offers the process of convergence, in which schools are responsible providing course content across different media platform, and producing learning environments – some of which are created and directed by students. This can create a shift in the transmission-of-information role of schools toward a culture, in which teaching and learning becomes a multifaceted construct.

2.4.3 Third group of expectations: Technology as an answer for the rooted problems of education. The third group of expectations was also related with the revolutionary effect of technology in education. Most reformers seem to assume that earlier investments in technologies have been worth the cost and that further investments are necessary for expanding and integrating technology into schooling. One of the main assumptions to invest this expectation is that wiring schools and creating the hardware and software infrastructures that give students and teachers access to technology will solve some rooted education's problems, like inequity between urban and rural poor schools.

The noticeable expense of technology has already deepening the social gaps in the community by separating the technology users from the technology observers (Collins & Halverson, 2009). In the educational technology history, starting from the ancient Greek elite, who had the right of education, technology has been owned by the middle or high socio-economic class of the public that they create the opportunity of meeting with technology for their children, either in school or in home. However, the lower social level of the community has always been neglected and they couldn't catch the equity. Especially, with the projects of OCPC, OLPC and OTPC, it has been tried to be overcome the issue of equity, by providing the same standard for all students. However, "inequitable funding, extraordinary health and social needs goring out of poverty, crumbling facilities and unqualified teachers" have little to do with a lack of technology (Cuban, 2001). As technorealist principle stated “wiring the schools will not save them... The problems with … public schools … have almost nothing to do with [digital] technology” (“Principles of technorealism,” 1998). Thus, searching solution for equity only from technology can create a fallacious perception toward technology. In this regard, the promise made by FATIH Project in Turkey to solve inequity issue is one of the important goals, which should be discussed considering the arguments presented above. It is true that technology can help to increase the standards of education by reaching those students who may have been previously inhibited geographically, physically, or even socially (Cuban, 2001). However, it does not seem quite possible, by ignoring the facts of “seasonal working,” “lands without Internet connection,” “schooling proportion of girls,” and “physical difficulties in rural schools.” The fear related with FATIH is that social cohesion and equity inherent in the promise of public schooling will be undermined. Paradoxically, technologies that seem to create more opportunities for equity in learning may well serve to reinforce the widening economic gap. Although FATIH promises of the traditional school system was to engage all students with common learning technologies, the different access in homes limits the abilities of school to equitably distribute access to new learning technologies (Koparan & Güven, 2012). After investigating the arguments of both enthusiasts and skeptics related with the expectations of technology, in the following title, a closer look will be developed toward Tablet PC. In order to judge the integration more concretely, both advantages and drawbacks, disadvantages of the Tablet PC use in education will be discussed consulting the related literature. Additionally, the studies, which reveal positive and negative aspects of Tablet PC use in FATIH project, will be presented.

2.5. Advantages of Tablet PC Usage in Education

All over the world, major technology projects in education have been popular with the entrance of PC in schools. After that, classrooms have begun to witness the efforts of integration of contemporary technological tools or infrastructure to support education.

After BYOD, OLPC, GLP and some other projects of companies like Apple and Windows, this decade, has opened its doors to Tablet PC use for educational proposes. South Korea is one of the countries who has been spending effort to adapt Tablet PC into the education since 2011. This project, covering all primary and secondary level students, aimed to convert all the printed books within curriculum into digital textbooks in order to provide interactive digital content (Eason, 2011; Grzybowski, 2013; Smart Education in Korea, 2011). Since 2012, the USA has also been digitalizing textbooks and giving importance to Tablet PC integration (Toppo, 2012). In Florida, with the new regulation, in the semesters of 2015-2016, there will be only used digital textbooks in K-12 level (Ni, 2013). All over the world, Tablet PC integration pilot studies have been seen in few countries (the US, Portugal, England, Spain and South Korea), but there is no example of Tablet PC integration in primary and secondary levels all over the country. In this regard, FATIH Project is unique project by handling the whole country (Çetinkaya & Keser, 2014).

As far as Tablet PC usage in education is concerned, it was meaningful to present revealed educational advantages of TPC in the literature. In previous part of the study, the general expectations from technology were discussed with providing skeptical approaches. Here, the reasons which create expectations from Tablet PC as a contemporary technological device will tried to be investigated considering the advantages highlighted in the literature.

When the literature about using Tablet PC in teaching and learning environment is scrutinized, it can be listed studies under some categories: the tendency toward Tablet PC usage (technology acceptance, relation between attitude and technology use) (Bozdoğan & Uzoğlu, 2012; El-Gayar, Moran, 2011 & Hawkes, 2011; Moran, Hawkes, & ElGayar, 2010;) using Tablet PC in different learning styles (Fister & McCarthy, 2008; Galligan, Loch, McDonald, & Taylor, 2010; Gök, 2012; Hieb, & Ralston, 2010; Loch, Galligan, Hobohm, & McDonald, 2011; Rogers, & Cox, 2008; Romney, 2011; Tofan, 2010; Uzoglu, & Bozdoğan, 2012; Yoon, & Sneddon, 2011), importance of Tablet PC in education (Dundar, & Akçayır, 2012; El-Gayar, Moran, & Hawkes, 2011; Ferrer, Belvi´s, & Pa`mies, 2011; Le Ber, Lombardo, & Quilter,

2008) the impact of Tablet PC on the behaviors in teaching-learning environment (Amelink, Scales, & Tront, 2012; Roschelle, Tatar, Chaudhury, Dimitriadis, Patton, & DiGiano, 2007; Stickel, 2009), the effect of using Tablet PC in assessment and evaluation (Enriquez, 2010; Gök, 2012; Kowalski, Kowalski, & Gardner, 2009; Siozos, Palaigeorgiou, Triantafyllakos, & Despotakis, 2009). In most of these studies, it is emphasized that with careful planning Tablet PC can bring some opportunities into the classroom. As a result of these studies, the possible contributions of Tablet PC integration can be summarized as followed:

1. Positive effect on motivation (Mills, 2012; Price & Simon, 2009)
2. Flexibility in learning in terms of time and space (Nie, Armellini, Witthaus, & Barklamb, 2011) and easing to access and carry the classroom materials (Dallas, 2012; Shurtz, Halling & McKay, 2011).
3. The potential of supporting and improving teaching and learning processes (Enriquez, 2010; Gorgievski, Stroud, Truxaw, & DeFranco, 2005; Koile & Singer, 2006; Phillips, & Loch, 2011; Sneller, 2007).
4. The positive effect on interactive and cooperative learning (Ellington, Wilson, & Nugent, 2011; Jones, & Sinclair, 2011; Loch, Galligan, Hobohm, & McDonald, 2011; Moore & Dicken, 2006; Mulholland, 2011; Rawat, Riddick, & Moore, 2008; Romney, 2010; Sneller, 2007).
5. Students peer review, problem solving exercises, student collaboration and communication (Berque, 2006; Moore & Dicken, 2006; Quinones-Perez & Turner, 2004; Scharff, Hill & Eugene, 2005; Singer, 2006)
6. Enriched classroom environment (prepare and give more interactive and spontaneous classroom presentation) and creating interactive multimedia environment in classroom (Colwell, 2004; Frolik & Zum, 2004; Mills, 2012; Moore & Dicken, 2006; Shahbazi, 2013; Shurtz, Halling, & Mckay, 2011; Stickel & Hum, 2008; Willis & Mieryschin, 2004).
7. Supporting individual learning (Ellis-Behnke et al. 2003; Mendelsohn, 2012; Singer, 2006; Steif & Dollar 2009; Stickel, 2009)
8. Assessment (Mark-up and return assignments digitally), provide effective feedback loop between students and instructors (Berque, 2006; Enriquez, 2010; Gök,

2012; Hawkes, & Hategekimana, 2009; Koile, & Singer, 2006; Kowalski, Kowalski, & Gardner, 2009; Siozos et al., 2009; Sneller, 2007; Tront, & Prey, 2007)

9. Enjoyable and interesting lecture experience (Chambers et al., 2006; Sneller, 2007; Stickel, 2009; Stickel, & Hum, 2008)

10. Additionally, Pen-based Tablet PC, creates opportunity to take, organize, replay digital notes and also combine notes with digital materials (Berque, 2006; Singer, 2006).

Interactive, flexible, ergonomic nature of Tablet PC has been bringing a new approach to the education environment. That increases the attempts of using Tablet PC in education in order to answer contemporary needs of the age and to enhance teaching-learning processes (Ellington, Wilson, & Nugent, 2011; Horton, Kim, Kothaneth, & Amelink, 2011; Mulholland, 2011; Stickel, 2009). The contemporary technological attempt in Turkey, FATIH, has also showed some of the positive reflection of Tablet PC use. The initial results of pilot studies in FATIH confirmed that Tablet PC integration in Turkish classrooms has either positive effect on teaching-learning environment or the potential of betterment in education. In addition, having some concerns, hesitations and problems related with Tablet PC or project as a whole, in general, some studies showed that teachers, students, school administrators, parents and academicians have positive attitude toward the opportunities created by Tablet PCs in education environment (Çiftçi, Taşkaya, & Alemdar, 2013; Dursun et al., 2013; TBD, 2012). The preliminary results on FATIH, especially Tablet PC use in classroom can be summarized as follows:

1. Fostering the attention in class and motivation (Dursun et al., 2013; Güllüpınar, Kuzu, Dursun, Kurt, Gültekin, 2013; Kuzu et al., 2013) enjoyful classroom (Kuzu et al., 2013).

2. Improving self-confidence in students (Dursun et al., 2013; Güllüpınar et al., 2013).

3. Solution for heavy bags (Çiftçi et al, 2013; Dursun et al., 2013; Güllüpınar et al., 2013).

4. Enrichment of teaching-learning environment (Akbaşlı, Taşkaya, Meydan, &

Şahin, 2012; Çiftçi et al., 2013; Dursun et al., 2013; Pamuk et al., 2013)
5. Enlarge the educational environment (Çiftçi et al., 2013).
6. Efficient use of technology, and improving skills of technology use (Çiftçi et al., 2013).
7. Reaching information easily (Çiftçi et al., 2013; Dursun et al., 2013; Güllüpınar et al., 2013; Kuzu et al., 2013).
8. Enhancing students teacher communication (Dursun et al., 2013).
9. Positive effect on learning (Çiftçi et al., 2013; Güllüpınar et al., 2013; Kaya & Koçak-Usluel, 2011).

2.6. Disadvantages and Drawbacks of Tablet PC Usage in Education

When a new tool introduced in educational environment, it is accepted that it has both advantages and disadvantages. Although educational technology literature underlines the positive effect and benefit of Tablet PC usage in classroom, there are also a number of disadvantages to Tablet PC use in educational environment. In order to develop more realistic attitude, all aspects of the technology should be taken into consideration. Because of that an effective implementation can be possible by becoming aware of the drawbacks and limitations. The disadvantages of Tablet PC in classroom, which are repeated in the literature has been listed as follows:

1. Wasting time on games and Internet (Lanir, 2012; Mares, 2012).
2. Distracting students attention during the class (Bacon, 2013; Lanir, 2012; Mares, 2012; Schumacher, 2013), dealing with non-course activities (Oh & Gwizdka, 2010).
3. Lack of educational apps and e-content (Goodwin, 2012; Purcell, Entner & Henderson, 2010; Shuler, 2012).
4. Technical problems: lack of keyboard, screen damage, repairs and maintenance expense, fragility, lack of data input and drawback in data transfer (Bacon, 2013; Garfield, 2005; Jones, 2012; Mock, 2004; Oh & Gwizdka, 2010; Sherber, 2014; Smith, 2005).
5. Adjustment time for inexperienced students in the class (Galligan et al., 2010).

6. Lack of pedagogical repertoire of teachers (Goodwin, 2012; Lanir, 2012; Yelland, 2007).
7. Problems related with attitude and technology acceptance (El-Gayar, Moran & Hawkes; King & He, 2006; Kiraz & Özdemir, 2006; Schepers & Wetzels, 2007).
8. Problems related with health: high radiation and eye problems and diseases (AFP Relaxnews, 2012; Council of Europe, 2011; Rosenfield, 2011;Yan, Hu, Chen & Lu 2008).

Some of these disadvantages and drawbacks of Tablet PC in classrooms have also been seen in the results of pilot studies of FATIH project. Although, Dursun and his colleagues (2013) showed that school administrators had supported the projects and developed positive attitude toward Tablet PC integration; teachers were declaring their negative perception about the improbability of the project in our schooling system (Çiftçi et al., 2013). Among the stakeholders of the project, students are the most pessimists by declaring that Tablet PC use is completely inefficient (Kuzu et al., 2013). Supporting this, academicians have warned that it did not seem possible to get benefit from project with the current shortcomings (Bilişim Ajandası, 2013). Parallel with the other researches, they emphasized teachers' hesitation about the project, so detailed and more systematic in-service, pre-service training has been advised. Drawbacks and disadvantages of Tablet PC in FATIH has been listed as follows:

1. Insufficiency in e-content and z-books (Bilici, 2011; Dursun et al., 2013; Kuzu et al., 2013; Pamuk et al., 2013).
2. Technical problems of tablets (Çiftçi et al., 2013; Gürol, Donmuş, & Arslan, 2012).
3. Students', parents' lack of computer literacy level (Dinçer, 2012; Dinçer, Kutlar, Kaleci & Kıran, 2012).
4. Lack of teachers' digital competency (Çiftçi et al., 2013; Cüre & Özdener, 2008; Gürol, Donmuş, & Arslan, 2012; Kayaduman, Sırakaya, Seferoğlu, 2011; Pamuk et al., 2013), teachers' (especially, experienced teachers) hesitation and negative attitude (Çiftçi et al., 2013; Dursun et al., 2013).

5. Problems in classroom management (i.e. discipline) (Gürol, Donmuş, & Arslan, 2012; Kuzu et al., 2013), and problems in management of classroom time (Gürol, Donmuş, & Arslan, 2012), and increase in teachers' workload (Çiftçi et al., 2013).
6. Distraction of students' attention to classes (Kuzu et al., 2013), using Tablet PCs for playing game during the class (Güllüpınar et al., 2013).
7. Lack of pre-service and in-service training for teachers (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Cengiz, & Coskunoglu, 2013; Çiftçi et al., 2013; Gürol, Donmuş, & Arslan, 2012; Kayaduman, Sırakaya, Seferoğlu, 2011) pedagogical training (Koparan & Güven, 2012; Pamuk et al., 2013).
8. Negative effect on students' writing, reading and speaking skills (Çiftçi et al., 2013; Dursun et al., 2013; Güllüpınar et al., 2013), creating computer-addiction (Çiftçi et al., 2013).
9. Lack of technical support and expert for technical problems during the lecture (Çiftçi et al., 2013; Dursun et al., 2013; Pamuk et al., 2013).
10. Negative effect on students' socialization (Çiftçi et al., 2013; Güllüpınar et al., 2013; Kuzu et al., 2013), and limitation in students' face-to-face communication with the teacher (Kuzu et al., 2013).
11. Health problems: eye-diseases and headaches (Kuzu et al., 2013), over-dose radiation (Çetinkaya & Keser, 2014; Karabacak, 2012; Koparan & Güven, 2012).

Overall, beneficial results are most readily seen when there is a match between the learning technologies, pedagogical techniques, learning objectives and curriculum planning (Kadiyala & Crynes 2000). When the harmony is lost because of the shortcomings, even the advantages taken for granted have been threaten. For example, with e-content and z-books, Tablet PC was promising not let students carry heavy bags. However, studies revealed that insufficiency of e-content and unavailability of data-entrance (like writing on screen by handwriting) resulted with more heavy bags: Students are carrying their books, notebooks and also their Tablet PCs (Çiftçi et al., 2013; Dursun et al., 2013; Güllüpınar et al., 2013). As the researches and experts in the field underlined that ICT integration is complex and multi-dimensional process including many components (Askar & Usluel, 2003; Askar, Usluel, & Mumcu, 2006; Teo, 2009b), and its success depends substantially on efficient correlation between these mechanisms (Kaya & Koçak-Usluel, 2011). As it is seen above, the reasons of most of the disadvantages are actually coming from unsatisfactory planning and lacking of well-thought system. Since Tablet PCs and learning technologies more generally, must be thoughtfully utilized and incorporated into educational setting if they are expected to produce significant benefits (Hancock, Bray, & Nason, 2002). With this in mind, as Cengiz and Coskunoğlu (2013) and also academicians in participated in evaluation of FATIH Project stated, FATIH should begin to concentrate on neglected pedagogical and instructional dimensions of technology integration. In the following part of the study, in order to support the goals of the FATIH and promote Tablet PC use in classrooms, instructional design aspect of the integration will be evaluated. The main question of "how should we design Tablet PC integrated instruction, in order to attain the expectations?" will be discussed by presenting different approaches and studies on the field of Instructional Design (ID).

2.7 Instructional Design

The proposal of this study is developing an Instructional Design Model, in order to answer the reasonable expectations of Tablet PC integration in FATIH Project; to get benefit out of advantages, explained previous parts, and also to reveal possible steps of instruction which can guide educators toward attainment of the goals, drawn in the scope of the project. Before coming to that point, here, the rational behind using the field of Instructional Design (ID) to achieve betterment in Tablet PC integrated classrooms will try to be presented.

Instructional Design is a field of education, which provides systematic design process to reach the expected goals: It could be useful to focus on the meaning of the words separately. "Instruction" is the intentional facilitation of learning toward identifies learning goals (Smith & Ragan, 2005, p.5). According to Seels (1995), the discipline about instruction has produced a growing knowledge base about methods of instruction and their effects for different kinds of goals, content, and learners.

Driscoll (cited in Smith & Ragan, 2005) focuses on the designing of learning conditions to achieve some intended goals. Likewise, Dick, Carey and Carey (2005) view instruction as a system whose purpose is to bring about learning with the components of learner, instructor, instructional material, and learning environment. Interaction among these components brings the success by achieving the goals. In all definitions, it can be interpreted that instruction is delivering the educational experience through an intentional arrangement to achieve intended goals and objectives. The term "design" is used in many fields and it implies many a systematic planning (Reigeluth & Stein, 1983). Smith and Ragan (2005) explained design; something related to planning, is "an activity or process that people engage that improves the quality of their subsequent creations". The requirements of this planning process is identified by Posner and Rudnitsky (2006, p.2) as "time, energy, and commitment by the planner; learner how to design." This design process requires problem solving, creativity, judgment, precision and expertise (Smith & Ragan, 2005). Reigeluth and Stein (1983) stated that ID plays a sort of catalyzer role in education. It is a "linking science" or a "middleman" between learning theory and educational practice; that is "a body of knowledge that prescribes instructional actions to optimize desired instructional outcomes, such as achievement and affect" (p.5). From the definitions above, instructional design can be defined as the process of "systematic planning of instruction" which aims to facilitate the instruction (Smith & Ragan, 2005, p.8).

Instructional design is a discipline that is concerned with understanding and improving one aspect of education: the process of instruction. The purpose of any design activity is to devise optimal means to achieve desired ends. Therefore, the discipline of instructional design is concerned primarily with prescribing optimal methods of instruction to bring about desired changes in student knowledge and skills (Dick, Carey, & Carey, 2005). This discipline concerned with producing knowledge about optimal blueprints developed from the ideas of different theoreticians like Games and Dewey, Skinner, Gagne, Bruner, Ausubel, Bloom and also Gagné, Merill Briggs, Reigeluth and Stein (Aronson & Briggs, 1983; Reigeluth & Stein, 1983). In addition to all these names, there are also researches who studies on technology integration in instructional design.

As a summary, parallel with the people who worked in the area of instructional design with the aim of increasing quality in teaching and learning conditions, materials, and environment, this study investigate the answer of more qualified Tablet PC integration in classroom in the field of Instructional Design. In this part, the aim was creating a general understanding toward ID in order to respond why the solution had been sought in this field. Additionally, this background information will guide the readers to be able to discuss the instructional design approaches in detail in following section.

2.7.1 Approaches and models in instructional design. Theory is used in different ways but an instructional design theory is usually thought of as a set of principles that are systematically integrated and are a means to explain, predict and control instructional phenomena (Reigeluth & Stein, 1983). The theories from which instructional design draws are of two kinds: descriptive theory and prescriptive theory. Descriptive principles and theories take sets of conditions and methods as given and describe the likely outcomes as the variable of interest (Smith & Ragan, 2005). Instructional design is a prescriptive science (Glaser, 1976; Reigeluth, Bunderson, & Merrill, 1978; Simon, 1969; Snelbecker, 1974) because its primary purpose is to prescribe optimal methods of instruction. In that sense as Smith and Ragan (2005) stated that instructional design theories suggest, “If instruction includes certain features, it will lead to certain types and amounts of learning”. Reigeluth and Stein (1983) summarized the distinction between descriptive and prescriptive theories in Figure 2.6. For descriptive theories (1), the condition variables and the method variables are independent variables and their parameters may interact to produce fairly consistent effects on the outcome variables, which are dependent variable. For prescriptive theories (2), the desired outcomes and the conditions are independent variables that may also interact and their parameters are used to prescribe good methods of instruction, which are dependent variable.

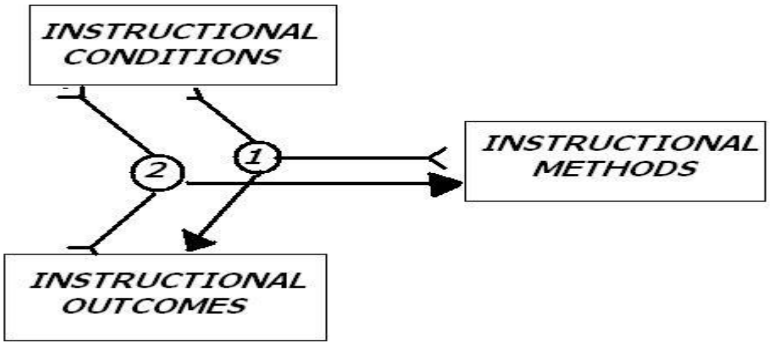

Figure 2.6 The Distinction Between Descriptive and Prescriptive Theories

Source: Reigeluth, C., M. & Stein, F., S. (1983). The elaboration theory of instruction. In C. Reigeluth (ed.), *Instructional Design Theories and Models*. Hillsdale, NJ: Erlbaum Associates.

The theories in many areas lead to construct some models in instructional design. Model is the term used many different ways, but what is referred to as an ID model is usually "an integrated set of strategy components" (Reigeluth & Stein, 1983, p. 21). An architect's blueprint should show what many different aspects of the building are to be like. So also an instructional design model should show what many different aspects of the instruction process are to be like in order to best achieve the desired outcomes under the anticipated conditions. In instructional design, ADDIE Model which is a colloquial term used to describe a systematic approach to instructional development (Molenda, 2003) is a generic model for instructional design process (Gagne, Wager, Golas, & Keller, 2005). ADDIE is an acronym referring to the major processes: Analysis, Design, Development, Implementation, and Evaluation. Furthermore, it provides a step by step process that helps instructional designers plan and create training programs with a framework in order to make sure that their instructional products are effective and that their processes are as efficient as they can possibly be (Schrock, 1995). To achieve this, five main steps of ADDIE model should be followed step by step as illustrated in Figure 2.7 (Gagne, Wager, Golas, & Keller, 2005, p. 21).

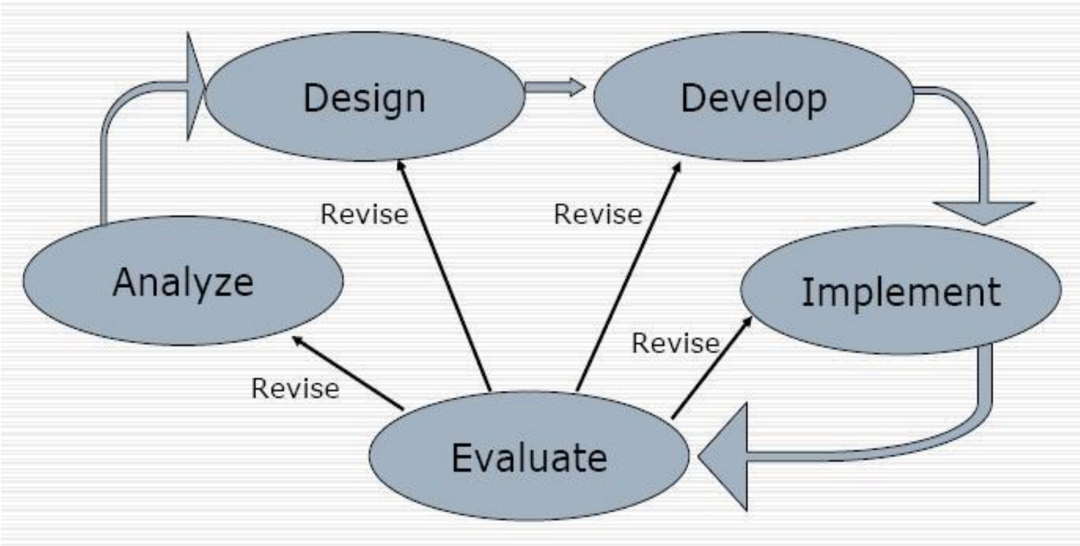

Figure 2.7 The Steps of ADDIE Model

Source: Gagne, R.M., Wager, W.W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design*. Belmont, CA.: Wadsworth/ Thomson Learning.

The first phase is analysis phase where it should be focused on collecting data that will impact the design of instruction. During this process, some important areas should be analyzed: first defining the educational goals and objectives; then defining the material that must be taught and recognizing the learner's current capacities (Schiffman, 1995). Additionally, budget, delivery options, existing constraints, necessary competencies, learner characteristics, contexts of the instruction and the performance environment should be analyzed to create a more effective instruction (Rossett, 1987). Once the analysis has been completed, the instructional designer begins to create the "blueprints" of the instructional experience. This is the design phase of the ADDIE process. In this phase, the instructional designer plans the elements of instruction, such as: the objectives of the instruction; motivational strategies that will be incorporated into the instruction; the introductory presentation of content; examples and non-examples to be shown to learners; practice activities and feedback mechanisms; testing and evaluation strategies; the instructor materials that will be needed (Gustafson, 2002). Development is the production phase of the ADDIE process. This is the point where the plans of the design phase become the reality of instructional materials and activities. In this phase, the instructional designer is concerned with issues such as: what is the most appropriate medium for instruction; how can the visual design of the instructional materials support and facilitate learning; are the materials "usable" or do they actually get in the way of learning; are the instructional materials affordable given the budget of the project (Gustafson, 2002). Furthermore, this phase should contain determining the appropriate interactions which should be "creative, innovative, and encourage learners to explore further" (Porter, 1997, p. 200) and also Simonson, Smaldino, Albright, and Zvacek (2003) include this step planning activities that allow for student group work to help construct a supportive social environment. The implementation phase is the reason for the instructional design process. Implementation is instruction. In the implementation phase, all the work of analysis, design and develop come together, and the pay-off is that (if all goes well), learners actually gain valuable knowledge and skills as the result of instruction. In order for implementation to be successful, instructional designers must consider issues such as: how much time is available for instruction; where will instruction occur; how many learners will engage in the instructional experience at one time; how many sets of instructional materials will be needed; how do I ensure that the instructors/students experience the materials as I intended? (Gustafson, 2002) The final phase is evaluation, which has a least two fold. The first question that needs to be addressed in evaluation is, did the learners achieve the goals that were set out for the instruction? Other questions that should be asked as parts of the evaluation are: did the learners like the instructional experience? Were the learners able to transfer what they learned in class out into the real world? Was there any long-term return on the investment in the instructional experience? (Schrock, 1995). The answers to these important questions allow the instructional designer to certify that learning has actually occurred as result of the “instructional experience they created, and additionally, evaluation helps the instructional designer to identify ways to improve future applications of the instructional activities and materials” (p.67). Evaluation provides a feedback link back into the analysis phase of the ADDIE model. For good instructional designers, the ADDIE model is actually not linear, but more of a loop. Instructional designers are constantly and continually engaged in analysis, design, development and evaluation of their products, looking for ways to make them better or more appropriate for any particular learning situation (Schiffman, 1995).

ADDIE model is not a specific, fully elaborated model in its own right, but rather an umbrella term that refers to a family of models that share a common underlying structure (Schrock, 1995). The models and ID processes are generally very close to the ADDIE model as the stages. For example, Smith and Ragan (2005) offer general three phases of the instructional design process: analysis, strategy, and evaluation. Also, the model includes revision of all the stages. The model is presented in the Figure 2.8. Unlike Kemp's model, Smith and Ragan (2005) suggested a linear model which is very similar to the design model proposed by Dick, Carey and Carey (2005). Smith and Ragan (2005) did not pointed out the uniqueness of their model and they described it “a common model of instructional design” (p.10). The originality of this model is that it has been chose to “sequence designing assessment items immediately after writing learning objectives, considering the design of assessment to be part of the analysis” (p.104). It is because objectives are related with the assessment points. The conditions and actions specified in the objectives are considered in the writing of each assessment (Smith & Ragan, 2005). The other models mentioned handled in this section are also close to ADDIE model in structure. However, their organization, system and approaches differ from each other.

In systematic design of instruction, Dick, Carey and Carey (2005) suggested a system approach model which is called it an Instructional Systems Design, or ISD, model. A system is technically a set of interrelated parts, all of which work together toward a defined goal. The parts of the system depend on each other for input and output, and the entire system uses feedback to determine if its desired goal has been reached. If it has not, the system is modified until it does reach the goal. In relating this system approach to the instruction, first, the instructional process itself can be viewed as a system. The purpose of the system is to bring about learning. The components of the system are the learners, the instructor, the instructional materials, and the learning environment. These components interact in order to achieve the goal.

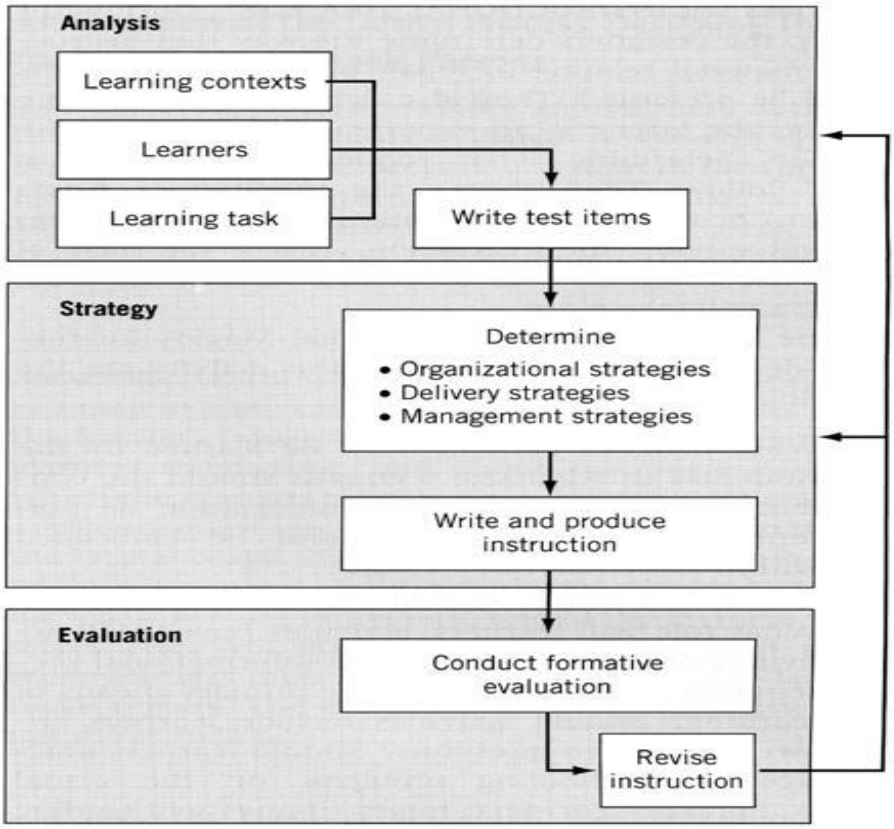

Figure 2.8 Instructional Design Model Proposed by Smith and Ragan

Source: Smith, P.L., & Ragan, T.J. (2005). *Instructional design* (3rd ed.). New York: John Wiley & Sons.

Design models (systems approach) and processes that they represent are referred to as ISD, because it incorporate an *eclectic* set of tools drawn from behaviorist, cognitivist, and constructivist theoretical positions of the past fifty years. "Behaviorism is prominent in the roots of the systems approach to the design of instruction" (Burton, Moore & Magliaro, 1996, p. 57). The instructional strategy component of the model is heavily influenced by the work of Robert Gagnë. Dick, Carey and Carey (2005) stated that this model is not only based on theory and research but also on a considerable amount of practical experience in its application. However, it is also true that model is more meaningful when a designer used it in his process. Dick and Carey explain the purpose of the model as “to help people learn, understand, analyze, and improve practice of the discipline” (p. 5). Reigeluth and Stein (1983) summarized the reasons of using system approach by trying to show the effectiveness of systematic approaches to instructional design. The first is the focus, at the outset, on what learners are to know or be able to do when the instruction is concluded. A second reason is the careful linkage between components, especially, between instructional strategy and the desired learning outcomes. The third is an empirical and replicable process. Instruction is designed not for one delivery, but for use on as many occasions as possible with as many learners as possible.

The steps of the Dick and Carey Model are illustrated in Figure 2.9. Dick and Carey made a significant contribution to the instructional design field by championing a systems view of instruction as opposed to viewing instruction as a sum of isolated parts.

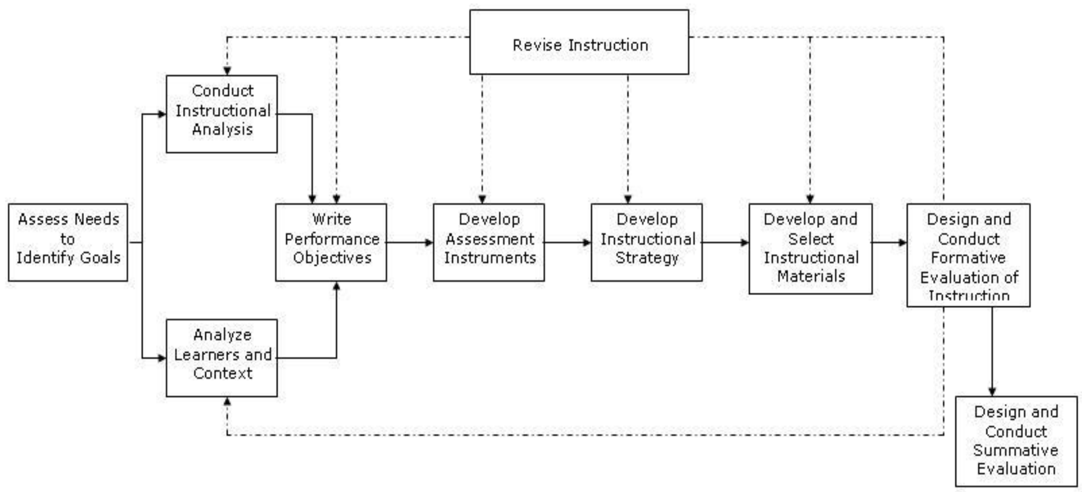

Figure 2.9 Dick, Carey, and Carey ISD Model

Source: Dick, W., Carey, L., & Carey, J.O. (2005). *The Systematic Design of Instruction*. Pearson/Allyn and Bacon, Boston.

The model addresses instruction as an entire system, focusing on the interrelationship between context, content, learning and instruction. According to Dick and Carey, "Components such as the instructor, learners, materials, instructional activities, delivery system, and learning and performance environments interact with each other and work together to bring about the desired student learning outcomes" With this model, components are executed iteratively and in parallel rather than linearly (Dick and Carey, 2005).

Morrison, Ross and Kemp (2006) present a model, which is eclectic in that it borrows ideas from many different disciplines and approaches to instructional design. According to Morrison and his colleagues (2006), an effective instructional model is both flexible and adaptable. Therefore, the model designed is circular rather than a more traditional linear flowchart, as shown in Figure 2.10. It is applicable to designers in business, military, medical and government settings as well as to higher education and P-12 classrooms.

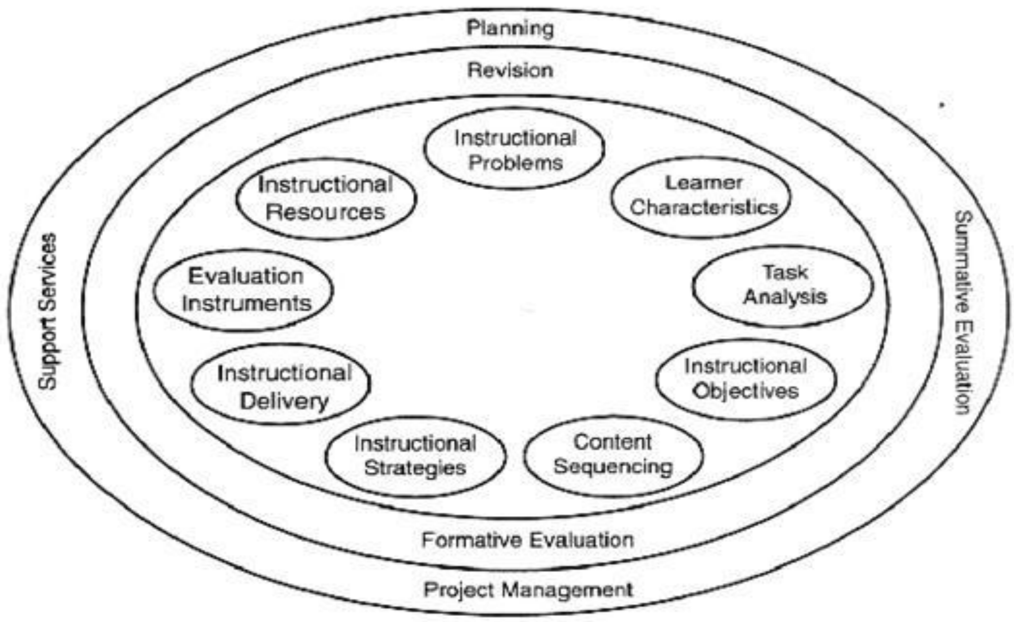

Figure 2.10 Instructional Design Model Presented by Morrison, Ross and Kemp

Source: Morrison, G. R., Ross, S. M., & Kemp, J. E. (2006). *Designing effective instruction* (5th ed.). NJ: John Wiley and Sons.

Using a systematic design process is termed instructional design and it is based on learning theories, information technology, systematic analysis, educational research, and management methods. They explain the goal of instructional design is to make learning more efficient and effective and to make learning less difficult. The process of design focuses on what the learner needs to know and avoid including nonessential content that is nice to know. According to Morrison, Ross and Kemp (2006), the job of the instructional designer is first defining the problem and then determining what knowledge and skills are needed to solve the instructional problem. Their complete instructional design plan includes nine elements, which are shown in Figure 2.10.

Although these designs are very different in their shape, their components and principles are very similar. All these designs start with an analysis process. Dick and Carey (2005) propose that careful analysis work is absolutely critical prior to initiating the design of instruction. Kemp (2006) points out the importance of beginning with the identification of the problem or need. In analysis part of according to Smith and Ragan (2005) learning context, learner and learning task analysis should be conducted while Dick and Carey (2005) suggest in addition to the learner and context analysis, carrying out goal and skill analysis under the topic of instructional analysis, at the beginning of the design process. Analysis part is followed by specifying the objectives. Although Smith and Ragan (2005) named this process by writing test items, the purpose of the step is the same as other models. In this step, a detailed description of what students will be able to do when they complete a unit of instruction is given (Gagne, Wager, Golas, & Keller, 2005). The following task after writing objectives is designing instruction by defining the strategies, content and material in a most appropriate sequence and concepts for presenting the information (Kemp, 2006). In this point, only the model presented by Dick and Carey differs from others by developing assessment instruments before the organization of instruction. In models, this planning process continues with application of prepared instruction and finally, the process come to end by evaluating the design. Both formative and summative evaluation is suggested to conduct to determine the effectiveness of the materials and to revise them if needed (Morrison, Ross & Kemp, 2006). Smith and Ragan (2005) also emphasized formative evaluation that it should be conducted on both new and existing materials since the needs of the learners can change. While conducting evaluations the consideration should be to find out faulty instruction and to suggest how it could be corrected. As Morrison, Ross and Kemp (2006) indicated, summative evaluation is defined as the design of evaluation studies and the collection of data to verify the effectiveness of instructional material with target learners. Its main purpose is to make go-no-go decisions. This last decision is taken in every design mentioned in this part.

As Snow (1977) stated that models like myths and metaphors help us to make sense of our world. An instructional design model gives structure and meaning to an ID problem, enabling the would-be designer to negotiate her design task with a semblance of conscious understanding (Tessmer & Wedman, 1995). Models help us to visualize the problem, to break it down into discrete, manageable units. The value of a specific model is determined within the context of use. Like any other instrument, a model assumes a specific intention of its user. A model should be judged by how it mediates the designer's intention, how well it can share a work load, and how effectively it shifts focus away from itself toward the object of the design activity. (Ryder, 1996) There are many instructional design models but many are based on the ADDIE model with the phases of analysis, design, development, implementation, and evaluation (Snow, 1977). Although most of the stages are very similar in instructional design models, they are constructed to satisfy different needs. In that sense they offer some different points like greater flexibility for designer, including client to the process, inductive or deductive approach in instructional design (Tessmer & Wedman, 1995).

In this part of the study, some main ID theories and models have been discussed in order to determine a road map for the design appropriate for Tablet PC integrated instructions. The similarities and differences between models have presented to be able to justify the possible steps of the model created throughout the research; and to observe differentiated part of the instruction with integration of technology. In the following title, technology integration will be investigated more precisely in the extent of ID.

2.7.2. Instructional design in technology integration. The need of systematic approach toward the integrating technology within education emerged decades ago with the goal of using technology efficiently in the education environment. To satisfy this need, besides the efforts of applying existed ID Models presented above -especially ADDIE, Gagne and Briggs, Dick and Carey models, in technology integration (Li, 2003; Royal, 2007; Sun, 2001), there were also efforts to develop technology-specified models. Heinich, Molenda, Russel and Smaldino (1996) designed a model called ASSURE focusing on "planning and conducting instruction that incorporates media" (p.31)- its main perspective is on how to integrate technology, any kind of media, into instruction systematically in terms of learning outcomes.

ASSURE is also an acronym, and stands for: Analyze learners, State objectives, Select methods, media and materials, Utilize media and materials, Require learner participation and Evaluate-revise. The model shows a sequence of operations to be developed for planning of technology use that helps teachers to design and improve most convenient educational environment. The first step of the model is analysis of the learners, where general qualities, preliminary level, learning style are determined. In the second step, state the objective, the information and skills be gained are chosen. Then, according to the objectives defined, method, environment and materials are defined and utilized in the third and fourth step. The last step of the model is for evaluating all components to test quality of learning outcomes and conducts a revision, if necessary. According to Megaw (2006) ASSURE model is the most convenient for integrating the technology in education in order to make students more active, use alternative pedagogical methods and conduct wide-range of evaluation.

In order to describe learner's motivation in instructional design and development, Keller (1987) developed a model called the ARCS model. It is aimed to underlined motivation as the most appropriate and useful construct in instruction development, with the learning cycles of Attention, Relevance, Confidence and Satisfaction. According to the model, strategies in an instruction must be in place to arouse and sustain students' curiosity and interest. Once students pay "Attention," teaching should seem "Relevant" to students in order to meet with students' needs and to affect a positive attitude. Practices during instruction help students to build "Confidence." For students to remain motivated, they should be reinforced to feel "Satisfied" with the learning experience. When this flow is in place to activate the chain of A-R-C-S, students will be motivated and ready for the future challenge. Although, ARCS model, which also addresses the process of identifying and solving motivational problems in computer assisted instruction (Keller & Suzuki, 1988), is used to design an instruction for technological tool use in classroom. For example, Singhatanadgid and Sripakagorn (2012) followed the steps of ARCS model in order to systematically describe strategies in guided slides and Tablet PC (GS/T) technique helps to enhance students' motivation in class. Results of the study confirmed the effect of model on positive attitude among students and high satisfaction toward the subject. Moreover, Kwon and Jeong (2013) developed a prototype of mobile game contents for mathematic through applying the motivational strategies of Keller's model. The pilot studies of the research revealed that the developed prototype of math mobile game based on ARCS model was effective in reaching intended outcomes and successful for enhancing learners' motivation during mobile learning.

The other model, inspired by ARCS, is Shih's Mobile Learning Model. This model was created based on ARCS learning model and mobile technologies' characteristics in promoting and enhancing human interactions in order to support instructional design for mobile learning. The learning cycle in the Shih's model includes:

> "1. Sending a multimedia message to mobile phones to trigger and motivate learners
> 2. Searching the Web for relating information by using embedded hyperlinks (URLs) in the message received in the phone
> 3. Discussing with learning peers by text, voice, picture, or video messaging
> 4. Producing a digital story telling of what they learn by audio or video diary
> 5. Applying what they learn in the simulated environment, such as online educational gaming" (Shih & Mills, 2007, p. 5-6).

Unlike the adaptation of old models, Xianzhong, Rensheng, Fend and Zhongmei (2008) developed a new e-learning system design model based on cognitive flexibility theory in order to explore feasibility and effectiveness of technology integration which can promote higher-order learning, solving ill-structured problems and improving creative thinking ability. In this regard, they developed circular model. From inside to the out, the components of the model can be listed as: in the inner circle, learner needs, learners, structured problems and learning content; in the second circle, learning resources design, focus on designing examples; in the third circle, cognitive tool design, and focus on designing reflective tool; in the outer circle, evaluation, reflection, revision, management and help design. During the process the letters of A, R, C, S stands for attention, relevance, confidence and satisfaction are supporting the process. In the model, different instructional level respond to different motivation strategies: In order to maintain students' attention, changing speech styles, using games, finding alternative ways to present material are listed. When leaners face with a difficulty, appropriate help is given with rich reference, specific explanation, and cooperative learning opportunities. Reflection is provided by the information of their learning conditions. It also contains assessment of their task and academic behavior in class as well as the degree of recognition among classmates. Following these steps and instruction, it is promised that model helps students' satisfaction.

Additionally, Sitti, Sopeerak and Sompong (2013) developed an instructional design model, called as pbCONNEC model, and based on connectivism learning theory to enhance problem-solving skills in ICT for daily life of higher education students. In this specific model, which focused on problem solving, three components had been emphasized:

> "1. The learning input is including the conceptual framework and motivation
> 2. The online learning processes are driven connectivism (awareness, connection, and contribution) within the problem-based learning or PBL [Problem Based Learning] approach (problem assigned, identify what we need to know, learn what we don't know, and apply it to solve the problem)
> 3. The learning outcomes consist of knowledge, attitude, and skill" (p. 320).

Another model developed for technology integration is MISA. The MISA instructional systems engineering method was developed as a result of applying knowledge engineering to the instructional design domain (Paquette, Aubin & Crevier, 1994). This model, enabling the production of computerized job aids or design tool, is structured into six phases and four axes under which the main 35 design tasks and their subtasks are distributed. Four axes applied in each phase, apart from definition and evaluation phase, are knowledge, pedagogy, media and delivery axis. Phases are: Definition (where training system, objectives, present situation and reference documents and learners' properties were defined), Initial solution (where knowledge model and competencies are determined under knowledge axis; instructional decision made under pedagogy axis; media principles are reviewed under media axis; and delivery principles and cost-benefit analysis conduced under delivery axis), Architecture (learning unit and content are chosen in knowledge axis; learning scenarios and activity properties are reviewed in pedagogy axis; infrastructure is developed in media axis; and delivery planning is done in delivery axis), Detailed Design (learning resource and content is designed in knowledge axis; learning resource is determined in pedagogy axis; media model, resource list, media element are developed in media axis; delivery models, actors and resources, tools and telecom are determined in delivery axis), Evaluation (test planning, revision decision log), and Delivery Plan (knowledge/competency management in knowledge axis; actors and group management in pedagogy axis; learning system/source management in media axis; maintenance/quality management in delivery axis).

The last model, which is presented here, is Isman Model, has also strong technology emphasis. In Isman Model (İşman, 2011), which points up how to plan, develop, implement, evaluate and organize learning activities effectively in order to ensure competent performance by students, highlighted to construct new knowledge by using educational technology in order to support lifelong learning through communicative technology. Five steps defined in the model are: Input (identify needs, contents, goals-objectives, teaching methods, instructional media); process (test prototypes, redesigning, teaching activities); output (assessment and revise instruction); feedback (go back to related step); learning (long term learning). In 2012, model was tested by Alias and Siraj in developing physics module based on learning style and appropriate technology in secondary education. Results revealed that model was implemented successfully in design and development of the module which contains educational technology, using of PC and website (Alias & Siraj, 2012).

The efforts in instructional design in the new century have created a shift toward more postmodern approaches. Technology integration, using mobile technologies, like Tablet PC, in classroom has been highlighted different components of the ID. In 2008, the organization of the Partnership for 21st Century Skills determined six elements of 21st century, which can encourage schools to infuse technology into education:"1. Emphasize core subjects; 2. Emphasize learning skills; 3. Use 21st century tools to develop learning skills; 4. Teach and learn in a 21st century context; 5. Teach and learn new 21st century content; 6. Use 21st century assessments that measure core subjects and 21st century skills" (Partnership for 21st century skills, 2008). Considering these skills, parallel with Wilson (1997), Sahin (2009) proposed the main principles of postmodern ID processes. According to this proposal, first of all goal and learner analysis should be conducted to relate goals with the prerequisite skills of 21st century, where learners are digital natives. In instructional strategy development, the needs of the new age should be considered, which could direct instructional designers more student centered, collaborative and technology intense learning environment in implementation. Then, media selection should be done with the help of the students, who can be active and productive with art of technology. And finally Sahin (2009) emphasized student evaluation through e-portfolios and self or peer-evaluation. As it is seen from the literature, after the introduction of technological machines or system in education, instructional designers have also begun to discuss and test the place of technology in ID planning. As Hannafin, Hill, & McCarthy (2002) highlighted it is necessary to be aware of what kinds of technology are present and also how and for what kinds of educational purposes they are used. In this regard, it is important to investigate the suitable ID models for the Tablet PC technology in the context of FATIH project. Although, there are some proposal to use existing models in FATIH project, like ASSURE Model (Sezer, Yılmaz & Yılmaz, 2013), it seems crucial to develop a model which can be special for Tablet PC integration in FATIH in order to achieve the specified goals of the project. With this starting point, this study is focusing on Instructional Design Model development, which can be a guide for Tablet PC integration in classrooms.

CHAPTER III

METHOD

In this chapter, the methodological details of the study were presented. Firstly, the overall research design with ontological and methodological details of the study was drawn. Then flow of the research was presented in order to create a scheme in readers' mind. Next, data sources and data collection instruments were explained. Afterwards, the details about data analysis were drawn. Finally, trustworthiness, limitations and delimitations of the study were discussed.

3.1. Overall Research Design

The purpose of the study was to explore instructional design steps of a course, where Tablet PC use is promoted, and to develop a model unique for Tablet PC use in instruction. Having this purpose in mind, Grounded Theory Method (GTM) was selected to develop a comprehensive instructional design model.

Grounded Theory, in general, explained as a qualitative research method of generating and discovering theory (Glaser & Strauss, 1967), but more specifically, it can be defined as "an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical data" (Martin & Turner, 1986, p.141). Grounded theory provides detailed, rigorous and systematic methods of analysis, which can create freedom to explore the research and allow issues to emerge (Bryant, 2002; Strauss, 1987). Grounded theory method offers flexible guidelines, which includes general principles and heuristic tools more than prescribed rules, for collecting and analyzing qualitative data to construct theories from the data gathered (Charmaz, 2006). In this method, collecting of data goes together with the foundation of constructs through developing theoretical analysis from the beginning of the study (Atkinson, Coffey, & Delamont, 2003). Thus, both processes inform and streamline each other. The GTM forms empirical possibilities in order to provide opportunity for examination of variety of theoretical explanation rooted to empirical findings (Bryant & Charmaz, 2007).

Before giving any further details about the methodology and its implementation in this study, it is important to give a historical detail, which also shows the roadmap of the study. The Grounded Theory Method developed in significance and gratitude over the years from the seminal work of Glaser and Strauss in 1967 (Zarif, 2012). However, over the years, two theoreticians followed separated pathways that ended up with two different schools of thought in the grounded theory: the Glaserian school and the Straussian school (Stern, 1994). The summary of discussion about the differences between two approaches and methodologies, rented from Onion (2006), were given in Table 3.1 in order to present the main alternating parts.

Although the debate about the characteristics of grounded theory study has been creating different naming and different steps in this methodology, the fundamental components of GTM, as Sbaraini, Carter, Evans and Blinkhorn (2011) investigated and revealed in their study, was followed throughout the design. As it is shown in Table 3.2, these components are openness, analyzing immediately, coding and comparing, memo-writing, theoretical sampling, theoretical saturation, and production of substantive theory. Though the main components were followed during this study, in differentiating parts, Straussians perspective was preferred to consult. The reason of this choice can be explained as the parallelism between the theory drawn by Strauss (1987; Strauss & Corbin, 1998) and the nature of the presented study.

Table 3.1

Key Difference in GTM Approaches

Glaserian Perspective	Straussian Perspective
Starting to the research with an empty mind	Starting to the research with a general idea
Guiding research with neutral questions	Guiding research with structured questions
An effort for conceptual theory	An effort for conceptual description
Need to recognize a basic social process	No need to recognize a basic social process
The role of the researcher: Passive	The role of the researcher: Active
Developing theoretical sensitivity trough data	Developing theoretical sensitivity through method and tools
Theory is grounded in data	Theory is interpreted by an observer
Data reveals he theory	Data is structured to reveal the theory
Credibility of theory is grounded in data	Credibility of theory grounded in construction of methodology
Coding: less rigorous, a constant comparison of incident to incident, evolving categories and properties out of neutral questions, not 'over-conceptualizing' but identifying key points	Coding: more rigorous, variation in comparisons with the coding technique. Derivation of codes from detailed analysis of data by word by word.
Coding phases: Simple (fracture the data then conceptually group it) and substantive (produce categories and properties)	Coding phases: open (identify, name, categorize and describe phenomena), axial (relate codes to each other), and selective (to develop theory)

3.2. Flow of the Research

In this study, the main aim is to develop an instructional design model for Tablet PC use in classrooms. In order to reach this aim, the steps constructed according to grounded theory were followed. As shown in Figure 3.1, the flow of the study was constructed in a linear form at the beginning, however, during the data gathering and writing analysis and reflecting on the entire process, more circular and repetitive flow was followed. Since, whenever ideas occurred during the research process, the researcher tried to shape the model, this led the study to more than one analytic direction. The changes in the main flow were presented during the explanations about research methodology.

Table 3.2

Fundamental Components Followed in This Study

Component	Stage	Description
Openness	Throughout the Study	In this study inductive analysis is conducted. That emphasis moving from particular to general in order to develop new theory. In this regard, throughout the study, very open approach is tended, and also what is important for the participants of study will not be regarded.
Analysis immediately	Analysis and data coding	The researcher will not wait until the data are collected before commencing analysis. Data analysis will begin in parallel with data collection, to allow theoretical sampling.
Memoing/Memo-writing (drawing diagrams, models)	Analysis	The researcher and (the other analysts) will write many memos throughout the study in order to see and record researchers' developing thinking, including comparisons made.
Theoretical sampling	Sampling and data collection	In this study, the researcher departure from the point of unknown. Because of this, by carefully selecting participants, modifying questions in data collection, the researcher will try to fill the gaps, clarify uncertainties, test their interpretations in order to build the theory.
Theoretical saturation	Sampling, data collection and analysis	The research will continue till all of the concepts in the substantive theory being developed are well understood and verified by the existing data.
Development of theory	Analysis and interpretation	The result of the study will be expressed as a substantive theory, which is an instructional design model for TPC used classrooms. This theory should be considered to be fallible, dependent on context and not completely final.

The research procedure was started after receiving the necessary approval from the Human Subjects Ethics Committee in METU. The flow of this study was mainly shaped under the three level of coding of Straussian grounded theory method: open, axial and selective coding.

At the beginning of the study literature review and expert opinions were consulted in order to reach the first categories of the research. As Charmaz (2006) stated the starting point of grounded theory is data: “We construct these data through observations, interactions, and materials that we gather about the topic or setting” (p.3). However, considering Straussian Perspective (Strauss, 1987), the study was not started with an approach of tabula rasa, rather study was started with a general idea about instructional design processes in Tablet PC integration. Having a general idea of a subject area in mind, the initial data collection was done through conducting open ended interviews with three (3) experts in the field of Instructional Design, Curriculum, Computer Education, and Educational Technology. Additionally, as Strauss and Corbin (1998) suggested consulting different sources and documents in order to enlarge the perception, the studies about technology integration and instructional design were reviewed in order to detect key concepts in the light of the literature. After that, preliminary interviews were conducted with two (2) teachers, who work in a public school which conducted pilot studies of FATIH, to emerge core categories. During these first data collection procedure, the process of coding, categorizing the data to reflect the various issues represented, was started. As it is shown Figure 3.1, in the preliminary data gathering part, open coding was employed. At this stage, the raw data (mainly transcripts of expert interview and teacher interview; and the data gathered from literature) were initially examined and coded through a process, which fractures the interview into discrete threads of datum. In this phase, as Strauss and Corbin (1990) stated an analytic process were conducted through identifying “concepts and their properties and dimensions, discovered in the data” (p.10). Main categories were developed in terms of their properties and the dimensions of the properties. In this developing process all data, without limitations in its scope and without application of any filter, were examined in order to reach core categories.

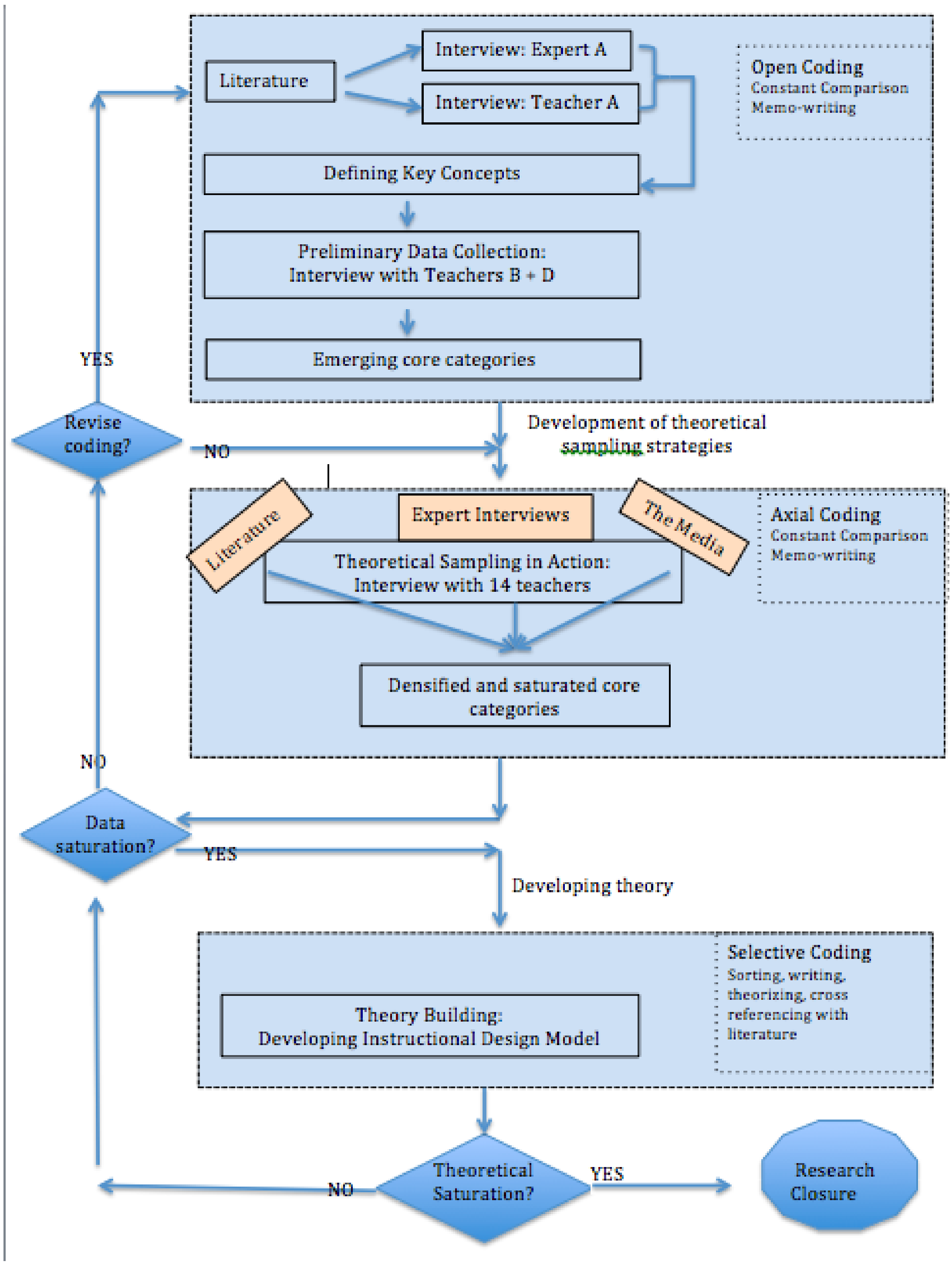

Figure 3.1. Flow of the Research

In the second phase of the study, keeping the core categories in mind, interviews were continued to be conducted with teachers. Here, in data collection, every interview was evaluated through axial coding. The purpose of axial coding, according to Strauss and Corbin (1990), is to put the fractured data back together in new ways “by making connections between a category and its subcategory” (p. 97); and by building “a dense texture of relationships around the axis of a category” (Strauss, 1987, p. 64). Thus, in this phase, the categories, developed in open coding, were related with the subcategories revealed through interviews in order to bring data back together in a coherent whole. A constant comparison was done between both the interviews and also interviews and literature (or expert’s opinions taken in the first phase). Additionally, the news on media and writings on the FATIH project was analyzed through document analysis, in order to support or de-support the findings of interviews. In establishing links between categories and subcategories, Strauss and Corbin (1998) proposed component of an organizing scheme as conditions, the circumstances that form the structure of the studied phenomena; actions/interactions, participants’ routine or strategic responses; and consequences, outcomes of actions/interactions. During the coding, conditions used to answer why, where, when and how come questions; actions and interactions utilized for by whom and how questions; and finally consequences used to find out the results of these actions. Moreover, memo was written in order to present hypotheses about connections between categories and their properties and establish integration of these connections. Memo writing, which is parallel with the coding and analysis process, is important to create theoretical notes about the data and the conceptual connections between categories (Holton, 2007). In the open coding, short memo writing conducted to describe the situation in few lines but here, more than some description memos was used to raise the level of conceptualisation. Since, memo-writing was explained as a separate title, the details were not explained here. During the axial coding, it was investigated how saturated variables and categories achieved during the research. And, the data collection was finished when data saturation was reached. It means that additional data did not lead to discovery of new concepts and categories (Strauss & Corbin, 1998).

The last phase of the study was selective coding, which was explained by Strauss and Cobin (1990) as formalizing the core categories which unified all the categories and lead to theoretical framework. In this last part, through sorting, writing, and cross-referencing with literature, and media, a theory was built. Here, an instructional design model for integration of Tablet PC use in education was the final product. After building theory, theoretical saturation was checked again, to reach conceptual density and theoretical completeness. Since, the categories and theory found sufficient enough, the proposed feedback path (see in Figure 3.1) did not be followed.

3.3. Data Sources

In this part, data sources of the study were discussed according to the procedure of grounded theory. First, as Strauss and Corbin (1990) supported, the uses of technical literature as a background material and also as point of comparison for actual data was discussed. Then, theoretical sampling procedure was explained giving the details about the participants of the study, who are the main data source for the present study. Finally, documents gathered from experts and teachers were presented as supportive data source.

3.3.1 Process of literature review. The initial phase in this study was the technical literature on instructional design and tablet PC use in education. Strauss and Corbin (1990) supported this approach and stated: “The literature can be used as secondary sources of data. Research publications often include quoted materials from interviews and field notes and these quotations can be used as secondary sources of data for your own purposes. The publications may also include descriptive materials concerning events, actions, settings, and actors' perspectives, that can be used as data…” (p. 52). Considering this, literature was used to identify the previous studies in the field, to analyze the missing parts, to reveal the concepts and categories studied, to understand the suggested relationships among concepts and categories, and also to draw the initial theoretical framework for the study. Additionally, some empirical cases were then selected in order to check and extent this framework. As

Strauss and Corbin (1990) proposed literature could serve as a point of comparison for actual data gathered during the study.

3.3.2 Theoretical sampling and participants of the study. In the study, before conducitng theoretical sampling, for the preliminary results of the study convenient sampling was done. In the following titles, procedures were explained seperately.

3.3.2.1 Step 1: Convenient sampling. Grounded theory studies are characterized by theoretical sampling, which requires jointly collection of data, emerging codes and conducting analysis on data; and also giving decision about next sources, suitable and necessary for theory development (Glaser & Strauss, 1967). Indeed, Strauss and Corbin (1998) emphasized the feature of theoretical sampling, which “maximize opportunities to discover variations among concepts and dimensions” (p.201). In this aspect, as it is suggested by Morse and his colleagues (2009), convenient sampling was started in order to obtain an overall view of the overall process. In this respect, the experts from the field of Instructional Design, Computer Education, Educational Technology, and Interactive Distance Education were consulted to detect key concepts. After that again through convenient sampling, first group of teachers, who are teaching in a public school where FATIH project’s pilot studies are going on, were selected. This preliminary data collection generated initial codes by using open coding, which in turn stimulate further data collection.

In this study, in order to detect the key concept, together with the literature, expert interviews were conducted. In selection of experts, the researcher reached out to variety of experts working in the field with the aim of conceptualizing the phenomenon in a wider perspective. First, interview was conducted with Prof. Dr. Soner Yıldırım, from the department of Computer Educational and Instructional Technology at Middle East Technical University (Expert A). His experiences and knowledge were referred to support the academic perspective of the study and develop holistic understanding toward Instructional Design and Technology use. The second expert is Dr. Damijan Stefanc from the department of Educational

Sciences at Ljubljana University (Expert B). Regarding his experience on didactics and technology integration, he was interviewed with the aim of widening the perspective internationally and realizing the possibilities and solutions through the interpretations of an expert who has experience on tablets at the international level. The third expert was from a company, which is specialized on distance education, and e-learning, Expert Yalçın Öztürk (Expert C). His knowledge and expertise was consulted considering his role in developing interactive platform for FATIH project and his experience on teaching-learning methodologies in teaching-learning processes in technology enriched environments.

In addition to the experts, teacher's thoughts and experiences were also examined in order to reach extended concepts for the study. To determine teachers to be interviewed, firstly school was chosen. In selection of school, the first pilot schools, to which Tablet PCs were distributed in the term of 2011-2012, were reviewed. Among 52 schools in 17 cities, Ankara was selected considering prolonged engagement, easy access and the studies before and after the interviews. In Ankara, there were 7 pilot schools, which have been already carrying out project for 3 years. Among them, Hasan Ali Yücel Anadolu Öğretmen Lisesi was selected by random sampling. This is a boarding school whicg is specialised to rise up teachers. It is located in a district very close to the city centre of Ankara. It has 52 teachers, from the branches of counselling, mathematic, Turkish langugae and litearture, Physics, Chemistry, biology, history, geography, German and English language, vocational courses, philosophy, pysical education, religious courses, music, and art education. The school has 624 students. In this boarding schools there are two boardings comprising both soem students and teachers. Students are coming from different socio-economic statues (SES) from high SES to low SES. This boarding school was equipped with the infrastructure, interactive whiteboard in every classroom and Tablet PC for all teachers and students starting from the 9^{th} level.

As a starting point, 1 teacher, who was pointed out as most frequent Tablet PC user, were volunteers for the initial interviews. First teacher (Teacher A) was from the field of Computer Education, with 11 years of experience. After revealing the main concepts through expert interviews and initial teacher interview, two (2) more teachers were interviewed. Second teacher (Teacher B) was from the field of History, with 21 years of experience. Third teacher (Teacher D) was from the field of English, with 22 years of experience. The summary of the teachers in convenient sampling was presented in Table 3.3. (Teacher C was started to interview but she had to quit the interview after 10 minutes because of her personal reasons, but she involved to the study in the following part.)

Table 3.3

Teachers' Demographics (Convenient Sampling)

Teacher	Teaching Subject	Years of Experience	Gender	Having TPC before FATIH?
Teacher A	Computer	11	F	YES
Teacher B	History	21	F	YES
Teacher D	English	22	M	NO

Note. F: Female, M: Male

3.3.2.2 Step 2: Purposeful sampling. Once the general trajectory was identified, sampling strategy was changed to purposeful sampling and snowball sampling. Purposeful sampling is defined as the selection of participants with shared knowledge or experience of the particular phenomena identified by the researcher as a potential area for exploration (Sandelowski, 1995). This enables confirmation of path though a rich description of different stages. Through purposeful sampling, interviews were conducted with 12 teachers. In addition to purposeful sampling, to reach richer extent of data, snowball sampling, relies on referrals from initial respondent to generate additional respondents, was also conducted with the teachers' invitation or suggestion of their colleagues who are experienced in the field and who are willing to participate to the study. Snowball sampling was important in order to achieve more data from the participants, who were experienced and provide adequate data. Through this, 2 teachers were included to study from a different pilot school in Ankara. (These teachers were interviewed out of school context.) Moreover, operational memos were directed the study to get information from school administrator who was in charge of conducting FATIH project in the school. This interview helped to gain a general point of view toward Tablet PC use in the school. In the study, 11+2 teachers and 1 administrator (total 14 teachers) were interviewed. They were ranged from teachers who were not using TPC at all to teachers who were using in maximum level. Mostly, they were using TPC at a minimum level, just for some simple tasks. The demographics of the teachers were summarized in Table 3.4.

Table 3.4

Teachers' Demographics (Purposeful Sampling)

Teacher	Teaching Subject	Years of Experience	Gender	Having TPC before FATIH?
Teacher E	Mathematic	11	F	YES
Teacher F	Biology	17	F	NO
Teacher G	Turkish Language and Literature	18	F	YES
Teacher H	Turkish Language and Literature	24	F	NO
Teacher I	German Language	12	F	NO
Teacher J	Music	23	M	NO
Teacher K	Physics	11	F	NO
Teacher L	Chemistry	21	F	NO
Teacher M	Geography	25	M	NO
Teacher N	Administrator	22	F	NO
Teacher O	English	17	M	NO
Teacher P	Teaching Methodologies	15	M	NO
Teacher R	Philosophy	20	M	NO
Teacher C	Visual Arts	18	F	YES

Note. F: Female, M: Male

3.3.3 Documents and materials. In this study, teachers' documents, materials and plans they used were used as a data source for the research. At the end of each interview, teachers were asked whether they have materials developed to support TPC use in classroom. Also, their plan (if they have prepared) to use TPC in classroom was scrutinized to see the place of the tablets in planning phase. The documents in EBA website was also reviewed to see how comprehensive the content was and to understand the reason of teachers' utilization or exclusion of the EBA website.

The media was also an important source for the research. Starting from the introduction of the FATIH project, there have been several news and writings about the project on newspapers, forums and daily writings on magazines or online newspapers. They were also consulted to comprehend the development of the project, the view of enthusiasts and skeptics. Moreover, the news on FATIH was highlighting the strengths and weaknesses of the investments. Exploring the media was helpful to be aware of application in different parts of the country and also, to get updated information about the project's itself.

3.4 Data Collection Instruments

In this study, data were collected through interviews conducted with experts and teachers, written literature, socio-demographic form, and document analysis form. Both forms and schedule were developed by researcher and reviewed by the experts in the field. All the instruments used in this study were examined by the Human Subjects Ethics Committee in METU.

3.4.1 Interview schedules. In the present study, the main data was gathered through face-to-face interviews with teachers and experts. As a nature of Grounded Theory, first interviewees were faced with some un-structured open-ended questions prepared considering the literature and news on FATIH project. The Interview Schedules were developed in the process of data gathering.

3.4.1.1 Interviews with experts. After reviewing the literature and news about FATIH project, a pattern of questioning was created to conduct interview with the first expert. In this regard, expectations from technology, our teachers' position in FATIH project and the changes created in instructional design phases through Tablet PC use in classroom were planned as headings. The first interview, conducted by Expert A enlighten the organization of the interview. Thus, a semi-structured interview with open-ended questions were developed (See Appendix B). Interview Schedule for Experts was sent two experts from the fields of curriculum and instruction and also research methodologies. Considering the feedbacks, the necessary changes were done.

The interview consisted of 10 main questions with some sub-questions. Interview schedule was enriched by alternative questions and some prompts, which could guide the interviewee. The schedule was shaped under 4 main headings:

Introduction: This part was built to give general information about researcher and the topic of the research. Also, the necessary information like predicted time duration, right to quit of interview was presented; the request of recording the interview was asked.

Questions about expectations from Tablet PC: In this part the expectations from this technology questioned with highlighting the abilities of the hardware itself and the role of the other components. The conditions necessary for meeting the expectations were asked.

Questions about instructional design steps: Here, the instructional design steps of ADDIE model (analyze, design, development, implementation and evaluation) were used to question the effect of the Tablet PC in these different design phases.

Further questions: In this concluding part, a question of whether the interviewee would like to add anything related for the topic was asked.

3.4.1.2 Interviews with teachers. Interview Schedule for Teachers were developed in 3 stages, first, un-structured open questions were asked to teacher A. The results gathered from Teacher A and Expert A used to develop first version. Then, two more teachers (Teacher B & Teacher D) were interviewed to create a structure. Considering the answers and flow of the interview, researcher developed a semi-structured interview schedule with open-ended question (See Appendix C). The interview was piloted before the actual interviews so as to ascertain whether weaknesses exist in techniques, structure, approach and content. For the pilot study, the interview instrument was administered to two teachers in Hasan Ali Yücel Anadolu Öğretmen Lisesi. The criterion and convenience sampling methods was used in order to select the teachers involved in the pilot study. After the pilot study, interview schedule was sent to two experts in the field of Curriculum and Instruction and Research Methodologies. They revised the instrument and reworded some questions for better understanding and gathering accurate data via the instrument.

The interview consisted of 8 main questions with some sub-questions. Interview schedule was enriched by alternative questions and some prompts, which could guide the interviewee. The schedule was shaped under 4 main headings:

Introduction: This part was built to give general information about researcher and the topic of the research. Also, the necessary information like predicted time duration, right to quit of interview was presented; the request of recording the interview was asked. Additionally, teacher were informed that it was expected them to review their answers summarized by the researcher after the interview.

Demographics and preparative questions: In this part, demographic information of the participants asked (like branch, year of experience, age). Also, some preparative questions were asked in order to see the teachers’ usage of technology and TPC.
Questions about expectations from Tablet PC: In this part the expectations they developed with the introduction of FATIH project was questioned. Also, overall positive and negative effect of Tablet PC in their classroom were discussed.

Questions about instructional design steps: Here, the instructional design steps of ADDIE model (analyze, design, development, implementation and evaluation) were used to question to see the changes created by Tablet PC use in education.

Further questions: In this concluding part, a question of whether the interviewee would like to add anything related for the topic was asked.

3.4.2 Document analysis form. Documents broadly include any papers, especially official ones, which provide more or less direct evidence of decision, transaction, status, thought, debates or actions, which are directly or indirectly related to the purpose of the research (Prosser, 1998). In the present study, teachers' materials, plans and documents, EBA website, and also the news were taken as source for document analysis. In order to gather data out of these sources, document analysis was conducted in light of the research questions.

Teachers' materials, plans and documents were reviewed considering their explanations and responses in the interviews, and they were crosschecked with the teachers' answers. Their plans and documents were used as a supportive data for the interview.

Additionally, mainly online news and writings on FATIH projects were gathered as source of data. In order to analyze these documents, a document analysis form (see Appendix D) was developed under the 3 headings: General information about the document like data of document, author of document, and so on; potential prejudice of the document; and also potential benefits of the document.

3.5 Data Analysis

Strauss and Corbin (1998) explained data analysis as a process of breaking down, organizing and reassembling data in order to create a different understanding of a phenomenon. In Straussian approach, data analysis procedure for grounded theory was done under three categories: open coding, axial coding, and selective coding. In this part of the study, the process deconstruction and reconstruction of data was explained in order to build an instructional design model appropriate for Tablet PC use in classrooms.

In present study, in addition to the researcher, two debriefers were engaged in coding, providing feedback on coded categories, and interpreting the data to develop the theory. One of the debriefers was methodologist, who has PhD degree from Middle East Technical University and experience on both quantitative and qualitative methodologies. Other debriefer was a PhD student at the department of Curriculum and Instruction at Middle East Technical University. Characteristics of both debriefers were their experience in qualitative data coding and their background about Instructional Design Modeling.

In the following part, data analysis procedure was explained through the steps of open coding, axial coding and selective coding. Examples of coding interview data; memo-writing and diagrams were included in order to make the process clear for the reader. Since memo writing (memos and diagrams) was an essential part in data analysis and coding process, before going any further, this adjunctive procedure was explained as a subtitle.

3.5.1 Memo writing (memos and diagrams). Memos and diagrams are two important activities during coding the data. Memos, as written records, and diagrams, as visual representation, “help to tease out distinctions that sharpen [my] treatment of the material” (Charmaz, 2006, p. 84-85). Strauss and Corbin (1990, p.10) emphasized the place of memo-writing: “Writing theoretical memos is an integral part of doing grounded theory. Since the analyst cannot readily keep track of all the categories, properties, hypotheses, and generative questions that evolve from the analytical process, there must be a system for doing so. …Memos are not simply ‘ideas.’ They are involved in the formulation and revision of theory during the research process.” Strauss and Corbin (1998) defined three types of memo: code notes, theoretical notes and operational notes.

Code notes include taking notes mainly during the open coding for conceptual labeling, revealing the features of the concepts and categories. In this study, code notes were written during open coding and axial coding (see Figure 3.2 for a code note in open coding).

Expert A, p.3-4, dated, 16/06/2014

Code Note: REAL EXPECTATIONS

Two real expectations of Tablet PC can be discussed and some dimensions should be established in order to meet with these expectations.

General Properties	Possible Dimensions
1) Access	free 3G, fast Internet, in and out of the school context
2) Interactivity	collaboration-share in and out of the school context, software, hardware

If the free and fast access to the Internet can be established in and out of the schools context; and also if the interactivity can be used in and out of the school context using proper software and hardware, then we could mention about some significant change.

Figure 3.2. Code Note #3 in Open Coding

Theoretical notes, which are more related to axial and selective coding, are used to sensitize and summarize codes theoretically. These notes contain the results of "inductive or deductive thinking about relevant and potentially relevant categories, their properties, dimensions, relationships, variations, processes, and conditional matrix" (Strauss & Corbin, 1990, p.197). In this study, theoretical notes based on code notes were used in every stage of data coding, but, intensively, in axial coding. The last type of memo-writing is operational note, which shows the direction for further steps like choosing next participant, or developing further questions, deciding on possible comparisons (Strauss & Corbin, 1990). In this study, operational notes were written during the open and axial coding. Throughout the data analysis, in order to select the next interviewee, hypothesis or area to focus during the interviews, and even the documents to check, operational notes were used (see Figure 3.3 to see the operational note taken during axial coding.) Additionally, some very direct operational notes like “check the article no.1” or “write the conditions determined by interviewee no.8” were taken in order to shape the theory.

> 12/06/2014
> SAMPLING FOR INSTRUCTIONAL DESIGN STEPS
>
> When I consider the data I gathered from teachers who are not frequent technology users, I guess I have to find some teachers who are using the Tablets more. I will ask teachers whether they can advise some teachers in or out of this school. Because, I also need to know the effect of tablets in instructional design phases. I want to look at 4 steps, analyze, design and development, implementation and evaluation from the perspective of a teacher who is showing effort to integrate tablet PC use. The present conditions of the FATIH project is quite clear but I want to clarify the necessary conditions, which are important for effective application. What are the optimal conditions? What do the teachers need to benefit form tablets in or our of class context?

Figure 3.3. Operational Code Note #8 in Axial Coding

Apart from memos, diagrams were utilized in order to visualize the relationships between concepts and categories. Although Strauss and Corbin (1990) emphasized using diagrams in selective coding to present “the density and complexity of the theory,” they were also useful to shape the draft models, emerged from each interview. These draft diagrams sent to the interviewees in order to allow them to check their responses (member check) and approve their answers one more time. Additionally the diagrams drew by researcher during selective coding was used to present the steps in model development and how to reach the final version.

3.5.2 Open coding. The initial step in data analysis of grounded theory is open coding, where the raw data (here, transcripts) are initially examined and are coded through which the key concepts and core categories can be emerged (Jones & Alony, 2001). Strauss and Corbin (1998) defined the significance of this phase as conceptualizing, where data was breaking down into concepts. Mainly, open coding is basic analytic procedure to reveal concepts and then grouping them considering similarities and differences (Strauss & Corbin, 1998). Here, the transcripts of initial interviews with experts and teachers were reviewed by researcher and two debriefers. The synopsis of their transcripts and draft models shaped according to their speech were sent to the participants to ensure the accuracy of captured categories (For further information, please check trustworthiness section).

The aim in this coding phase was to generate a list of concepts regarding the knowledge and experience of participants in TPC use and their expectations. In this process, first, the transcripts were read systematically and coded through line-by-line open coding in order to detect similarities between concepts. Line-by-line coding forces the researcher to verify and saturate categories, minimize the risk of missing some categories and ensure relevance by generating codes (Glaser & Holton, 2004). Strauss and Corbin (1998) identified line-by-line coding "most detailed type of analysis but the most generative," as well (p. 72). The first reviewing process of data revealed 201 concepts and experiences. An example of concepts can be seen in Table 3.5. Then, through the process of comparing the concepts for similarities and differences a list of 55 groups was constructed. These categories were shaped by grouping the conceptual labels. This was done to reduce the number of units into a degree easy to handle. After reaching this category list, each interview was coded by the researcher and one of the debriefers, separately in order to reach a consensus on the categories. Naming the categories was also discussed in this stage of the coding. At the end of this, categories endorsed by each participant were explored and non-representative categories were eliminated. During this process, code notes were written in order to examine the properties and dimensions of the categories.

Table 3.5

Concepts and Categories of the Study

Concepts	Categories	Core Category
Goals od TPC use Place of TPC in Classroom (integration/use/adaptation) Philosophy behind TPC use	Revision in Tablet PC Distribution	FACTORS TO USE TPC FUNCTIONALLY
Standardized TPC Pen Infrastructure Free 3G High-speed Internet Non-free TPC distribution	Hardware (HW)	
Access to websites Access to programs Language barriers Interactive software e-books & z-books Notebook Quality of programs Quality of materials	Software (SW)	
Teachers' readiness Teachers' knowledge Teachers' technology adaptation Teachers' guide In-service training Pre-service training Teachers' decision	Teacher Training	
Technology supporters in schools Software developers Software evaluators	Technology Leader	
Curriculum planning Place of TPC in curriculum Instructional design Link btw. technology and curricular goals	Curriculum	

3.5.3 Axial coding. Strauss and Corbin (1990) defined the function of axial coding as "procedure whereby data are put back together in new ways after open coding, by making connections between categories" (p. 96). Thus, in this phase of coding, the relation between categories were suggested and tried to be verified. Through the process, 45 categories representing the experiences of the majority of the participants emerged.

During the coding to reach these core categories, memos were written in order to reflect the efforts to link categories with subcategories. These memos and core categories found out were checked separately by peer debriefers in order to reduce bias and misconception and to reach a common understanding. Throughout axial coding, diagrams were also used to establish comparisons between the ideas and experiences of the teachers. They were also provided easy way of express categories revealed in coding from each participant.

3.5.4 Selective coding. The last step in data analysis proposed by Strauss and Corbin (1990) was selective coding, which was "the process of selecting the core category, systematically relating it to other categories, and validating those relationships" (p. 116). The main goal of this step was to develop a theoretical frame through uncovering the patterns by systematically settling down the connections between categories and identifying core categories. In this step of analysis both memos and diagrams were used to show detailed explanations about thoughts. During developing the model in this stage, theoretical saturation was also investigated. Theoretical saturation indicated that there is no category left over and all of them revealed and saturated through the data gathered. In this step, by giving decision about the theoretical saturation, the relations between categories emerged and core categories were identified in order to create the model.

3.5.5 Constant comparison. Constant comparison is a simultaneous and concurrent process of coding and analysis (Corbin & Strauss, 1990). Throughout the data analysis and data gathering procedure of grounded theory, constant comparison compels the researcher to start reflecting on the data and to initiate conceptualization, usually using memos or diagrams to record the researchers' reflection and annotations of the data (Glaser & Strauss, 1967). In constant comparison, it is important to check whether data is supported with the other data and continue to support emerging categories (Strauss & Corbin, 1990). As Holton (2007) suggested, constant comparison process continued through open coding to selective coding "collecting redundant data as once a category had been saturated" (p. 278). In order to satisfy this, three kinds of comparison were suggested by Glaser and Holton (2004): comparing incidents to establish underlying uniformity; comparing emerging concepts with more incidents to develop new concepts and reach saturation; and finally comparing concepts with each other to reach the categories which form the theory.

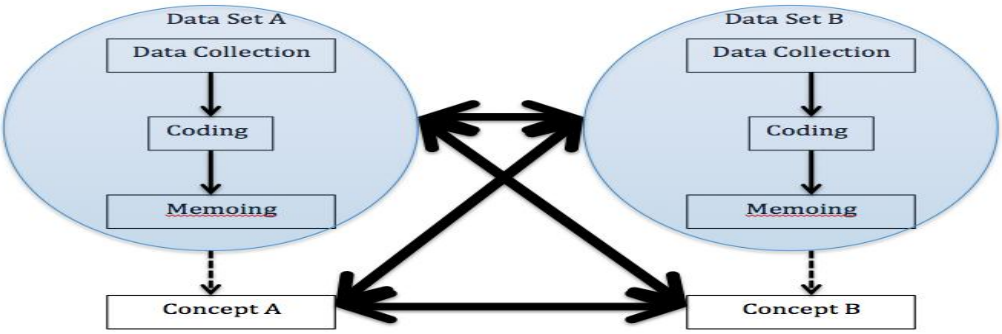

Figure 3.4. Constant Comparison

Source. Adapted from Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. New York: Aldine de Gruyter Sage.

In this study, constant comparison was employed starting from open coding until the end of the development of theory. During the data analysis, with the aim of reaching harmony, the data gathered by interviews were compared within interviews and between interviews. The main aim is firstly to compare the concepts revealed in the interviews by coding. In grouping the concepts into groups the similarities and differences of the concepts were compared through checking coded transcripts. Then, the concepts were grouped into categories and each new data was checked whether it fit into the existing category or not. And also, it was compared whether the new data were confirming or disconfirming the existing data. The procedure followed to establish constant comparison was shown in Figure 3.4.

3.6 Trustworthiness

In any research study, qualitative or quantitative, the trustworthiness, or validity, of the research findings is an important concern (Creswell, 1998). Trustworthiness involves establishing credibility of a study from the standpoint of the reader, participants, and the researcher (Creswell, 2003; Schram, 2003). Determining the trustworthiness of a study shows the credibility of the research, as Creswell (1998, p. 209) stated: “[trustworthiness is an] active part of the process of a research and becomes part of the standards one should use to judge the quality of the study.” In this regard, researcher must consider some strategies to verify accuracy of the data collection, analysis, and interpretation methods used. Creswell (2003) suggested utilizing at least two verification techniques among eight primary strategies for verification of the correctness of the findings. For the present study, clarification of researcher bias, triangulation, member checks, peer review and debriefing, and thick-rich description was used to ensure trustworthiness.

3.6.1 Clarifying researcher’s bias. One of the initial steps in Grounded Theory is to disclose possible influences, which may bias the study. Although Glasserian approach (as seen in Table 3.1), recommended to enter the field without preconceived ideas about the area of study, as Straussian perspective claimed that it was very difficult to divorce one’s self from the field of study. In this point, as Charmaz (2003) suggested it was important to disclose the information of researcher which may affect the result of the study. It found important to acknowledge researcher bias to create open and honest background. In order to reveal the researcher bias, before starting to collect data or to read the literature, researcher drew a prior model to reveal the initial ideas of self. This earlier model used to compare the results from interviewees whether coding had been affected by the researchers’ perspective. Moreover, it can be presented as an advantage that researcher entered the study with little prior knowledge and experience about Tablet PC use in the classroom, that could be an opportunity not to develop any prejudice and perception which may effect the result. Despite the lack of experience, researcher was open to the area of study. Although this was motivation for the research, researcher has to be careful not to be subjective in conducting the interviews, data analysis and interpretation. Additionally, the initial purpose of the research was to create a model and this was guiding the interviewees to respond to the questions in a more systematic way. In this process, researcher spent a conscious effort not to control and lead interviewees to the expected path. This concern was also shared with the peer who helped to review the codes emerged from data. As a summary, conscious and passionate attitude was tried to be kept in order to be creative and open minded while working with data, because the main purpose of this study was to understand the place of the Tablet PC in classroom and find out the best solution of instructional design for Tablet PC use in education.

3.6.2 Triangulation. Triangulation, which refers to the process of gathering data from different sources, comparing different results to validate findings, is a technique used to increase the trustworthiness of qualitative research (Lincoln & Guba, 1985). In the present study data source triangulation was performed by collecting data from experts, teachers, teacher's documents, news and writings about projects and also literature. Unlike the Glasserian approach, Strauss and Corbin (1998) advocated early review of the literature and the possibility of using it as a data source in grounded theory. Considering this, Tablet PC integrated or used in classrooms in different studies reviewed and the important aspects mentioned were tried to be revealed. In this present study, multiple teacher participants were included and their experiences were compared for similarities and differences. The theory was developed on accumulation of common experiences, rather than data unique to any one participant. In order to compare of data gathered from teachers and teachers' documents, the data gathered from experts were also consulted in order to see the similar techniques and qualities toward Tablet PC usage. Moreover, news and daily writings about FATIH project was used as a source. Gathering data from different sources allowed to cross check information (Strauss & Corbin, 1998) and develop more widen perspective to understand instructional design steps.

3.6.3 Member checks. Member checking is another most important technique for establishing credibility of a study (Strauss & Corbin, 1998). This technique, providing soliciting feedback from participants, is the "… way of ruling out the possibility of misinterpretation of the meaning of what they say and the perspective they have on what is going on" (Maxwell, 1996, p.94). In order to avoid the risk of losing the focus of the participants while recording, transcribing, analyzing and interpreting data, interviewee were sent a list of the main ideas or the model as interpreted by the researcher from the answer of the interviews. Participants, including the experts, were asked to respond and correct any mistaken perception. All participants returned back to this offer and all of them verified the findings, only 3 of them clarified some points, which they did not explain explicitly during the interview.

3.6.4 Peer review and debriefing. Peer review is another method used to verify accuracy of the study. As Maxwell (1998) stated that asking feedback from peers was an efficient strategy for "identifying validity threats, your own biases and assumptions, and flaw in your logic and methods" (p.94). Two peer debriefers, one methodologist and one expert from the field of curriculum and instruction, have taken role in this study. Debriefers were provided background information about the aims, procedure, and methodology of the study. After that, they were included in the open coding process through examining interview scripts, coding sheets and category lists, synopsis of the findings and they participated in category coding. In axial coding, the debriefers evaluated main categories and gave feedback on the comparisons of models, and components of the developing theory. Finally, debriefers reviewed the draft model developed and they were asked to provide feedback comparing the data gathered from participants and theory developed. As Lincoln and Guba (1985) proposed through peer review process, it was tested first, whether analysis were conducted logically and systematically; second, whether the reasonability and accuracy of the findings was defined.

3.6.5 Thick rich description. Thick, rich descriptions, which allow transferability (Creswell, 1998), was used in order to provide vicarious experience and detailed information for the reader. In order to enrich the database, after each interview, during analysis, and at the end of the analysis, descriptive and relevant data was tried to be created. First, a meeting was arranged with the interviewee in order for them to know the researcher and to ask their questions about the study. This step was done in order to create more comfortable and honest discussion environment during the interviews that could facilitate the generation of rich data about their experiences. That provided detailed description for the study and in the results of the study, the thick, rich description of the classroom experienced of teacher was tried to be exhibited.

In addition to these strategies of trustworthiness of the study, the interviews were recorded in order to capture every expression of the interviewees. Moreover, the recordings were transcribed by the same researcher. That helped to get familiar with every aspect of the data, and ease the data analysis procedure. Moreover, according to Miles and Huberman (1984), full access to the research site was also highlighted as an important condition for external validity. In this study, the school selected to collect data from was visited few times, before starting to conduct the study. In these early visits, informal meetings with administrators and teachers were established to give information about the study and to get familiar with the participants. These efforts helped to create sincere atmosphere between researcher and school staff that resulted with full access to the research site. This was important to have an access whenever new data required for enriching the data sources.

3.7 Limitations of the Study

This study was conducted in one school with participants chosen purposefully. Thus, the findings of the study may not be generalized. With regard to this, there is a risk in meeting external validity and external reliability.

The researcher played a vital role during the study as an interviewer, data collector and analyzer. In order to protect the analysis from the researchers' bias, member-check, and peer debriefing was used to ensure the trustworthiness. Additionally, researcher bias scheme was drawn to evaluate researcher's point of view. However, still there might be possible researcher effects in the study. This limitation poses a threat to the internal validity to some extent.

3.8 Delimitations of the Study

This study was delimited to various groups of participants including one school, Hasan Ali Yücel Anadolu Öğretmen Lisesi, with its 14 teachers from the branches of history, English language, mathematic, biology, Turkish language and literature, German language, music, physics, chemistry, geography, teaching methodologies, philosophy, and art education. One administrator who was in charge of carrying out FATIH project in school was included. Additionally 2 teachers from other pilot schools of FATIH project in Ankara from the branches of Turkish language and computer participated. Moreover, 3 experts attended from the fields of computer education and instructional technologies, didactics and distance education, e-learning and interactive mobile applications for education. Furthermore, considering the borders of the study, the documents supplied by teachers and online news and writings were involved.

CHAPTER IV

RESULTS

The purpose of this study was to explore instructional design process of Tablet PC (TPC) use in classroom and to discuss expectations being invested in Tablet PC use in education. As a consequence of this investigation, the present research aimed to reveal the existing situation in classrooms and also to discuss instructional design process when the conditions necessary for appropriate use of TPC in the teaching and learning environment had been met. Using the methodology outlined in Chapter III, a large amount of data was gathered from various data sources and instruments. The following research questions and sub-questions were investigated throughout the study.

The study was guided by two major research questions:

1. What kind of expectations is invested in contemporary technology of Tablet PCs in the field of compulsory education?
    - 1.1 What are the teachers' expectations related with introduction of Tablet PC in compulsory education in Turkey?
    - 1.2 Up to what degree does the usage of Tablet PC meet with the expectations in teachers' opinion?
    - 1.3 What are the reasons behind the unmet expectations of Tablet PC usage in classrooms?

1.4 What can be considered as the advantages and disadvantages of Tablet PC usage in classrooms?

1.5 What conditions should be established in order to use Tablet PC instructionally functional and advantageously in teaching-learning process?

2. What Instructional Design Process should be followed in order to adapt instructionally functional and advantageous practice of Tablet PC usage in compulsory education?

2.1 What are the instructional design steps followed by teachers to use Tablet PC technology in current teaching and learning process?

2.2 What should be the steps of the instructional design, which is followed when the necessary conditions for using TPC in teaching and learning process has been met?

The results of this study were organized according to the research questions. As explained in Chapter III, in order to answer each questions different data sources, instruments and analysis were conducted (for summary of relation between research questions and methodology, see Appendix A). According to the data gathered from indicated sources, here, the results were presented separately through answering each research questions. Since, grounded theory was chosen as a methodology to draw a framework for the theory investigated throughout the research, each finding was discussed considering the existing literature. Thus, here, both results and discussion were presented. In this respect, first questions about expectations were examined and then the instructional design steps of Tablet PC use in teaching learning process was discussed.

4.1. Expectations Related with Introduction of Tablet PC Usage

The results about expectations of teachers were presented considering the following research questions:

1. What kind of expectations is invested in contemporary technology of Tablet PCs in the field of compulsory education?

1.1. What are the teachers' expectation related with introduction of Tablet PC in compulsory education in Turkey?

1.2. Up to what degree does the usage of Tablet PC meet with the expectations in teachers' opinion?

1.3. What are the reasons behind the unmet expectations of Tablet PC usage in classrooms?

In the scope of these research questions, interviews were conducted with 17 teachers and 3 experts (see Chapter III for detailed explanation) to find out their general expectations from Tablet PC, and also the covered and uncovered expectations related with the introduction of Tablet PC in classroom. Additionally, literature and the media were utilized to discuss the findings. Responses of interview indicated that while there were some common expectations of all teachers, there were also some expectations showed difference considering the perspective of teachers.

Table 4.1

Teachers' Expectations Related to Introduction of Tablet PC Usage in Education

Expectations		# of teachers, who indicated expectations	# of teachers, who think expectation has been met	# of teachers, who think expectation has not been met
Interaction	In-class	17	0	17
	Out-of class	3	1	2
	Interactive activities	14	0	14
	Interactive assessment	2	0	2
	Control on students	10	0	10
Solution for heavy bags		16	3	13
Enriched teaching learning environment	Rich e-content	14	2	12
	Multimedia	16	9	5
	Interactive materials	12	1	11
	Diversity in assessment	15	10	5
Introduction to technology		10	8	2
Reduced amount of paper-material		9	4	5
Increase in students motivation		7	2	5
Flexibility in learning		6	3	3
Access to Information		15	13	2

In interviews, the main point emphasized by 17 teachers were that their expectations were increased through the news on media related with FATIH project and in-service training they attended to learn how to use technology in their classroom. They indicated that the real applications in schools and classrooms fell behind the advertisements of the projects. The results of the study indicated 8 expectations from TPC use in classrooms: Interaction, solution for heavy bags, flexibility in learning, increase in students' motivation, reduced amount of paper-material, introduction to technology, enriched teaching learning environment, access to information. These expectations and up to what degree they have been met, summarized in Table 4.1 (for teachers), and Table 4.2 (for experts) were discusses separately in this part of the study.

Table 4.2

Experts' Expectations Related to Introduction of Tablet PC Usage in Education

Expectations		Expert A	Expert B	Expert C
Interaction	In-class	+*	+	+
	Out-of class	-**	+	+
	Interactive activities	+	+	+
	Interactive assessment	-	-	+
	Control on students	+	+	+
Solution for heavy bags		+	-	+
Enriched teaching learning environment	Rich e-content	+	+	+
	Multimedia	+	+	+
	Interactive materials	+	+	+
	Diversity in assessment	-	-	+
Introduction to technology		+	+	+
Reduced amount of paper-material		-	+	+
Flexibility in learning		+	+	+
Access to Information		+	+	+

* + : the expert presented it as an expectation
** - : the expert did not present it as an expectation

4.1.1 Interaction. The first expectation highlighted by all of the teachers (*n=17*) and experts (*n=3*) was the interaction. The project was introduced in media and in-service trainings as an opportunity for interactive teaching and learning environment. Teachers explained their disappointment about lack of interaction between tablets and interactive white board (IWB), between teacher's TPC and students TPCs, and also between students' TPCs. Under the main category of interaction, teachers mentioned about in-class real-time interaction (*n=17*), out-of-class real-time interaction (*n=3*), and also interactive activities (*n=14*), interactive assessment (*n=2*) and having control on students' Tablet PC (*n=10*). A teacher who experienced Tablet PC integration in her previous work area (a private school) stated,

> … I was among the teachers who were excited about the TPC usage in classroom, because I was in such a project in my earlier work and I know that it could be useful to enhance teaching and learning. However, interaction is the main key to establish. There should be interactive platform for students and my friends [teachers] to do some charming activities, which could really attract the students' attention. We could establish a platform during our classes and also, there could be times when I could direct students when they are their home or dormitories (Teacher G).

Computer teacher, who was explaining the functionalities of TPC, described her expectations about assessment and evaluation: "TPCs are great opportunity to develop and use interactive game-based assessment. I expected and still expecting a module system, where we can assess students using games" (Teacher A). A parallel issue was drawn by an English language teacher, who claimed that it would be easier for him to find out varieties of interactive teaching and assessment applications available in his subject matter: "… Since, I do not have barrier to use English materials available in web, in an interactive classroom, I could make students to download and use some applications. However, lack of interactivity forbids me to try new things" (Teacher O). As it was seen, teachers' expectation about having interactive platform in and out of the classroom could not be satisfied because the planned system of interaction has not been established in pilot schools yet. As a related category with interaction, teachers (n=10) mentioned about their expectation to control students' work in their TPCs. Eight teachers complained about the inefficiency of lack of control on students' individual work during the class. They indicated that without the digital interaction it was not possible to use TPC functionally: "I do not know what my students are doing with their tablets while I am teaching in front of the whiteboard. Thus, sometimes I had to warn them to turn their tablets off," (Teacher O); "They showed us during in-service training that it would be possible to see student's TPC desktop whenever it is necessary, but it is not applicable now. In this case, it is not possible to control students" (Teacher M). Teacher F explained her effort to use TPC in her class but she explained her hesitation after some negative cases: "…Few days ago, I assigned students to watch chromosome multiplication in a very nice animation. When I was walking around desks, I realized that one of my male student was watching bride-mother-in-law program on YouTube."

The opinions of experts in the present study were also parallel with the teachers' un-met expectations. They perceived that one of the main aims to use TPC in education was to develop interactive platform in and out-of the classroom. That could foster the collaboration and sharing among students. Expert A congregated the issue of interaction as follows:

> Actually, we cannot expect much about TPC use in our classrooms. One of the few things that we can accept is interaction. We need students to collaborate and share with their peers, teachers, students out of their class or city. If we can establish this interactive platform, which requires serious software and infrastructure, then we may begin to expect more about quality of education.

The Expert C, who emphasized his expectations about supportive distance learning for formal education mentioned about the teacher-controlled interaction both in-school and out-of school context.

> In interactive learning environment, teacher should be the person, who monitors the interaction. We should give the control of the interaction among students both in and out-of the school context to the teachers. They should decide why, how much, when and how students will interact. Thus, education process should be under control mainly by teachers (Expert C).

The literature related with lack of interaction in pilot studies was parallel with the un-met expectations of teachers. As Dursun and his colleagues (2013; Kuzu et al., 2013), underlined in their studies conducted to evaluate FATIH project that lack of interaction was limiting the usage of the technologies functionally. The problem of interactivity was also discussed by media channels by presenting the reports of the studies or by translating the foreign sources: "… teacher cannot send the document neither to students' TPCs nor his own TPCs. For example, teachers want to prepare a question and send it to student's TPC and receive the answer back to the IWB. However, this is not possible yet" ("İkinci yılında FATIH projesi," 2014). As a result, interaction appeared as an expectation with the introduction of the project but it could not be met yet.

4.1.2 Solution for heavy bags. The most common expectation among teachers (*n=16*) about TPC use was found out as "solution for heavy bags." Since TPC was introduced as a device where the digital documents were available as e-book, z-book (enriched e-book) and note-taking opportunity, teachers had created an expectation about the reduced amount of book and note-book carriage by students. They indicated that in first months of the project, their expectation was met because students were motivated to bring their TPCs, access books through EBA website and take their notes using the keyboard. However, one of the teachers explained the change throughout the time: "At first, all 9^{th} graders were using their TPCs for their classroom activities, but around 2 months time, they skipped using tablets and began to take-notes in a classical way and to use their paper-based books" (Teacher B). A math teacher explained the change by stating the importance of classical note taking: "The first circle of Tablet PCs, did not have pen to take notes and students were trying to use keyboard. That was not effective for my subject, and finally, they gave up and went back to their paper-pencil system" (Teacher E). Apart from note taking, teachers explained the relation between students TPC usage and sufficiency of the digital material:

> I was expecting to find varieties of documents, digital content, and also enriched books where I could conduct extra-curricular activities. However, I am quite disappointed because there are only 5 pages of difference between the book we use and z-book in EBA. This resulted with blanking the documents in TPC both by me and by students. Even, I am bringing extra-books to support their studies; so, the bags become heavier (Teacher G).

The expectation invested on creating solution for heavy bags was also reinforced by the media during the first cycle of Tablet PC distribution of FATIH project. News stated: “students get rid of carrying heavy school bags” (Demirci, 2012); “FATIH project makes bags lighter” (Elek, 2012; Özer, 2012). The findings were parallel with the results of studies, which concluded that insufficiency of e-content and impracticability in data-entrance resulted with more heavy bags: Students are carrying their books, notebooks and also their Tablet PCs (Çiftçi et al., 2013; Dursun et al., 2013; Güllüpınar et al., 2013). Thus, the expectation related with the solution for heavy school bags of children did not met in the current system, and even, the TPCs were added as an additional weight to carry, because of the recent setbacks.

4.1.3 Enriched teaching learning environment. The interviews revealed teachers’ expectations about enrichment of the teaching and learning environment. Under this category, four sub-categories emerged through data analysis: rich e-content (*n=14*), multimedia (*n=16*), interactive materials (*n=12*) and diversity in assessment (*n=15*). Fourteen teachers explained that they expected a rich pool of e-content among which they could choose to use in their classes. They expressed their disappointments related with the limitations in e-books and z-books available in EBA market: “as a teacher, unfortunately, I do not find the books provided by ministry of education [either e-book or printed] useful to prepare students for YGS exam [university entrance exam]” (Teacher G). Teacher M explained the insufficiency of e-content: “As a geography teacher, I could only use technology if I satisfy with the e-content… Otherwise, my teaching methodologies are good enough to make students understand. Why would I change my strategies now?” (Teacher M).

Although teachers were not happy with the e-content provided in the scope of the project, some (*n=9*) expressed their satisfaction about the multimedia tools in TPC. The results showed that using both IWBs and TPCs, the usage of audio-visual materials or activities became easier for teachers. Although, they explained that their preference was not the website of EBA and they searched their multimedia elements on Internet by themselves, they accepted the easy way of directing students to find the same material on Internet since all have TPC on their desks. Teacher K gave the following example about using multimedia for her class:

> A teacher has to have different methods to keep students in the activity. I like telling jokes while I am teaching, but with the technology I added short videos to my lectures.… Once, I made students open a funny video about a cat falling down from the top of the deck to the ground and I made them discuss about the rule of Newton.

Likewise, Turkish language and literature teacher mentioned about the value of listening a poem from its poets voice for permanent learning, “I make students listen to poets from their original voice, or listen to a story while a theatre player reading it. These applications add extra taste to my classes” (Teacher G). As it was seen from the teachers’ implementations, the number of teachers (*n=9*) who were satisfied with the multimedia feature of Tablet PC was high.

Findings showed that teachers’ expectation about interactive materials did not be met (*n=11*), but it can be said that their expectations about diversity in assessment (*n=10*) was met with the TPCs in a basic level. The interviews revealed that the implementation of TPC for assessment showed variety among teachers’ lessons. Most of the teachers (*n=12*) expressed their satisfaction on content-related tests available on Internet: “Nearly after every unit, I am encouraging students to download tests to their TPC and solve them… After they finish, we are discussing together” (Teacher I). However, few teachers (*n=3*) explained different usage of TPC for assessment. Teacher A, who was more technology oriented, stated that they made a game project with 9^{th} graders:

> I have introduced them with one simple game console where they can develop an easy game…. In order to develop a game, they had to present lots of objectives covered in my class. That was a perfect opportunity for me to see their performance in the level of application and synthesis.

Furthermore, Teacher B proposed another way of utilizing TPC by asking students to shoot a short movie to explain a specific scene from the era of Ottoman Empire. In addition to these creative ways, teachers’ expectations were also directed by the university entrance examination, which had been playing important role in students’ education life. Teacher H emphasized the value of providing good multiple-test materials for the students, especially for those who cannot afford them:

> Ministry of education can be in contact with the market of the publishers which are publishing test-books for preparation to university exam, and these books (qualified ones) can be uploaded to EBA market for the use of students, especially who cannot afford it. I think that would really help students and it would support their success.

The expectation of enriched classroom environment with e-content, multimedia and interactive materials were parallel with the literature, Colwell (2004) discussed about the effective usage of Tablet PC through focusing on the enhanced teaching and learning environment. Especially, using interactive multimedia in or out of the classroom was defined as a well-designed instruction for the new generation (Frolik & Zum, 2004; Moore & Dicken, 2006; Shahbazi, 2013). Although, the studies in literature supported the place of TPC for creating richer teaching and learning environment, the applications in FATIH project fell behind the expectations. Parallel with the present research, earlier studies pointed out the lack of e-document provided by EBA website in order to enrich classroom environment (Bilici, 2011; Dursun et al, 2013; Kuzu et al., 2013; Pamuk, Çakır, Ergun, Yılmaz, & Ayas, 2013). As a result, the necessities of producing more e-content, and establishing interactivity to utilize interactive materials were perceived prominent steps in order to use Tablet PC functionally. Interviews showed that some innovative teachers constructed their own way to use this technology in order to support their teaching and learning environment. However, it can be said that teachers' expectations on enrichment of teaching-learning environment through TPC was not met, apart from the availability of multimedia elements in EBA market and on Internet.

4.1.4 Introduction to technology. The results of study showed that there was a basic expectation about TPC being as a good introduction to technology for the students, especially whom coming from socio-economically deprived families. Ten of the teachers mentioned about the socio-economical differences among the students, including the administrator of the school and also dissimilar effect of TPC on diverse students:

> Our school represents Turkey with its students from varieties of social classes. When we started to distribute TPC to students, there were students who already had better device and also students who had a smart machine for

> the first time in their life…. I observed that some student have met with the technology here. Although, I do not perceive TPC more than a toy, I can admit that those students learned what it means to be engaged with a technological device (Teacher N).

Although two of ten teachers discussed about their unmet expectations on students being introduced to technology and claimed that it could be more effective with a more systematic approach, the rest were satisfied with the idea of technology equal opportunities (this category was discussed detailed in advantageous of TPC). Technology introduction was also a category revealed in expert opinions. Expert C, working in the sector of technology, emphasized the importance of providing TPC for all students in formal education with the FATIH project considering the raising up citizens for the future. He indicated the value of meeting with Internet and at least one technological device in early years of education. Likewise, Expert B stated: "…with Tablet PC student can develop understanding about what technology can do or what he or she can do with the technology. This early introduction lead the brain of child parallel with the need of the digital age." This particular aspect of bringing TPC into classroom environment considered in different 1:1 (one to one) OLPC and OTPC approaches in different countries (Eason, 2011; Smart Education in Korea, 2011; Grzybowski, 2013). Especially in developing countries, the opportunity provided by government or private institutions to introduce children with technology valued with the emphasis on the aim of improving 21st century skills in youngsters. (Camfield, Kobulsky & Paris, 2007; OLPC, 2007). Although, some fractions of the media was skeptic about the halting points of the project like teachers' and administrators' insufficient knowledge on technology (Kolukısa, 2014), most of the news on Tablet PCs presented the value of this introduction.

4.1.5 Reduced amount of paper-material. Nine of seventeen teachers mentioned about their expectations invested on the reduction of paper-based material usage for education. They emphasized the large amount of paper material in education including text-books, work-books, note-books, maps, supplementary books, exam papers, assignment papers, and so on. Transforming hardcopy materials into digital form created an environmental expectation considering the paper consumption in schools. The findings showed that e-content and materials available on Internet had answered needs of four teachers among nine. For instance, Turkish language and literature teacher explained place of TPC to facilitate distributing of multiple-choice exams without using paper:

> In my subject area, the multiple-choice questions are mainly constructed by big paragraphs, which consume pages of paper. With the help of TPC, I kind a reduced this amount and I am trying to construct questions in digital from and distributing it through network (Teacher H).

Also, Expert B and C highlighted this point by explaining the requirements, which had to meet for systematic reduction of paper-used materials in education. Expert B indicated the importance of political approach for such case,

> Such big decisions [efficient reduction of paper-based material from education] require more systematic and political perspective to deal with but it is also true that digital technologies help us to publish less paper-based material every year. For example, we skipped writing letters to our friends or notes for ourselves. Now, we are using apps for such businesses…. New generation is using e-readers to read books, they quit checking old city maps, and they use Google Earth…

The approach stated by the experts and teachers were also supported by Prensky (2001), who described digital natives as people who did not print out an e-mail just to be able to read. Although, the discussion on the positive effect of using paper-based material, such as reading from a real book, or taking note to a paper was on table, in one interview Polat (2014) stated the risk of resisting to change: we were not insisting to write on primitive tablets or papyrus, paper was an innovation and we adapted ourselves into it. Publishing director of Medyasoft, a firm developing e-content for education, highlighted the cost-benefit behind the e-books in education (Medyasoft, 2014). Thus, considering the cost and environment, it can be interpreted that this expectation could be fully met by ministry in the scope of FATIH project.

4.1.6. Increase in students' motivation. The effect of technological devices in students' motivation was a highly popular topic in the literature as discussed in Chapter II. However, in this study, there were only seven teachers who mentioned about their expectations about increase in students' motivation toward individual learning, using TPC to reach e-books and for note taking. In general, teachers thought that students would perceive TPC as a tool for education. However, nearly all teachers agreed that students identified tablets as a toy more than anything. Expert C stated that it would not be possible for students to use TPC, in the current situation of FATIH project, for the purpose more than browsing on Internet and playing video games. As skeptics suggested that machine itself could not create a long-term motivation for education (Cuban, 2001). Parallel with the literature, Teacher D explained the case in his school:

> In the first two months, all students were using their TPCs every day for nearly everything, including some educational purposes like searching for supportive documents on web. However, it didn't last long. In few months time, I observed that students began to bring their books and notebooks. TPCs distributed to 9th graders 3 years ago have already disappeared from the desks of the students.

On the other hand, teacher A and J, who were keeping students engaged with TPCs stated the importance of teacher factor to use the pre-existing motivation toward the device and enlarge it by pointing out different aspects, capabilities of tool. However, they also admitted incapability of the tool itself to preserve the motivation high: "… I do not trust machine itself, I do trust myself to find different activities to use this toy" (Teacher A). Teacher J gave an example to support motivational effect of technology,

> Once, I watched a group of students on TV, who were making music using Tablet PCs. Each student were playing different virtual instrument on digital screen and they played beautiful music through this technology. I also searched for the similar application and…. [made it available for my class]. I introduced lots of instrument through this software and students had great fun while enjoying the process of meeting with different instruments.

As it is obvious from the quotation above, motivation is more dependant on the educational features than the technology itself. As Newby and others (2006) suggested, when the effect of being unknown has fading out, the excitement, curiosity and enthusiasm have begun to vanish, as well. Thus, it can be said that teachers who declared motivation as an unmet expectations and who claimed their satisfaction perceived the phenomenon from different perspectives: one who expect everything form device; and one who does more than device does. In this point, as Ayerman (1996) and Chen and McGrath (2003) stated the short-term motivation effect created by a technological device could be enlarge by systematic planning and teacher's applications in the classroom. Although, expecting long-term motivation from Tablet PC did not seem possible, as it was pointed out in this study and discussed in the literature, teachers' role was asserted an important factor to use and extent the beginning motivational effect of a technological device.

4.1.7 Flexibility in learning. The analysis of the interviews conducted with the teachers showed they were expectant from TPC to provide flexibility in learning in terms of space and time. Three of the experts in the study stated the importance of mobile technologies, like TPC, in creating learning environment any place students are in. However, as Expert A warned that to use this flexibility there were some unmet conditions like 3G support for each device. Although, news about FATIH project was stated that the bills of Wi-Fi students were using would be paid by the government, ("Öğrencilerin interneti devletten," 2012) this promise has not be met yet, apart from the school's wide-area network. However, experts in this study stated the importance of 3G in tablets to bring the flexibility for students and teachers to use educational document no matter where they were: "… Although 3G is not only condition should be met, it is quite crucial to be able to use TPC for its purpose in education" (Expert A). As it was indicated by academicians in evaluation of FATIH, without proper Internet, it would not possible to consider TPCs more than a new toy for children (FATIH Projesi Akademisyenler Çalıştayı, 2012).

In the study, tree of six teachers explained their satisfaction in flexibility in time and space in learning. It was not contradictory with the 3G condition of other teachers and experts because the school were they taught was a boarding school with two third of the students were staying in dormitory. Since whole school and dormitories were surrounded by a Wi-Fi connection, students got benefit from the Internet using their TPC wherever they wanted. This case made clear by Teacher P,

> As you already observed, there is no point without wireless Internet in and around the school. There is no restriction for students if they would like to use Internet for educational purposes. The problem is why they do not want to use it for education… Otherwise, they are playing with their tablets in garden, during the class, in the breaks, before they go to sleep; even in the moment they open their eyes early morning.

In addition to students' use of TPC, teachers indicted their expectation for their own usage of the device. Teacher A emphasized the possibility of getting training through systematic e-learning:

> Few years ago, I attended to the distant education program developed by INTEL to educate teachers in designing technology-based materials. It was a very professional experience for me. I am expecting the same from ministry of education with these TPCs. Since they equipped all the teachers with this latest technology, they should make teachers to improve themselves, with varieties of e-learning opportunities organized or supported by government.

In addition to the idea of providing distance education for teachers, Teacher H underlined some basic distant education opportunities for students, as well: "If the aim is to raise up individual for 21st century, high school students can experience some e-learning classes time to time." In this point Expert C warned not to distinguish distance education with formal education and he stated the role of the e-learning only as a "supporting activity" for compulsory education: "Widening distance education in 12 year compulsory education can be threat for the girls in this country. It cannot be substitute, it can only be a supporting activity in formal education."

As a result, teachers and experts in the study were in agreement on the expectation of flexibility, but they emphasized the importance of conditions to cover in order to use TPC functionally and efficiently for educational purposes. This issue was also repeatedly highlighted in the literature, in evaluation studies and also on media in order to use the devices properly by the students and teachers (ERG, 2013; Nie, Armellini, Witthaus, & Barklamb, 2011)

4.1.8 Access to information. The data analysis pointed out that teachers were concurred in the covered expectation of students' and their own access to information using TPC, which was perceived as more practical device for Internet use. The dimension revealed in analysis were, access speed, easiness of access and amount of data they could access on Internet with a portable device. Teacher R explained that he did not use smartphone in his daily life, so he met with smart technology through the tablet provided by FATIH. He explained students' case on his own experiences:

> I have a computer but I have to admit that I am not a literate computer user. However, I realize that my attitudes toward technology changed with the TPC. First of all, I am using Tablet PC to chat with my son moved in abroad, I stop buying paper news, but I read online news side. I also download few simple games for my granddaughter to play. Thus, I became an active Internet user.… Because, TPC provide easy access to Internet and I can reach information wherever I am. I observed it is the same for students, who are much better than me as Internet users.

Likewise the experiences of the teacher, Expert A indicated access one of the main aspect, which can be used in teaching and learning environment: "We cannot expect much from TPC technology, but access. It is a device to facilitate our journey on Internet through making access easier and faster. It has a well-designed device to reach as many information as we desire." Parallel with this, Expert C mentioned the main reason behind the innovation,

> Tablet PCs have very nice deign which combines both functionality of laptop and portability of smartphone. On the other hand, it is not as functional as laptop and not as practical as smartphone. What I mean is we should see what we could do with TPCs. …In my opinion, what we can really expect from TPC is "access!" This is a device to access Internet.

As Collins and Halverson (2009) argued that in this age, children were seeking for the opportunities to access Internet using different ways in order to do varieties of activities like playing Interactive games, use social media, chat with friends, browse on Internet, do homework, and so on. As the teachers and experts in present study discussed TPC was a good way to facilitate that access but it was also important to create conscious for the results of this fast and easy access. Also, as it was presented largely in the chapter II, it was important to know that access to more and faster information does not necessarily mean knowledge (Cuban, 2001; Koparan & Güven, 2012; Motorola White Paper, 2010). Participants of the study were also highlighted establishing necessary conditions to satisfy the educational expectations. These conditions were presented separately, in the following part 4.2.

4.2. The Opinions on the General Features of the Tablet PC Usage in Class

The findings about the opinions on the general features of the Tablet PC were presented considering the following two research questions:

1.4 What can be considered as the advantages and disadvantages of Tablet PC usage in classrooms?

1.5 What conditions should be established in order to use Tablet PC instructionally functionally and advantageously in teaching-learning process?

In the scope of these research questions, interviews were conducted with 17 teachers and 3 experts (see Chapter III for detailed explanation) to find out the opinions about the general features of Tablet PC use in classroom. Additionally, literature and the media were utilized to discuss the findings. Responses of interviews indicated that while there were some common opinions of teachers and experts, some different opinions were also found out, which showed differences in the applications of teachers.

The findings of the study revealed that eight of seventeen teachers interpreted introduction of Tablet PC from more disapproving side, while nine of them were more optimistic for the place of Tablet PC in their classroom. Especially, four teachers expressed that there was no advantageous of the device for their lessons. Two of them explained their effort of using Tablet PC advantageously for their class at the beginning of the project but finally; they came up with the solution of forbidding students to open their Tablet PCs during their classroom. The other two of the teachers did not try and do not want to spend time on it. The rest of the teachers in pessimists' side stated the conditions in order to have a successful implementation of technology in education. Teacher C explained the reason of being hopeless,

> …[She stated lots of conditions to be met] In my opinion, it is quite hard to establish all the conditions I explained up to now. I do not believe that FATIH project will be able plan all those things [that she mentioned] and apply them strategically. I wish I could believe.

On the other hand, the other teachers (*n=9*) voiced their hope for using TPC more advantageously. Although, they complained about the same kind of un-met expectations and conditions, their perception to Tablet PC use was more optimistic and they stated that they wanted to spend effort to use this device for their classes. Especially two teachers (Teacher A and Teacher B) presented the materials they use, the practices they conducted actively to involve TPCs into the education. Among nine optimists, four of them said that they could not use this technology if they would know how to do it and also if there would be some specific conditions. Teacher R exemplified this optimistic attitude,

> …It is true that I am not a competent technology user. However, I can see the need of being engaged with technology among youngsters. They really need it…. Since I met with technology very late, for me it is very hard to adapt but with a proper support, not only 5 days of in-service training, I would love to develop some skills and catch students' attention through TPC or any other recent device.

In the following part, advantages and disadvantages of Tablet PC usage in the current schooling and also the condition to be met in order to increase advantages and minimize the disadvantages were discussed considering the experiences of the teachers and opinions of the experts.

4.2.1 Advantage, disadvantage of Tablet PC usage in current situation and necessary conditions. The results of the interviews conducted with teachers revealed the preexisting conditions in the classroom, which was introduced with

Tablet PC in the scope of FATIH project 3 years ago. Teachers explained their experiences in this time and they shared their practices and efforts to adapt TPC into their instruction. Although preplanned conditions of the projects, like establishing interactive platform, providing software for TPCs, developing e-content, and adapting curriculum according to the technology use into classroom ("FATIH project," 2012), has not been met yet, teachers listed both advantage and disadvantage of the Tablet PC in existing condition. The results showed that most teachers were quite aware of both the advantage and disadvantage of the TPC in education. However, they declared their concern on how to put these features to the disposal of the education. In this point, they expressed lots of disadvantage related with the presence of Tablet PC in the classrooms, without establishing preconditions, including a proper training for them. In data analysis, it was founded out that some advantages of the TPC was also perceived as a disadvantage. The main reason behind was un-met conditions. To be more precise, results showed that one advantage of the TPC could reveal itself as a disadvantage for the classroom environment when some necessary circumstances were not satisfied. This particular case created a grift construct between advantage and disadvantage of Tablet PC, considering the conditions to be met in order to use it instructionally functional. In this regard, three issues (advantage, disadvantage and necessary conditions) were discussed together in order to draw more sophisticated framework related with the existing situation. In this regard, the following categories were founded out as advantages of TPC: access and display the information, multimedia, technology equity, interaction and cost-benefit (See Figure 4.1, for summary of advantages); the following categories were presented as disadvantages of TPC in current implementation: access and display the information, persistence inequity, multimedia, wastage, and interaction. As it was seen in Figure 4.1 and 4.2, the categories shaped in both disadvantages and advantages presented a connection between each other. Two-sided arrows represented the relation between the main categories, because the axial coding showed that it was not possible to create distinctive codes, which would dissociate from the others. Additionally the related conditions to be met in order to maximize the advantages and minimize the disadvantages of TPC were discussed under each title.

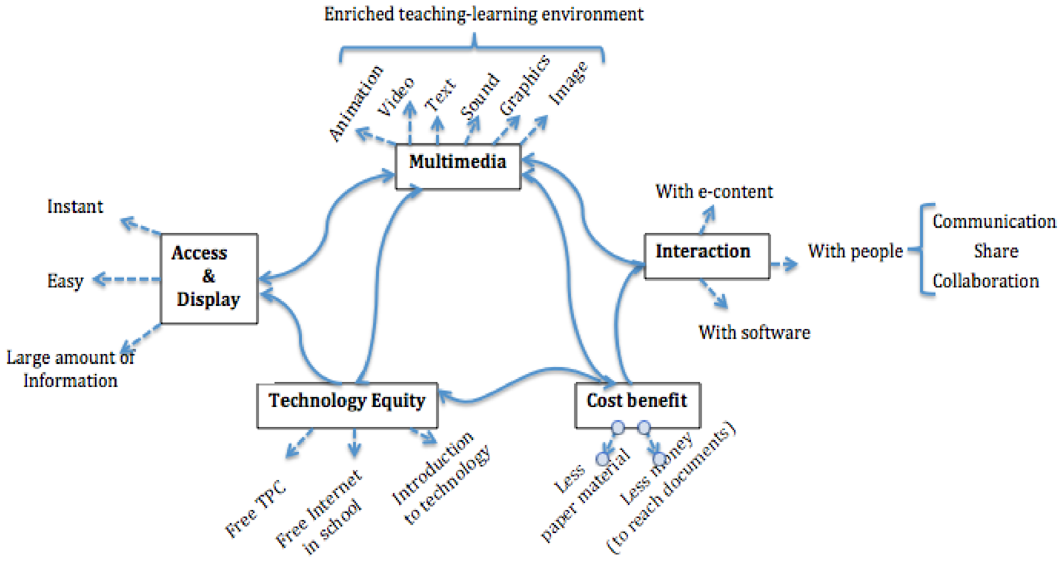

Figure 4.1 The Advantages of Tablet PC in Current Education

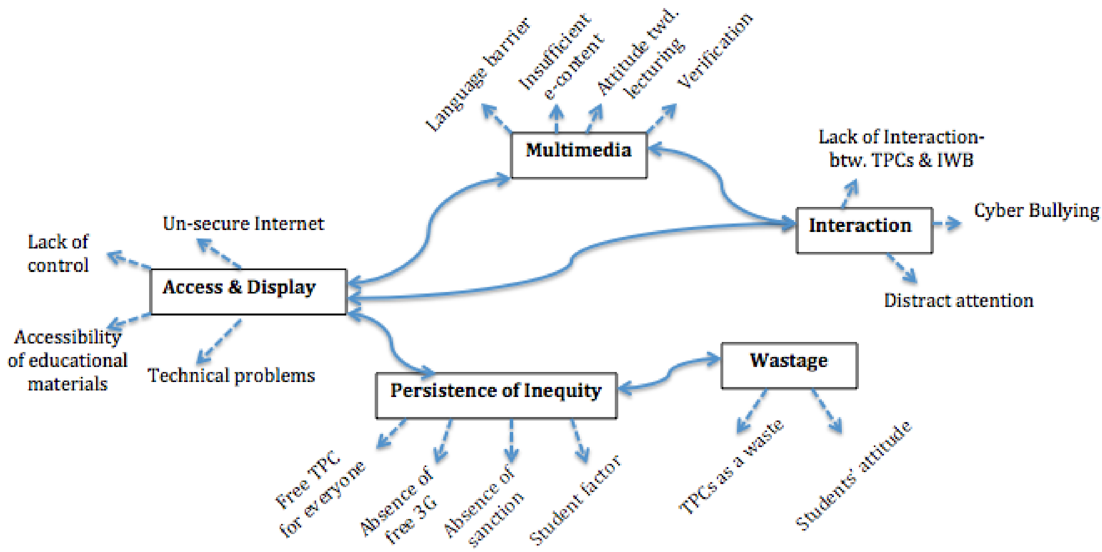

Figure 4.2 The Disadvantages of Tablet PC in Current Schooling

Legend: TPC: Tablet Computer, IWB: Interactive Whiteboard

4.2.1.1 Technology equal opportunities versus persistence of inequity. The findings showed that Tablet PC had brought technology equal opportunities to the children, especially from low socio-economic level. The advantages were categorized under three sub-category; free TPC for students (*n=12(teacher)/0* *(expert)*), free Internet in school (*n=12(teacher)/3 (expert)*) and introduction to technology (*n=14(teacher)/3 (expert)*); the disadvantages were grouped under four sub-categories; free TPC for everyone (*n=7(teacher)/3 (expert)*), absence of free 3G (*n=5(teacher)/3 (expert)*), absence of sanction (*n=8(teacher)/0 (expert)*), students factor (*n=8(teacher)/1 (expert)*). In order to get benefit from advantages more and to minimize the disadvantages of application, four conditions were revealed; condition distribution of TPC (*n=7(teacher)/3 (expert)*), standardization of TPC (*n=7(teacher)/3 (expert)*), free 3G (*n=5(teacher)/3 (expert)*), sanction for misuse (*n=8(teacher)/0 (expert)*), student education (*n=9(teacher)/3 (expert)*). These results were summarized in Table 4.3.

Table 4.3

Categories in Technology Equity Versus Inequity: Advantages, Disadvantages & Conditions

Advantage 1: Technology Equity			Disadvantage 1: Persistence of inequity			Conditions		
Sub-Categories	T.*	E.*	Sub-Categories	T.	E.	Sub-Categories	T.	E.
Free TPC for students	12	-	Free TPC for everyone	7	3	Conditional distribution	7	3
Free Internet in school	12	3	Absence of free 3G	5	3	Standard TPCs	7	3
Introduction to technology	14	3	Absence of sanction	8	-	Free 3G	5	3
			Student factor	8	1	Sanction for misuse	8	-
						Student education	9	3

*T. number of Teachers; E. number of Experts.

The data analysis showed that 1:1 (one to one) approach introduced by FATIH project mainly successfully introduced students, but not all of them, to the technology. As discussed in the expectations from Tablet PC (see part 4.1), providing TPC for each child created an opportunity to meet with technology and Internet for the students, especially who were coming from more socially and economically deprived areas. It found to be important to create technology equal opportunities for each child in this country with the help of such a wide-range project. Teachers and experts stated the importance of being engaged by the technology in early each of childhood to develop the skills necessary for 21^{st} century. In addition to the skill development, Expert A indicated the importance of developing positive feeling in children toward country through supplying opportunity for all, "…this project may be effective for students who can feel that their government care about them, respect them and give the chance of having a technological device." Furthermore, Expert C interpreted project as an incentive award, which can create short-term motivation:

> Free TPC is like an incentive award for children to make them perform better…. A new technological device has the ability to pump motivation for a while. So, I think it is a great opportunity for students, teachers and educational system. Of course, with a systematic planning.

Although creating technology equal opportunities had perceived as the advantage of 1:1 project, some teachers expressed their hesitations. After distributing of Tablet PCs, some news like "students are selling free PCs" (Emlik, 2011), "Tablets require insurance" ("Tabletler için kasko gerekli", 2014), emerged. That was parallel with the explanations of the administrator of the school, who mentioned about students' lack of care on free Tablet PCs:

> Few days after tablets were distributed, I caught some students who were trying to sell the tablets…. Some broke the machine in the first week, because of their careless behavior. I also witnessed that one student who was expert in computer technologies opened the machine and took some parts to upgrade his own computer. He was punished, of course…. One Tablet PC is staying here [in administrator office] more than a month already [she showed TPC]. The owner doesn't event bother himself to come here and pick it up.

Some teachers told their complaints about students' attitudes toward free TPCs, parallel with the administrator. Teacher A explained, "unfortunately, only few students showed a good care about their devices. Otherwise, why would all students' TPCs have problem, while teachers' stayed ok." Expert A clarified the aspects of the project, which became a threat for creating equal opportunities:

> We have to admit that distributing free Tablet PCs for each child threats the issue of equity, because we are giving TPC, for the student who doesn't have it at all and also to the students who may already have two devices at home. We give TPC free of a charge both to the student who can afford it and to the student who has difficulty to find bread. Thus, where is the promised equity?

As the results of the interviews and media showed technology equal opportunity can be an advantage of the project but it had also created some disadvantage in application. In this point, it found that some necessary conditions should be met to minimize the problems occurred during the application. In order to satisfy this, Expert A suggested an alternative for distributing free TPCs for everyone,

> …If a student already has a device, we shouldn't supply another for him. Or, every child has to pay some amount of money, for example, some should pay half of the price, some should pay 10%, some shouldn't pay at all. It should be decided considering the economical background of the family.

Likewise, Expert C agreed with the idea of prevention devices from careless usage, "there should be an "if" in free distributing. I'll take it back "if" you don't take care of your TPC. Or, I'll supply this opportunity, "if" you cannot afford it." Thus, first necessary condition was revealed as not distributing TPCs free of a charge, it could have a price, adjusted for each student and also imposing some sanction for careless and disregardful attitude could be a precaution for the broken TPCs.

The other problem in front of the equity was revealed as lack of standardization in TPCs. Since, the Tablet PCs of students showed varieties, it created inequity feeling in students. Teacher J explained that the features of the devices of different brands showed different capabilities, "students are always comparing their e-tabs with the new version of Tablet PCs, and we have to admit that Vestel vp10 tablets are more suitable for classroom." Moreover, teachers highlighted another drawback of project as absence of 3G in Tablet PCs. Teacher C explained one tragic story about a student: "One of my students said me that he was living with rats in his house…. It would be surprising, if he would have Internet at home…. Thus, there is still no technological equity for him." Parallel with this, Expert A, stated the importance of free Internet in Tablet PCs in order to approach to technology equal opportunities at least a little bit, and he emphasized the power of the Internet for some home,

> In Turkey, we have some realities like child-brides, illiterate mothers and fathers, homes without TV or even radio…. For me, it makes sense if we put 3G into those devices so that student will bring it to home and put the Internet to at disposal of sister, mother, or father. It can open big doors in front of the family members. For example, girl who is not send to school, can discover life over Internet. Or, mother can learn something using that device.

Similar to this example, Expert C explained his experiences in small villages of Turkey and he underlined the possible effect of Internet at some home,

> …We have regions where people continue a primitive life. Considering the realities of our country, a planned use of Tablet PCs can create a transformation in society, but first rule is that we need to put Internet into the doors of houses. This can create equity not only for children but also for families as a whole.

Additionally, findings showed that student factor was another important point creates disadvantage considering the equity. Since, students' knowledge, skill and perception of technology were not equal, their usage of TPC were not the same. Teacher B indicated that the engagement time, and quality showed difference among students, "at first, students were taking notes using TPCs but even that time, students' ability to use keyboard, and touch screen were totally different." Ten teachers explained students' common perception of the device. They said that most of the students perceived this technological device as a toy to play games, to watch YouTube videos, to use social media, mainly Facebook, twitter, instagram, and vine. However, there emphasized few students who acted differently toward TPC. Teacher E clarified this situation,

> We know that the conditions to use TPC effectively did not been met yet but still, if students' perception would be different, they could use it facilitate their own learning. For example, I have one student, she is really using tablet to learn something. While her friend were watching silly videos and checking the Facebook every few minutes, she was watching a documentary related with one curricular subject…

Five teachers gave example of these different students through indicating that these students were from higher social statue. Thus, the unequal conditions repeated itself only providing devices to the students. As Expert B and C stated students also needed a supportive training to develop skills and knowledge about technology use. As Yılmaz (2013) from the Association of Information approved that students were not as knowledgeable as they claimed or we perceived about usage of technology. Parallel with the results of the study, Akgül (2012; Yılmaz & Çağatay, 2013) emphasized the importance of technology training for students to change their wrong perceptions, to develop their skills and to equip them with proper knowledge of technology.

As a summary, as Banoğlu, Madenoğlu, Uysal and Dede (2014) evaluated Tablet PC as a good step in equity considering the teacher's opinions; this device had a good potential for it. However, in order to get fully benefit from the equity advantage, as Gükrer (2012) stated that rather than distributing free TPC to everyone, even to the students who had tablet at home, it could be more useful to put condition for free distribution. Apart from the student, who cannot really afford this device, a price could be applied in order to make students take the responsibility of their own Tablet PC. As Akgül (2012) discussed, equity can be established only if necessary conditions of free 3G, and student education would be considered. These conditions were parallel with the results of the evaluations of FATIH project (FATIH projesi akademisyenler çalıştayı, 2012).

4.2.1.2 Access and display. The analysis of the interviews presented that Tablet PC was perceived as a powerful device to access to the information and display it. Parallel with the expectations of the teachers and experts, two main characteristics of TPC, access to the information and display the information, showed some advantageous in usage; instant access and display (*n=15(teacher)/3 (expert)*), easy access and display (*n=50(teacher)/3 (expert)*), and also reaching large amount of information (*n=12(teacher)/3 (expert)*). On the other hand, findings indicated that the same features of TPC, access and display, resulted with the disadvantages in the recent classroom application. These disadvantages were un-secure Internet (*n=6(teacher)/1 (expert)*), lack of control (*n=6(teacher)/3 (expert)*), inaccessibility of educational materials (*n=6(teacher)/2 (expert)*) and software problems (*n=6(teacher)/3 (expert)*). In order to minimize the disadvantages lived through in classroom because of the access and display opportunities of Tablet PC, four necessary condition were founded out in the scope of this study: content filtering (*n=10(teacher)/2 (expert)*), interaction between students' and teacher's devices (*n=17(teacher)/3 (expert)*), student technology education (*n=15(teacher)/1 (expert)*), teacher technology education (*n=10(teacher)/3 (expert)*) and full-time technology leaders in schools (*n=8(teacher)/3 (expert)*). These results were summarized in Table 4.4. Furthermore, the category of access and display showed direct relation with multimedia considering e-documents accessed and displayed were mainly in multimedia form (see in Figure 4.1).

Table 4.4

Categories in Access & Display: Advantages, Disadvantages & Conditions

Advantage 2: Access & Display			Disadvantage 2: Access & Display			Conditions		
Sub-Categories	T.*	E.*	Sub-Categories	T.	E.	Sub-Categories	T.	E.
Instant access & display	15	3	Un-secure Internet	6	1	Content filtering	10	2
Easy access & display	15	3	Lack of control	6	3	Interaction between devices	17	3
Large amount of information	12	3	Inaccessibility of educational materials	6	2	Student technology education	15	1
			Technical problems	6	3	Teacher technology education	10	3
						Technology leaders	8	3

*T. number of Teacher; E. number of Experts

Interviews showed that fifteen of seventeen teachers agreed on the advantages of TPCs related with reaching information. They explained the importance of having large amount of information in front of students. Teacher O stated, "I'm English language teacher, and for my subject it is good to have great amount of content in Internet, which is available for my students, who have Tablet PC." Likewise, Teacher D explained how he used other dimensions of access, "I'm using online dictionaries for unknown words, when they don't know the meaning, it took half second for them to reach and find the meaning of the word." Although, all the planned aspects of the project have not been functioning yet, in preexisting condition, teachers were agreed on advantage of TPC related with accessing and displaying the information. Experts supported this quality of the device stating the feature of the Tablet PC as a machine, which open the door to the content in Internet, "tablet is not a device to store information or to do some complicated tasks, but it is a device simply for reaching and displaying data" (Expert A), "the best part of TPC is to offer an opportunity to students to have access to the world of Internet, independent of time and space" (Expert B).

However, in practice, teachers also reported the disadvantageous part of the limitless access and display independent of time, space and teacher. Six teachers and experts (A&C) mentioned their hesitations about the accessibility rights and software in TPC. They highlighted the easiness to reach inappropriate content and the difficulty students have when they want to use some educational materials. Teacher A summarized this contradictory case,

> … to support education, students cannot reach all the sites they want, because these sites require permission or signing in, i.e. libraries, educational materials, academic studies and videos. On the other hand, students have full permission for lots of unsecure content, because they can break content filters applied in Tablet PCs. This contradictory situation raises lots of concerns in me, like security problems, cybercrime, e-content, inappropriate for children's development.

Six of fifteen teachers emphasize the risk behind un-controlled and un-secure Internet use, and they expressed their concern about students actions on Internet, "students don't know the possible results of their action in Internet. When I told my 9^{th} graders the law about copyright in music sector and its extent, they surprised with the seriousness of punishment they could get, when they caught" (Teacher J). Furthermore, some students were worried with regards to inappropriate content that students exposed, “some students have tendency to watch pornographic content, it is not possible to stop them but the problem is they also make their friends to watch it. How can I control it?” (Teacher C). Few teachers emphasized the amount of responsibility on her shoulders:

> I feel myself like a guardian in break-times; I am entering classes to close the video-clips in IWBs, and rebuking students who are watching inappropriate things in Tablet PCs. I know it is not a solution, but they gave this responsibility to me without asking (Teacher F)

> Students are irresponsible Internet user and we [teachers] are bad controllers. Neither students nor us know what to do with this technology. Both sides require proper education on it. I graduated only 10 years ago but we didn’t have any content to deal with Internet problems, neither psychologically nor physically. However, now I have to be an expert to deal with students’ TPCs…. (Teacher K).

Additionally, teachers complained about the technical problems and software related problems in TPCs. The results showed that possible technical problems hold off from using TPC in their classroom, because teachers do not feel confident to deal with the technical difficulties appeared. As Teacher H told one of her experience,

> Only few time, I tried to use TPC in order to make students to access a video and watch it, and in the minute I ordered the problems had started. Some TPCs couldn't reach that site; some students had difficulty to display it. As a result, I spent 20 minutes just for nothing. I couldn't settle down that problem and it was a complete failure.

As it was seen from teacher’s quotations, there should be some conditions satisfied in order to minimize the disadvantages occurred because of the access and display. The results revealed seven necessary conditions to be met in order to minimize the disadvantages of access and display: content filtering, interaction between teacher’s and students’ devices, student and teacher technology education, technology leaders in schools. Ten teachers agreed on the content filtering regarding the developmental level of the students, “since TPC will be distributed from pre-school to high school, different filtering should be applied in order to answer different needs and avoid varieties of problems” (Teacher A). While filtering some content and some networks, software support and access permission were indicated as an important condition to be met. Experts suggested equipping TPCs with proper software according to the aims of the project, “students don’t need to download extra materials to use their devices properly…. The aims of the project should be explicitly clarified and accordingly, all the software students will need should be provided” (Expert B). The software and platform to be established for interaction between devices had also priority, considering using TPCs advantageously. For instance, Teacher E emphasized that “to get benefit from the easy and instant access to information, I need to control the students desktops in order to understand whether they are working on the task I assigned or not.” Likewise Teacher F explained the crucial role of the interaction between devices, complaining about students’ abuse of uncontrolled system, “I tried to let them work alone time to time, but I saw that only few students were engaged in task I assigned.” In addition to these, both teachers and experts expressed the need of education on technology for students and teachers, “students need to know about their rights and responsibilities in Internet” (Teacher G), “… and teachers need to know how to use Internet effectively for education in order to direct students’ attention to the teaching-learning content” (Teacher H). Expert B emphasized systematic training for everyone, “to raise up conscious generations, it is necessary to give a proper technology education, starting from the pre-school. I dream about an education which could end up without the need of filtering students devices in high school.” In addition to the training, teachers and experts supported the idea of having a full-time technology leader (person who has knowledge and skill to take of technical problems of machines) in schools rather than some formator, whose knowledge and skill was limited. Teacher A, who was graduated from the department of computer education and instructional technologies wanted to draw attention on possible technical problems in implementation,

> I have a mechanical knowledge to deal with lots of technical problems appeared during conducting a class with TPCs. Since, my colleagues aware of it, they are calling me for every technical issue. However, I shouldn’t be person for such details. There should be a person who can deal with the technical problems. And, I guess, there should also be a person who can guide and help teachers to integrate technology into their classes.

As it was indicated in FATIH project, in order to practice life long learning starting from the compulsory education, it was important to raise individuals who can access the necessary e-content, and through displaying it, to develop themselves by e-learning ("FATIH project," 2012). In this regard, TPCs opened the door to access information, which was also interpreted as a need of 21st century by Collins and Halverson (2009). The findings of the present research were parallel with the studies conducted to evaluate pilots of FATIH (Çiftçi, Taşkaya, & Alemdar, 2013; Dursun et al., 2013; Güllüpınar et al., 2013; Kuzu et al., 2013). Teachers' perception of advantages of TPC related with access of information in other studies were; reaching information easily, enriching teaching and learning environment through e-content (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Çiftçi et al., 2013; Dursun et al., 2013; Güllüpınar et al., 2013; Pamuk et al., 2013) and disadvantages were; lack of technical support and expert for technical problems during the lecture (Çiftçi et al., 2013; Dursun et al., 2013; Pamuk et al., 2013); technical problems of tablets (Çiftçi et al., 2013; Gürol, Donmuş, & Arslan, 2012).

4.2.1.3 Multimedia. The findings of the study revealed that teachers (*n=13*) perceived multimedia as one of the strong feature of the Tablet PC. Students who have personal TPC can display lots of multimedia elements, which can facilitate their learning. Both teachers and experts highlighted the value of the multimedia from the perspective of enriching teaching learning environment with different forms of e-content. Although, experts underlined the usage of all kinds of multimedia elements, answers of teachers showed variety in using different forms: animations (*n=7(teacher)/3 (expert)*), video (*n=7(teacher)/3 (expert)*), text (*n=10(teacher)/3 (expert)*), sound (*n=6(teacher)/3 (expert)*), graphics (*n=5(teacher)/3 (expert)*) and images (*n=5(teacher)/3 (expert)*). However, teachers and experts reported the problems appeared in multimedia usage to facilitate learning. These disadvantages were listed under four categories, language barrier faced by students and teachers to use multimedia elements in classroom (*n=15(teacher)/2 (expert)*), insufficient e-content provided by ministry of education and board of education (*n=15(teacher)/3 (expert)*), the change in students' attitude toward lecturing (*n=9(teacher)/0 (expert)*), the change in teachers' attitude toward lecturing (*n=4(teacher)/2 (expert)*), and the need of verification (*n=15(teacher)/3 (expert)*). Moreover, data analysis revealed the necessary conditions to be met as followings, sufficient e-content (*n=13(teacher)/2 (expert)*), providing a budget for schools (*n=10(teacher)/3 (expert)*), teacher education to be subject matter expert and to become verification point of information for students (*n=12(teacher)/3 (expert)*) and students' technology education (*n=3(teacher)/0 (expert)*). These results were summarized in Table 4.5.

Table 4.5

Categories in Multimedia: Advantages, Disadvantages & Conditions

Advantage 3: Multimedia				Disadvantage 3: Multimedia				Conditions		
Sub-Categories		T.*	E.*	Sub-Categories		T.	E.	Sub-Categories	T.	E.
Enriched teaching learning environment	Animation	7	3	Language barrier		15	2	Sufficient e-content (on EBA)	13	2
	Video	7	3	Insufficient e-content		15	3	Budget for schools	10	3
	Text	10	3	Attitude twd. lecturing	SS*	9	-	Teacher education	12	3
	Sound	6	3		T	4	2	Student technology education	3	-
				Verification		15	3			
	Graphics	5	3							
	Image	5	3							

*T., number of Teacher; E. number of Experts; SS, students.

Legend: EBA: Eğitim Bilişim Ağı (Education and Informatics Network)

Furthermore, data analysis revealed the connection between advantages of multimedia and access and display, technology equity, cost benefit and interaction (see Figure 4.1). Teachers stated the value of TPC as a device, which ease to access and display the information in multimedia form (*n=13*) and they also emphasized the importance of Tablet PC as a displayer from the aspect of cost-benefit (*n=4*). Additionally, the linkage was connected with equity by reaching the available content through multimedia and also the interaction established with the e-content. Likewise, the disadvantages in multimedia were presented connection with access and display, and interaction (see Figure 4.2).

Teachers mentioned their TPC use in classroom mainly related with the accessing and displaying of multimedia. Most teachers, who indicated their TPC usage during the class, emphasized the power of animations. One teacher gave an example, “my subject is biology and for biology there are very nice animations on Internet related with cell divisions, DNA replication or photosynthesis cycle. I make my students watch these animations either during class-time or at home, as a homework” (Teacher F). Another teacher emphasized using lots of sensory organs while presenting movie related with the topic she was covering:

> I am quite lucky that there are lots of movies and documentaries related with the big events in the history [she is history teacher] so that I can introduce kids with some characters or important moments from history…. Since they are new generation, they enjoy more with combination of watch, hear, read, take notes and even speak. As an old generation, I cannot combine watching with taking note (Teacher B).

Teacher G and H, both emphasize the effect of using voice in lesson where they discuss about poets in Turkish literature, “… after making children listen some poems from original voice of the poets, it was great to observe some students, who continue listen other poems during the breaks” (Teacher H). Teacher G distinguished the feature of TPC from IWB, which were also indicated as a powerful device to represent multimedia content for the class, “Tablet PC brought advantage through creating opportunity for students to listen or watch something in their own pace.” Another teacher supported this idea,

> I am providing to students some animations or documents to read related with chemistry. Sometimes, I allow them to engage with these extra materials alone during the class, because when we watch something in IWB they all need to go together and they can be shy to confess when they don’t understand. However, when they are working alone, they can run the video

> backward or forward, and they can realize the points they don't understand… (Teacher L).

Apart from enrichment of classroom environment through access and display of multimedia, four teachers emphasized cost-benefit. Although they stated that cost-beneficence could be supplied better through empowering Tablet PCs more systematically and more planned way, Teacher A, who used device actively said that, "even now, I stopped print-out every single material. I established a g-mail group with my students and they are downloading the necessary materials." Teacher I and B pointed out the easiness of reaching and displaying the multiple choice exams on Internet, "rather than photocopying some tests, I am writing the web address of the test and we are solving it together without the need of using paper" (Teacher H). Although teachers explained the advantage of TPC in cost-beneficence, they were agreed on the increase the effect of technology in reducing the usage of paper material through more systematic technology integration, "after distributing TPCs, and planning e-content more professionally, I hope we will stop use text-books in this paper-based form" (Teacher K). "Now, it is my effort to reduce of using paper, but it should be government's effort as an educational politics" (Teacher O). Thus, the pre-condition in using less paper material was to establish more systematic approach toward technology integration and use in compulsory education. Likewise experts approved the advantage of easiness, fastness in access and display multimedia content through TPC, "we have to develop content suitable for the students of this generation. Multiplication table, belongs to 18th century cannot catch students' neither attention nor interest. There is a need for content supported by different multimedia forms" (Expert A).

The results of the study showed that students' access to multimedia though TPC in the class created some disadvantage for the on-going lectures. The revealed disadvantages were, language barrier, insufficient e-content, attitudes toward lecturing, verification of information. Teachers called attention to the problems related with multimedia stating the insufficiency of e-content, as mentioned above, the site EBA constructed for FATIH project is not competent to provide rich e-documents for students and teachers to use. This problem leaded teachers to find their own material on Internet, but on this point, language barrier appeared as another obstacle in front of the reaching good educational materials. Teacher C explained this situation, “I am not competent in English and unfortunately, neither my students. Although I find some nice animations in English, I cannot use them.” Physics teacher explained the necessity of showing some experiments in virtual environment as follows,

> We can only read those experiments in the books, but now, there is an opportunity to display them but I cannot find any material…. Yes, there are some materials on EBA, but it is so obvious that there is no intentional planning, because most of the materials are useless for my subject area. Why do they not ask physics teachers’ need and put the materials accordingly on EBA in order us to use them? (Teacher G).

Moreover, as a solution for insufficient e-content, teachers proposed having a budget in the school in order to purchase some e-materials, software or to subscribe in some websites. This budget, which was coordinated with the cooperation of the technology leader and administrators, was stated as a possible way to reach more advance programs and documents. Teacher B expressed her idea as following,

> FATIH project has a huge budget but I suppose it will require even huger in the implementation…. I think we can have a financial plan, which is approved by administrators related with the technological cost of our school in the scope of FATIH project…. By providing some autonomy for schools related with technological cost, we can function better.

Apart from e-content, teachers who tried to use TPC during their class mentioned about the attitudes toward lecturing and verification of information. Since, Tablet PCs facilitated to reach information for students, teachers complained the attitude of students toward listening the lecture while teacher was teaching, “I stopped sharing all my presentations and documents with students, because they feel like they do not have to listen the teacher” (Teacher N). Some teachers explained their experiences during the class,

> I am catching students while doing other things during the class. When I ask the reason of their not being listening, one student told me that there was a video, which explained the topic I was covering and he had already watched

> and learned it. And, I said ok! Then, exam result showed how much he actually learned [sarcastic smile] (Teacher P).

> The problem is the content I use in multimedia form creates the illusion in some children that they can learn every aspect of the topic through watching one animation. Animation, video, extra documents can only be the supporters of my lecture. I know it but some students, and unfortunately some of my colleagues do not seem to know it.

> After TPCs, some teachers freed themselves from lecturing, they prefer to assign a long video to students and that's it! All content has been covered [angry voice]!

The importance of lecturing was also highlighted by the experts. They highlighted the place of TPC as a supporting unit for in-class and out-class activities. In this regard, both students and teachers had to believe the crucial value of the lecturing, "teacher has to teach, this is one of the crucial rule even in distance education" (Expert C). As a condition for this case, experts agreed on the teachers' role, "teacher should keep the role of being wise-person in order to synthesize all the information in all forms" (Expert B). "I wonder why we are not successful in teaching fractions in math. What is our problem? Or, what is our teacher's problem? Are our teachers subject matter experts? Is a math teacher competent enough to teach math in our schools?" (Expert A). Being subject matter expert was highlighted as a pre-condition to conduct good lecture and to sustain the positive effect toward the lecturing. Additionally, Expert A and B disserted the importance of teacher education as a whole in order to raise the quality of lecture, "when we increase the quality of lecture, would our students be distracted with a new toy, even after 2 months? But, they need to taste value of a good lecture" (Expert A). In this point, Teacher B stated her opinion, "I think, putting blame on students is useless. If I am not be able to conduct joyful, interesting and listenable class, then, of course students will engage with another thing, like smartphone, Tablet PC, passing papers with friends, etc." (Teacher B). Thus, teacher education, but more specifically, teachers being subject expert appeared as a condition for the disadvantage stated as verification of information. In interviews teacher stated that the problems occurred because of reaching bunch of information in any forms related with any curricular subject they were covering. It was found out that this issue had two dimensions, student role, which represented students' tendency to trust every information on Internet, and teacher's role, which indicated teachers' lack of expertise to become a verification point. The results showed that fifteen of seventeen teachers had problem with students' use of unverified information, "with TPC, students reach information easily but the problem is they don't know whether that information is reliable or not" (Teacher K), "students trust every bit of information they find through Google" (Teacher M), "in last exam, one student was claiming what he wrote is correct, because of a movie he watched before" (Teacher E). In this point, while eleven teachers proposed a technology course where students can learn how to reach trustable information, four teachers agreed on betterment in teacher education in order to raise teachers as subject matter experts who can be the verification point. Teacher B said, "I am motivated to learn new things and I feel the need of develop my expertise…. It is also important to catch the students who reach everything on Internet." English language teacher explained his experience,

> Since I'm not a native, I don't have solid grasp about idioms and slang language. When my students ask me a phrase from a video or text, I feel the need to check it…. If I don't know, I have to learn it first, before replying to students. However, recently, I found some good online dictionaries and I also direct students there to check the answer of their questions…. However, after both them and me have checked, I am comparing the answers (Teacher O).

Parallel with teachers' experiences, experts agreed on the importance of teacher role as a verification point. Expert A stated, "when a student comes with an information, this question is very important: where did you get this information? Is that website trustable?" In addition to this approach that was explained important for behavior development, experts emphasized the weight of being a real subject matter expert, "now, students are not listening only teacher, they gather lots of information all around. So, teachers' place is getting more crucial as a person who says that information is correct, this one is false" (Expert B).

In summary, more systematic planning in FATIH as a whole project emphasized by teachers. This finding was parallel with the academicians' evaluation of FATIH project (FATIH Projesi Akademisyenler Çalıştayı, 2012) and with the opinions related to TPC usage in the context of FATIH project (Akgül, 2012). More specifically, thirteen of teachers expressed the condition, which had to be met as sufficient Turkish e-content related with their subject area. Two experts agreed on providing varieties of multimedia materials for teachers in order them to enrich their teaching and learning environment. In EBA, there is platform where teacher can share the materials they developed or their students' work, which can help the other classes. However, Teacher H complained about teacher attitude in front of the content sharing, "…whether they share or not related with the attitude of the teacher. Some teachers are more into the sharing while others think why I would share my material on which I spent such an effort." In this point, teachers mentioned about lack of motivation and need for the encouragement, "only, teachers who are instinctively motivated spend effort to develop some materials suitable for IWB or TPC, others are doing nothing, because they do not have to" (Teacher M). Expert C proposed a condition of establishing some kid of a reward system for the teachers who engage with the development of some materials, content or exercises, "through such system, teacher who are spending effort can be rewarded and they would be courage." Additionally, as discussed above, betterment in teacher education was highlighted as a pre-condition both teachers and experts. In order to deal with their class in a technological environment and also, in order to be verification point, it is important to raise subject-matter expert teachers. Although students' education in technology was also proposed as a condition by three teachers, in general both teachers and experts agreed on finding solution in teacher education.

The literature supported the capabilities of TPC in multimedia as an opportunity to evolve educational standards through technology (Collins & Halverson, 2009; Cuban, 2001, McCabe, 1998; Kalogiannakis, 2008). Computer technologies have been offering multimedia for communicating information for ages but TPC is one of the mobile devices, which ease to reach multimedia elements. This feature was perceived as a capability to create interactive and richer classroom environment. Related with problems in multimedia, insufficient e-content and language barrier were discussed in previous studies (Bilici, 2011; Dursun et al, 2013; Kuzu et al., 2013; Pamuk et al., 2013). However, the need of verification and attitudes toward lecturing were the categories, which was not mentioned in the previous studies. The reason of this could be the different scope of the previous studies to evaluate project as a whole. Here, only TPC dimension of the project was investigated which let the researcher focus on accessing information and the type of information displayed by TPCs, more detailed. However, in the conditions, the findings were in the same line with the evaluative studies of FATIH.

4.2.1.4 Cost-benefit versus wastage. The data analysis presented that teachers interpreted one group of advantages of Tablet PC from the cost-benefit perspective. Teachers and experts indicated the usage of TPC, which brought benefit in cost under two sub-categories: reduce amount of paper-material usage (*n=11(teacher)/3(expert)*) and reduced amount of money spent for educational materials (*n=3(teacher)/2(expert)*). On the other hand, some teachers, who perceived TPC as a wastage for the budget of the government stated their concerns into the sub-categories, TPC as a waste of money (*n=5(teacher)/0(expert)*) considering the current applications and students' careless attitude and misuse, which resulted with more waste of money (*n=12(teacher)/1(expert)*). Finally, the conditions to be met proved to be necessary as the need for educational planning of Tablet PC use (*n=9(teacher)/3(expert)*), teacher education (*n=9(teacher)/2(expert)*), and student education (*n=13(teacher)/2(expert)*).

Table 4.6

Categories in Cost-Benefit Versus Wastage: Advantages, Disadvantages & Conditions

Advantage 4: Cost-benefit			Disadvantage 4: Wastage			Conditions		
Sub-Categories	T.	E.	Sub-Categories	T.	E.	Sub-Categories	T.	E.
Less paper	11	3	TPCs as a waste	5	-	Educational planning	9	3
Less money	3	2	Students' attitude	12	1	Teacher education	9	2
						Student education	13	2

The results of the study indicated that advantage of the TPC in the classroom had the power of providing cost-effective applications through reducing the paper-material usage. Even in the current system, where Tablet PCs were not into use, teachers stated that they got benefit of its access and display feature. As mentioned above, that helped to distribute less photocopied materials. Also, providing some materials, software or Internet site for educational purposes for a majority cost less than personal access. Teacher A explained her personal effort to buy an educational mobile application for the classroom use in Tablet PC, “we decided to buy it together and since it was for educational purpose they made discount.” However, five teachers indicated their perception of buying and distributing TPC as an excessive wastage for the economy of the country. Expert A explained the reason behind this perception is lack of systematization in the project, “the numbers in the project are fascinating but lack of educational planning behind creates a perception of wasting money just for nothing.” In this regard, educational planning appeared as a condition to rationalize the cost behind the project. Additionally, teachers complained about students’ attitude about not taking care of their own Tablet PCs, “after two months, at least half of the TPCs were broken. Why? Because we have to change the broken device without any sanction or penalty” (Teacher N). Another teacher perceived the problem more on the system, “I can’t put all blame on students. TPC is given, but not used effectively, and it turned to be a toy. So, child doesn’t perceive it a valuable machine in his/her learning” (Teacher D). Parallel with this, experts agreed on making use of Tablet PC in order to give the responsibility of taking care of it. “If a student feels that he will miss the lecture without TPC, then the responsibility will be gained” (Teacher A). Nine teachers and two experts expressed that the solution could be in teacher education: “There is a need to make teachers to understand the value of the project and they should know how to use it” (Teacher B). Expert C stated, “every door is opening to the teacher education or teacher education can open every door. I repeat one more time; we should support teachers in order to use these machines properly. We need to support them before service and in-service.” This approach is parallel with teacher’s idea, “I didn’t get education to integrate technology in university level, I see interactive whiteboard here, I didn’t have Tablet PC before. Thus, how can I use them effectively all by myself?” In this regard, it can be summarized that to make project cost-benefit, an educational planning to use Tablet PCs in classroom and also teacher education to teach how to make use of this technological device are two necessary conditions to be met. Additionally, experts emphasized the need of proper student education in order to get rid of misuse of any educational material in classroom, including TPCs, “I think, we need a comprehensive approach for human education…. The problem of misuse is not only the topic of technology education” (Expert A). Parallel this, Teacher E and G complained about educational politics in general, “I observe my students and unfortunately I see students without proper aims related with their future…. This is not only their fault, it is also the fault of the education system” (Teacher E), “when I observe my student, who was throwing her TPCs just like that, I asked her the reason and she replied me: ‘Don’t worry! It is ok!’ This tells a lot about the lack of education” (Teacher G).

In conclusion, Tablet PC was perceived as an opportunity to reduce wastage in the education through transforming paper-material into e-materials. The advantage of Table PC in the dimension of cost-beneficence was supported in the workshop done on June 11-12, 2012 at OKAN University (Okan Üniversitesi, 2012) as an advantage in saving papers and green in the country. Parallel with the academic results, the speeches of politicians on the FATIH project emphasized the protection of green through digitalizing educational content appeared several times on media (Ayan, 2012; Coşkun, 2014). However, unlike the results of this study, the conditions appropriate to reduce the cost were not discussed in the literature separately. Only teacher education was mentioned as a pre-condition of using effectively and functionally (Akbaşlı et al., 2012; Cengiz, & Coskunoglu, 2013; Çiftçi et al., 2013; Gürol et al., 2012; Kayaduman, Sırakaya, Seferoğlu, 2011). Since teacher education can increase the usage of TPC in classroom, it can create the need of having and protecting TPC in students. This can be interpreted as an important aspect to reduce students’ misuse or careless attitude toward Tablet PCs.

4.2.1.5 Interaction. The analysis of the interviews conducted both with teachers and experts showed that interactive feature of Tablet PC was perceived as an advantage for the participants. Although, it should be underlined that the planned interactive environment which will bring interaction between Tablet PCs and Interactive Whiteboard, has not been introduced in pilot schools yet, the results showed that students and some teachers had already established some limited interaction in classroom using some software. Considering this situation, interaction was presented under three subcategories, interaction with e-content (*n=6(teacher)/2 (expert)*), with software (*n=6(teacher)/2 (expert)*), and with people (*n=14(teacher)/3 (expert)*), which had three dimension, communication, share and collaboration. However, interviews revealed that teachers and experts highlighted the disadvantages of interactive feature of Tablet PC in prevailing system. These were the lack of interaction between TPC and IWB (*n=17(teacher)/3 (expert)*), distract students' attention (*n=10(teacher)/0 (expert)*), and cyber bullying, which became more popular with wide use of mobile devices (*n=8(teacher)/3 (expert)*). In order to minimize disadvantages presented and maximize advantageous usage of interaction, data analysis gathered three necessary conditions to be met, establishment of interaction between TPC and IWB in order to control students (*n=9(teacher)/3 (expert)*), students technology education (*n=15(teacher)/3 (expert)*) in order to develop conscious related with their cyber behaviors, and finally teacher education (*n=11(teacher)/3 (expert)*) in order to guide students appropriately in interactive educational environment and social environment. The results related with interaction were summarized in Table 4.7.

In general, fourteen of seventeen teachers pointed out the advantageous side of interaction, which could be established through Tablet PCs. Likewise, experts mentioned the positive effect of interactive environment created by TPC under three subcategory, interactivity with e-content and software (*n=2*); and interactivity with people (*n=3*). Expert A emphasized not to expect much about Tablet PC but interaction, "it is a very useful device to connect interaction among students in order them to share and collaborate." Another expert highlighted perceiving interaction as a whole,

> This smart-mobile machine can introduce nice new techniques to education in order to establish interaction. First of all, students learn how to interact with

> e-content and software, which of two they use a lot in their life. This develops skill in youngsters to deal with a technological machine. Additionally, they can interact with each other to conduct a research together, they can communicate with the students from Van, or they can collaborate some students from England or Hawaii…. The last dimension of interaction [interaction with people] makes me excited when I consider possibilities in education (Expert C).

Table 4.7

Categories in Interaction: Advantages, Disadvantages & Conditions

Advantage 4: Interaction			Disadvantage 4: Interaction			Conditions		
Sub-Categories	T.	E.	Sub-Categories	T.	E.	Sub-Categories	T.	E.
With e-content	6	2	No interaction btw. TPC-IWB	17	3	Establishment of interaction	9	3
With software	6	2	Distract attention	10	-	Students technology education	15	3
With people	14	3	Cyber bullying	8	3	Teacher education	11	3

Legend: TPC: Tablet Computer, IWB: Interactive Whiteboard

The experiences of the teachers were parallel with the experts' opinions. Although only six teachers mentioned about the interaction with e-content or software, nearly all of them (*n=14*) explained the advantage of interaction between students-students, and teacher-students,

> I have already established an interactive platform with my 11th graders. We found it together and we downloaded it. Now, we are developing a simple game using this platform…. The good part is we can work anytime anywhere. Students are always in contact and they are also sending me lines when they need help. I can open my session and see what they did. This is an extra-curricular activity and they did great job till now (Teacher A).

Although promised interactivity between machines did not be established yet, teachers mentioned students' use of interactive games to establish a sharing environment,

> Once, I caught students from 9-A, in a free-time, playing chess with 9-C, during the class. The problem was 9-C being in class and playing chess rather than listening the lecture. Although this part was problematic, I like that they managed to set their own interactive platform and sharing some time playing chess as a huge group (Teacher G).

Additionally, Teacher F highlighted interaction with the software, "…when everything is not given them, I think they discover more. In the chess issue, they were also experience how to use device, how to interact with software." Parallel with this, Teacher D explained, "I feel lucky as an English language teacher, because students interaction with English e-content related with my class, or English software related with [let's say] math or geography bring advantage to students' language understand." Another example given by music teacher was the following,

> Students in 10-A downloaded one application,which teaches different types of music. It enables them to learn different music, to interact with each other by signing in with their account and to have feedback about their knowledge. When they showed and explained the program, I can confess that I did not understand the value. However, just after few weeks, when I ask about classical music, their knowledge fascinated me (Teacher J).

Teachers stated their wish to have the interaction between devices in the classroom as it was promised in the scope of FATIH project, rather than spending personnel effort to make use of devices in their classroom. They asserted establishing the interaction first step to be able to use TPC in the classroom by controlling students' work. However, teachers also mentioned about some disadvantage of this limited interaction conducted between students through their TPCs. First one was distracting attention (*n=10*); and second one was a cyber problem like bullying (*n=8*). Likewise in different categories, related with the interaction, the main disadvantage was raised as distracting students attention during the class, especially whom were academically unsuccessful. One teacher gave an example to highlight the disadvantageous part of the interaction,

> During my class, I realized one youngster was typing on their TPC and when I approached I saw his lines to his girlfriend in another class, 'oh, my dear, this class is killing me.' He was distracted and he affected all class and me. (Teacher O).

Sharing lines, chatting during the class were repeated problems discussed by teachers. In addition to this negative effect, teachers were worried about cybercrime, because they explained some male youngsters attitude toward each other on the Internet. Administrator of the school explained the following situation,

> Now, they all can reach Internet easily, and they all can find each other through social media. This is a boarding school and students are always here, and sometimes I see some stranger around dormitory that are searching for some boys for fight, because of some earlier quarrel on Internet…. Of course I can't blame only Tablet PCs but we ease the way of reaching Internet without giving proper education.

In this regard, as administrator emphasized a proper technology education was proposed as a need by teachers. However, Expert A mentioned about the quality of human education as a whole, "if a person bad, of course he is going to use the device for bad purposes, but if a person is good, you will see good will behind his behaviors." This holistic approach also underlined by Expert C, "technology can only be one element in education. If we are going to raise conscious, we have to more comprehensive, which also includes technology education." In this regard, it looks important to educate students as responsible Internet users, while not separating it from the other ethical or citizenship issues,

> I think that our youngsters, and also our adults don't know their rights and responsibilities on Internet. It is not a platform that you can do whatever you want. It is like a public square where you have to put your behaviors under control as a social person. So, this education should be parallel with an ethic or civic education (Expert C).

Furthermore eleven teachers stressed on their own in-service education, in order to get benefit from interactive platform introduced by Tablet PCs. They emphasized the need to have a comprehensive technology education in order to increase the positive effects of interactivity and to reduce distractive effects of this feature of Tablet PC. As teacher B proposed, teachers' lack of knowledge resulted with the focusing on the negative effects of TPCs, "we are really old generation, and we are really need to taught, though we don't want to accept it. Tablets are really a new device for us, so ministry should take more time to teach us" (Teacher B). Likewise, math teacher stated her hesitation because of lack of competence, “I am teaching math with the way I know for fifteen years, already. So, now, I have to learn a new method, new device. But, they gave all responsibility to me, without learning much. How can I use this device? Since I don’t know how, I’m simply not using it” (Teacher E).

As Lepi (2012) stated interactivity appeared as a highlighted issue starting from the late 20^{th} century. As educational technologists emphasized the shift from technological device to interactive software and applications, it was not possible to disregard the effect of interaction environment in enriching the items in the teaching-learning environment (McCabe, 1998; Scardamalia and Berieter 1991). In this point, the advantages of interactive features provided by TPC were parallel with the literature (ASIJ, 2012; Collins & Halverson, 2009; Eason, 2011; Moore & Dicken, 2006; Sneller, 2007; Rawat, Riddick, & Moore, 2008; Romney, 2010; Ellington, Wilson, & Nugent, 2011; Jones, & Sinclair, 2011; Loch, Galligan, Hobohm, & McDonald, 2011; Mulholland, 2011; Smart Education in Korea, 2011). However, for FATIH project, since the interaction did not been established yet, most studies focused on this limitation and they did not emphasized the informal interaction set by students or teacher’s personal effort (Okan Üniversitesi, 2012, Dursun et al., 2013; Kuzu et al., 2013).

4.3 Instructional Design Steps of Teachers

In this part of the study, instructional design process of teachers in classroom where TPC usage had introduced was discussed considering the following research questions:

> 2. What Instructional Design Process should be followed in order to adapt instructionally functional and advantageous practice of Tablet PC usage in compulsory education?
>
> 2.1 What are the instructional design steps followed by teachers to use Tablet PC technology in current teaching and learning process?

2.2 What should be the steps of the instructional design, which is followed when the necessary conditions for using TPC in teaching and learning process has been met?

In the scope of these research questions, the results were presented in two categories, the instructional design of teachers in existing system and their steps under favorable conditions, which was described both by teachers and experts. Experts' opinions were also presented in both cases in order to widen the framework drawn by teachers. Before starting to present result, it was found necessary to make clear the number of teachers who were using TPC in their classroom and who were not. Among seventeen teachers, ten of them explained that they had been using TPC in their classroom. Three of ten teachers defined themselves as active TPC users, which includes arranging some software for students to work related with topic, active usage of TPC in or out of the classroom and getting benefit of Internet throughout the course. The rest seven stated that their usage of TPC for their instruction was limited, including only searching, watching or listening something on Internet. On the other hand, the rest seven teachers stated that they did not use TPC in or out of their class at all for any kind of teaching-learning activity. Three of seven teachers explicitly told that they forbade students to open TPC during their classroom. As a result, in pre-existing condition, Tablet PCs were not in use at all in three teachers' classes, but the other fourteen teachers allow students to open their devices. Only three of fourteen teachers' classrooms, TPCs were used actively for some educational purposes. In this regard, in the following parts, the instructional process of usage of TPC in these teachers' practices was discussed.

4.3.1 Instructional design process of teachers in current situation. The findings about the teachers' instructional design process in current situation were presented considering the following research question:

2.1 What are the instructional design steps followed by teachers to use Tablet PC technology in current teaching and learning process?

In order to present the findings in a systematic way, here, the basic steps of analysis, design/development, implementation and evaluation were followed.

4.3.1.1 Analysis. Data analysis revealed that usage of Tablet PC in the classroom was divided into two as limited usage and active usage. Seven teachers of ten teachers, who declared their effort to use TPC in their classes, explained their limited use, which covered only using some multimedia elements to support the class, using z-books, e-books and utilizing instant access to Internet through dictionaries, Wikipedia or other Internet sources. As seen in Figure 4.3, teachers made their decision considering the content they would cover. When they decided to support their class with some multi-media elements, they checked EBA website in order to see whether there were anything appropriate for their subject matter or not. Document analysis showed that if there were some materials, visuals, animations which could facilitate learning, they added the material to their plan, "there is no that much difference in z-books and published books, but sometimes, I'm using the videos, animation in that book" (Teacher H). Teacher K explained the place of EBA website in planning with TPC, "when I decide to use some multimedia, first I go to the EBA and checked whether there is an appropriate readymade material or not. Although generally the answer is no, "there isn't any," I prefer following this site." As shown in Figure 4.3, when EBA was satisfying, teachers were using multimedia materials and e-books, z-books provided on EBA. However, in general, teachers emphasized the fail of EBA to satisfy teachers' needs and as a result, they preferred to check the Internet for some materials they could use, "when I can't find anything on EBA, I check on the Internet for some suitable audio-visual materials. I have some sites which were constructed again by some teachers abroad and we can download materials for free" (Teacher K). The interviews revealed that apart from few teachers (*n=3*), teachers were not using EBA site for any kind of material, and if they would like to introduce students with some visual elements, they preferred to search it on Internet. On the basis of the materials they found on Internet, teachers gave a decision, whether this material appropriate for individual learning or whole-class learning, "generally, I prefer to show the documents I find on IWB to all class" (Teacher K). Mostly, they used Interactive Whiteboard (IWB) to share the material with whole class, but some teachers underlined their usage of Tablet PC for individual study,

> Sometimes, I allow them to engage with these extra materials alone during the class, because when we watch something in IWB they all need to go together and they can be shy to confess when they don't understand. However, when they are working alone, they can run the video backward or forward, and they can realize the points they don't understand… (Teacher L).

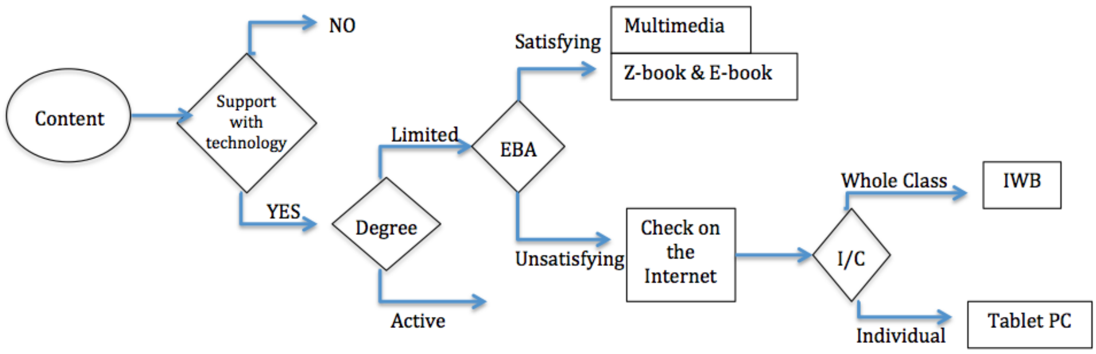

Figure 4.3 Analysis Process for Limited TPC-Used Instruction

Legend: EBA: Eğitim Bilişim Ağı (Education and Informatics Network), I/C: Individual usage/Classroom Usage, IWB: Interactive Whiteboard

The findings showed that three teachers were also deciding on the place of the learning when they chose TPC as a tool, "since every student has a Tablet PC, I can use the time out-of my class, too" (Teacher A). In this regard, as shown in Figure 4.4, teachers indicated that they analyzed the document whether it was appropriate for in-class or out-of class learning,

> I am actively searching for the materials for my class and I don't share all of them during the class. I sometimes prefer to assign students to watch that movie, this animation or those visuals at home. I give the web address in order to make them watch it after class" (Teacher B).

As it was seen in Figure 4.4, teachers stated their use of multimedia, z-books and e-books in the classroom and some supporters like dictionaries or websites to reach information instantly during the class. Three of them who considered out-of class learning as an opportunity to prolong learning activity indicated that they had to keep it optional for the students who did not have Internet at home. In this regard, the facilities of students became another parameter to take into consideration for teachers,

> I like assigning students to watch some videos as homework or as a supportive document…. However, I have to consider whether students have Internet out of the school or not. For the students staying in dormitory it is not a problem, but we have students who are staying with their families in Ankara; and I don't know whether they have Internet at home or not. Because of this reason, I either assign short videos or document, which they can handle even during the breaks or I make the assignment optional (Teacher D).

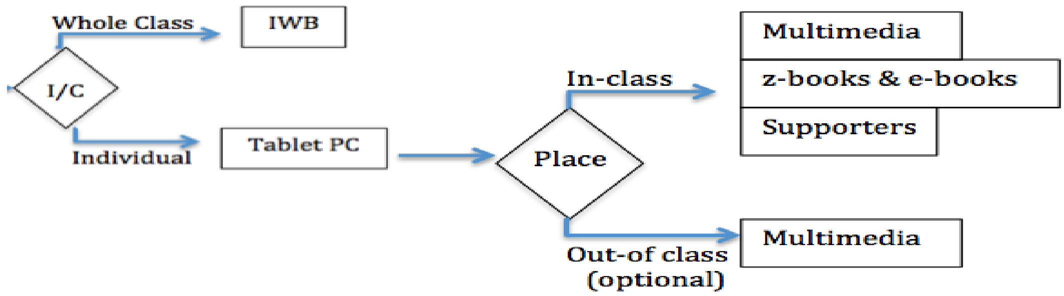

Figure 4.4 Analysis Process Related with the Place of TPC-Used Instruction

Legend: I/C: Individual usage/Classroom Usage, IWB: Interactive Whiteboard

While seven teachers explained their limited usage, document analysis and interviews revealed that three of them were using TPC more actively. The main reason for the decision to use TPCs more actively or not was defined as teachers' skill and knowledge by both teachers and experts, "teachers can use TPC only to access Internet with their limited knowledge" (Expert C); "I don't even have an e-mail address, but it is expected from me to integrate TPC into my lecture. Isn't it funny?" (Teacher P). In this regard, it was interpreted that teachers who indented to support their class more active use of TPC were more technology oriented considering their skills and knowledge. The active usage included using appropriate software, or application, supporting students with some projects, which could be done by using TPCs. In this point, teachers emphasized that with proper use of TPC, the number of the dimension they needed to analyze had increased. Although in limited usage teachers did not find necessary to analyze some aspects of instruction, in more advanced usage, teacher underlined analysis of students' skill and knowledge of technology, teacher's own skills and knowledge, budget and hardware.

As it shown in Figure 4.5, similar to limited usage, teachers' starting point in more active usage of TPC was again content. After the decision of using technology to support education, they began to search software, application or project to assign, where students can use different software. Two teachers who indicated their use of software explained their analysis on cost,

> Once, I watched a group of students on TV, who were making music using Tablet PCs…. I also searched for the similar application but I realized that each student had to pay 15 dollars ($15) to download. Since this was the cost, neither students nor me could cover, I found another application, which was for free, but I have to admit that not as good as the one I searched (Teacher J).

> Last year, we made a project to construct database for school library. I found a small application developed by INTEL related with organizing small databases. However it wasn't free. Since I knew people from Intel Turkey, I called them and explained my case…. They made a discount. Then, I discussed it with the administrators and we provided that app to students paying very little money (Teacher A).

As it was seen from the quotation, after a budget analysis, teachers decided to pick the free applications. Computer teacher who explained her experience with software-hardware compatibility, "I have software in my own Tablet PC [not the one distributed by the government] which allow students to integrate different office programs into each other, but the configuration of e-Tabs is not enough for this software" (Teacher A). Thus, for more advance software, properties of Tablet PC, or hardware-software compatibility became one parameter to take into consideration. After the decision about the suitableness of hardware, teachers stated the importance of analysis on learners' skills and knowledge,

> There are lots of software that I could bring to the classroom, but I cannot exceed curriculum too much and I cannot spend too much time on teaching the software before applying it…. At this point, what can students do and what they can't becomes important point for my class" (Teacher B).

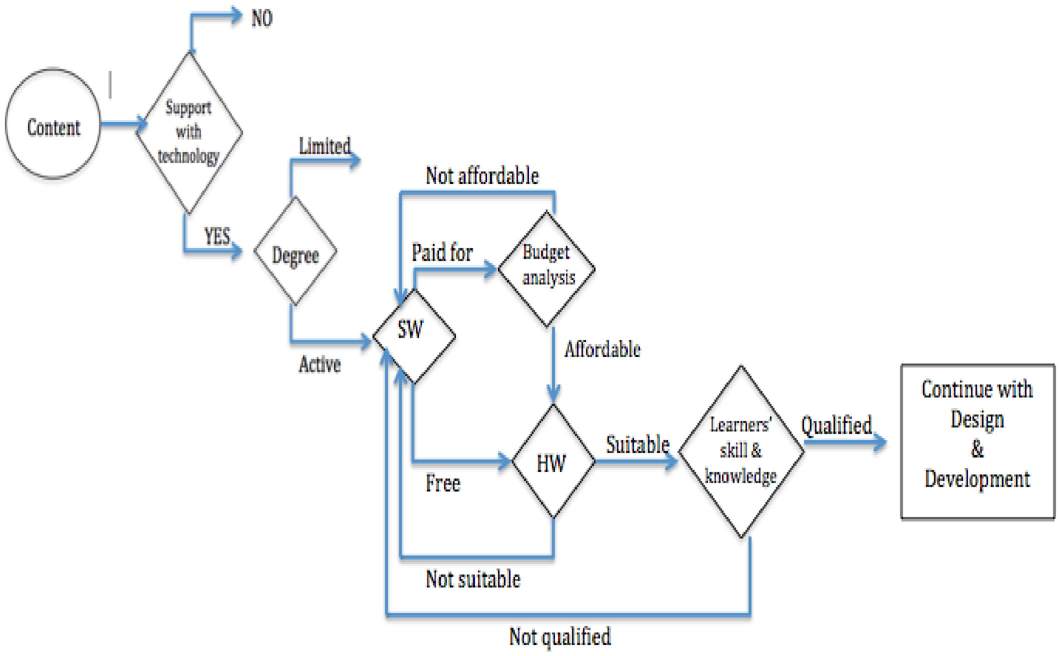

Figure 4.5 Teachers' Analysis Process for Active TPC-Used Instruction
Legend: SW: Software, HW: Hardware

The results showed that consideration on students' skills and knowledge directed teachers to continue with the selected software if students were thought to be qualified, or it directed them to pick another software if students were thought not to be qualified to use the software (see Figure 4.5). After analyzing the steps explained, teachers stated that they continue with the planning process, which was covered following title design and development.

4.3.1.2 Design and development. In this phase, the answers of teachers related with the instructional planning, including assessment was presented. The results showed that teachers were not conducting a whole class on only Tablet PC use. Although three teachers named few of their classes as TPC-centered, which were implemented using TPC through the software they downloaded, it was emphasized that they supported their TPC-oriented classes with some lecturing or additional materials. In this point, data analysis presented a flow in designing and development as it was given in Figure 4.6. As it was seen from the figure, it was revealed in unite-plans done at the beginning of the school year that teachers put the curriculum into the center while planning the lecture. Since in step-wise curriculum, there were suggested plans, activities and methods, teachers preferred to put the curricular planning into the center of their TPC usage, which was utilized mainly to support the pre-prepared planning. In this regard, teachers insisted on the paper-based or non-digitalized materials and also traditional teaching and learning techniques in order to build their instruction. Teacher G clarified the place of the technology as following,

> I think we exaggerate this technology issue…. It has to cover its own place and that's it. I perceive TPC one device introduced as a new teaching-learning device for me and for students. I can use it but it doesn't mean that I skipped my old-traditional methodologies, which I have tried for years and which I know successful in some degree…. So, TPCs can only provide one technique among all others.

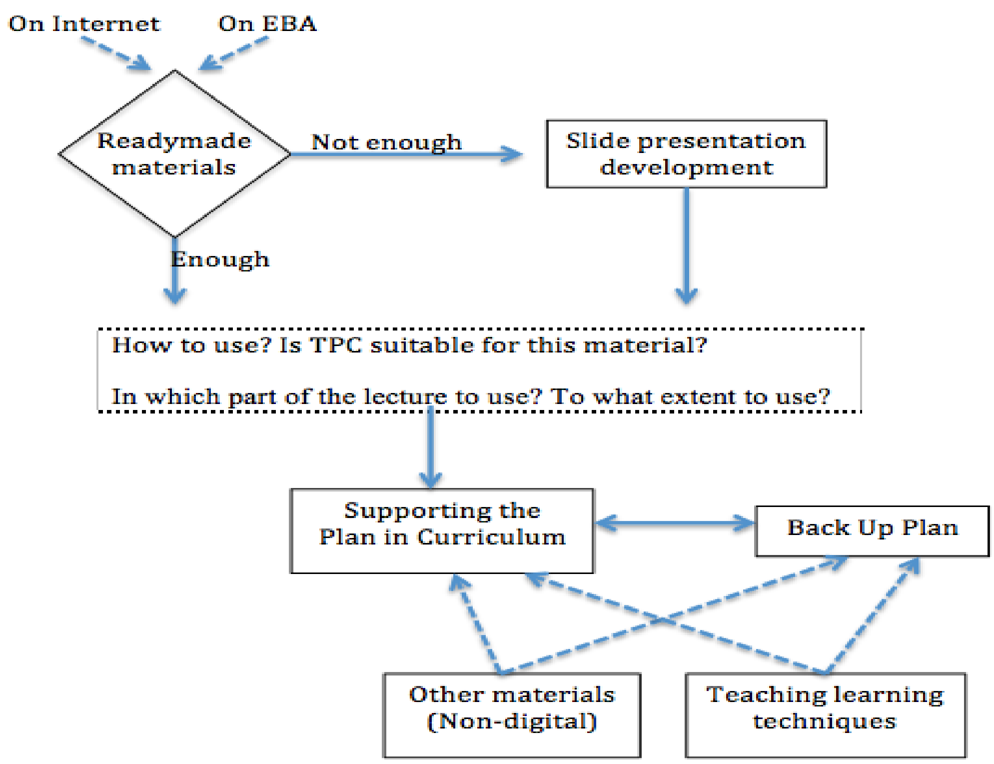

Figure 4.6 Design and Development Process of TPC-Used Instruction in Current Teaching & Learning

Legend: EBA: Eğitim Bilişim Ağı (Education and Informatics Network), TPC: Tablet Computer

When teachers wanted to support their classes using materials in TPC, they indicated that they checked the readymade materials on EBA and on the Internet. However, in the situation where they could not be satisfied by the readymade material, they developed their own document, which was mainly power point slides covering the topic of the class, "in order to share it with students on IWB and later, on TPC, I'm preparing slides. First, generally, I checked on the Internet and if I can find something suitable for my topic" (Teacher B). The reason of preparing only power point slide presentation were explained explicitly by some teacher as following:

> To be honest, I feel a pressure to use technology in my class, and in order to meet this; I'm preparing power point slides. I don't think that slides are the best material. Or, I may not be capable of preparing efficient ones.… I learned slide presentation that is the easiest thing I could do (Teacher L).

> I know how to prepare material for my classes but, honestly, first of all I don't need to develop some new materials. And secondly, if you are talking about technological material development, it is far beyond than my capabilities and skills. I prepare slide presentations using power point and well; it is easy to prepare such presentations (Teacher H).

After finding material on Internet or on EBA, or preparing presentations, teachers indicated their decision making process on which they answered few questions: how to use the material, in which part of the lecture to use, Is TPC suitable for this material, and to what extent to use. In the light of these screening questions, teachers included these materials into their plans. Teachers also mentioned about handicaps which was brought into classroom with technology and the one was highlighted as what if technology would not work as they planned, "in the first months of using IWBs, I was happy with the performance of this machine, but one day, when I wanted to make students watch video, IWB didn't work and I realized that I don't have a B-plan" (Teacher B); "I'm computer teacher and I know that there is always a risk of electricity cut, so I have always second plan in my mind. Just in case" (Teacher A). Considering this, as teachers highlighted they agreed on having back-up plan as an alternative for the technology-integrated plan.

Additionally, teachers explained their use of TPC in the formative assessment of their class. In this phase of the instructional planning, they investigated possible websites which offer related multiple-choice exams suitable for end-of-the-class assessment. Although, there was no interaction established between the devices, teachers (*n=5*) emphasized the role of Tablet PC to support some individual study for assessment. Teacher I explained the place of TPC in short exams, “after some classes, I make students answer some 10-questioned multiple choice exams. I only search for a proper test while planning my lecture and then I assign them in the last 10 minutes of the class to answer these tests on their own TPCs.” Likewise, teacher B, who developed her own questions and distributed them via e-mail group reported how she used TPC for assessment, “rather than distributing papers, I’m sending questions to students e-mail addresses and I want them to reply exam questions and send me back.”

4.3.1.3 Implementation. The results of the study showed that the attitude of teachers could be divided into two: teachers (*n=3*) who warn students in order to turn their TPCs off before beginning to class and teachers (*n=14*) who allow students to have their TPCs turned on. The latter group could also be categorized under two different title: teachers (*n=4*) who were not using Tablet PC actively in their teaching (i.e. teachers who were not doing any plan which covered TPC use during the class) and learning process and teachers (*n=10*) who were using TPC actively through planning some activities which enabled students to use their device. Since, this part of the study dealt with the current applications of teachers, here, the active usage of TPC was discussed. As shown in Figure 4.7, active usage showed itself by two kind of use: First, unplanned usage of students, which included students’ use of their TPC for some teaching and learning activities like note-taking ın TPC, instant access to the Internet in order to check some information on online-dictionaries, Wikipedia or on other sites. Teachers explained students’ use of TPC for the sake of class, “while I am explaining one topic, students are searching on Internet and finding something related with day’s issue, and if I have time, I’m giving time to students to watch it” (Teacher B). Additionally English teacher gave example about students’ access to information during the class, “in the texts, sometimes we come across with some idioms or proverb. Students are checking it on Internet before even I suggest it" (Teacher D). Second, teachers' planned usage of TPC that resulted from teachers' instructional planning during design and development as mentioned previous part. Document analysis presented that during this planned active use, teachers' implementation affected by whether a technical problem aroused or not. If there was no technical problem, teachers stated that they had no difficulty in implementation of their planned instruction. However in the case of facing with some technical problems, teachers explained their struggle with technology. Teacher A explained these technical problems:

> When the issue is technology we cannot disregard the problems. Although I am the expert in this field [computer teacher], I cannot guarantee that I can solve all the problems. Thus, the implementation can be affected by the degree of the problem occurred during the class.

Although technical problems had occured quite often, teachers expressed their frustration and how they became helpless as following:

> I cannot define myself as technology literate, but I wanted to use TPCs few times to facilitate my class. However, each time I encountered with some problems. And, each time, I felt desperate because I couldn't reach any person who can deal with that problem…. So, I spent half of my class just for nothing…. As a result, I am not using TPCs at all during my class (Teacher N)

> Technology is something that I have no idea and I am not capable of solving any problem related with any technological device, including IWB and TPC. Sometimes, I have difficulty in using interactive whiteboard and students are solving the problems. Getting help from student is not that bad but if it is repeating every day, it creates some discipline problems. That is the point of hesitation among teachers in using new devices (Teacher P).

Although, some teachers gave up using TPCs because of the negative experiences they had lived through, some teachers explained their way of problem solution. They stated that they asked help from different channels including students, knowledgeable teachers and formator teacher, who was present in the school at the beginning of the project. Teacher B emphasized the importance of teacher-students collaboration in solving the problems,

> …. I believe importance of using students' technological knowledge in this project. They have to play active role, because they know better than us, without question. For example, when some students cannot access Internet via their device, some students are helping their friends. We have even one genius student in class 10-B, to whom we are always consulting for any kind of technical problem.

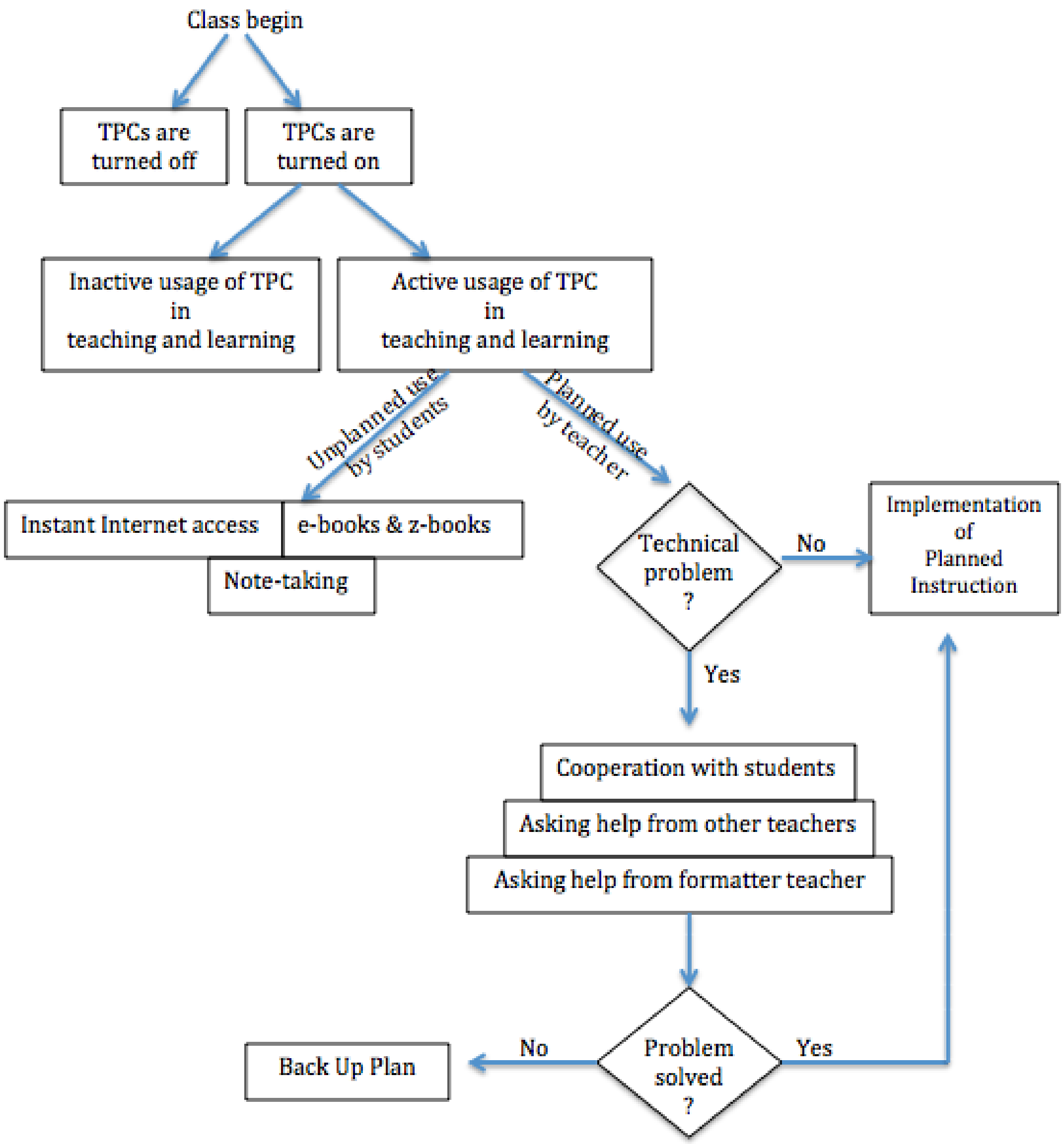

Figure 4.7 Implementation Process of TPC in Current Teaching & Learning

Moreover, teachers underlined the easiness of asking help from students more than teachers, “since teachers from whom I can ask help are also in the class, I let students try to solve the problem we have during the class” (Teacher J). Additionally, teachers clarified not consulting to the formator teacher as not having one regular formator to help in the school and also they expressed their disappointment with the insufficient expertise of the formator. In short, if teachers, who had technical problem during their class because of TPCs, could solve the problem through asking help from different sources, they continued with the planned instruction, as seen in Figure 4.7. However, if they were not able to solve the problem, then they proceeded to their teaching and learning process with the back up plan, as explained in the previous part.

The main problem of implementation repeated by teachers was lack of control on students work when they used TPC. Absence of interaction between devices restrained teachers who wanted to follow students’ action on TPC. That resulted with some students’ misuse of this un-controlled situation, “…Few days ago, I assigned students to watch chromosome multiplication in a very nice animation. When I was walking around desks, I realized that one of my male student was watching bride-mother-in-law program on YouTube” (Teacher F), “… once, I caught students from 9-A, in a free-time, playing chess with 9-C, during the class. The problem was 9-C being in class and playing chess rather than listening the lecture” (Teacher G). This misuse occurred in both practices of active use of TPC (see Figure 4.8) and inactive use of TPC (see Figure 4.9). Teachers, who conducted lecture where students used TPC actively in teaching and learning process, explained that they handled with this problem in two options, warning and confiscating for a short period of time, few minutes or at most one class hour. Teacher A gave an example about her attitude toward misuse, “when I assign them with a particular work, it is always possible to catch some while dealing with totally irrelevant thing. In such cases, I prefer to warn them go back to the work, but if they insist, I am taking their TPCs.” Likewise, teacher J discussed, “students know my attitude already, because I simply confiscate their Tablet PCs during my class, if they are not following my instruction. This is the rule for my class.”

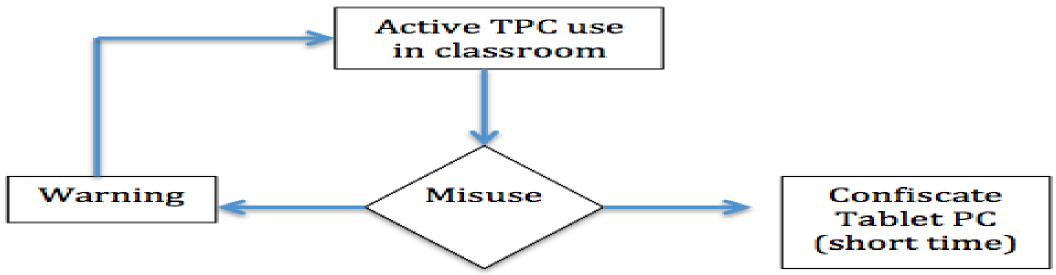

Figure 4.8 Process of Misuse in Active TPC-Used Classroom

During the classes, where teachers were not using Tablet PC actively but allowing students to keep their TPCs on, two ways of dealing with misuse was found out: confiscate Tablet PC and asking students to turned off their devices, as seen in Figure 4.9. Teacher N and P declared that they did not use TPC at all during their classes, but also they did not forbid students' usage. However, they emphasized the distractive effect of Tablet PC during the class and the need of making provision against, "I am simply collecting students' TPCs if I catch them playing with their TPC during my class. And, their TPC stays with me at least few days. Otherwise, I cannot deal with the distractive effect of these smart machines" (Teacher N). As it was seen, teachers who were not using TPC actively confiscated the devices more longer time than the teachers who were using more actively.

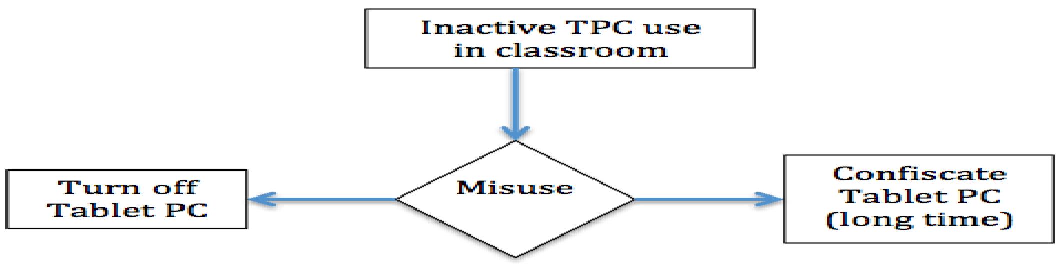

Figure 4.9 Process of Misuse in Inactive TPC-Used Classroom

4.3.1.4 Assessment and Evaluation. *Assessment:* The data analysis showed that teachers had two approaches in usage of TPC for assessment. In the first approach, teachers (*n=10*) perceived TPC as a device, which can access to the

Internet and display some materials in order to facilitate formative assessment. Teacher I mentioned about her use of some websites in order to conduct unit-tests at the end of every section, “nearly after every unit, I am encouraging students to download tests to their TPC and solve them… After they finish, we are discussing together” (Teacher I). Likewise, English teacher explained how to use TPC in order to conduct some grammar-exams: “I am always getting benefit of the websites of Oxford and Cambridge in order to find some good multiple choice test related with my subject. Students are solving these tests which show how much they learned” (Teacher D). Additionally, teacher B who distributed the multiple-choice test, which was developed by herself, through the e-mail group:

> At the end of some classes, I’m assigning students with some 10 15-questioned multiple-choice test which is for my formative assessment and also for the university exam preparation. They are solving the test and giving to me the results [on paper] so that I can check and evaluate how much they learned the content (Teacher O).

On the other hand, in the second approach, teachers (*n=3*) perceived TPC as teaching and learning device, which can support more complicated assessment process, like term-projects. Teacher B explained her use of TPC as an assessment tool in evaluating students’ knowledge and ability to apply their knowledge in other platforms,

> Some students are really technology-oriented and because of that I assign few of them to prepare a game, which presents some war strategies of Ottoman Empire. It was a term-project, and actually they proposed me this topic. They downloaded some software and they made a simple game, which explains two tactics of Ottomans perfectly. It was a good experience to see their knowledge both in technology and in history (Teacher B).

Parallel with the application of history teacher, music teacher pointed out his assessment process, where he assigned students to compose a music using some specific instruments and in a specific rhythm:

> After I introduced students with music software and practice it during the class, my first mid-term exam was composing music in 2/4 rhythms and

> using different instruments in the software. They did just great job…. I saw their knowledge in music, their creativity, and the effect of class I conduct through introducing this software and also the motivation created in students to make a better job than the others (Teacher J).

Evaluation: As it was seen above, teachers expressed their usage of TPC both to conduct formative and summative evaluation. Findings showed that teachers had used the evidence gathered by the assessment process in order to make judgments about the educational practice. In this point, teachers expressed how did they conduct formative and summative evaluation for their TPC-used instruction. However, before going any further in evaluation process, it found important to present teachers' decision process on conducting either formative or summative evaluation or both of them. In this vein, as it was presented in Figure 4.10, it was possible to divide teachers into two main categories who decided to use TPC in their class (*n=14*) and who decided not to use (*n=3*). Among the teachers who decided to use TPC, there were two groups; teachers who used TPC in a limited way (*n=11*), (which only includes using some multimedia elements in the classroom or limited access to the Internet during the class), and teachers who used TPC in more active manner (*n=3*), (which includes using a software o application to facilitate learning). Teachers who used TPC in a restricted manner were categorized as teachers who were successful in their attempt to use TPC (*n=4*), and who were not successful in their attempt (*n=7*). Teachers who evaluated their attempt as unsuccessful stated two different decisions they made (summative evaluation) after that; the first was the decision to give up and not try again (*n=4*), and the second was the decision to improve their instruction in order to use TPC more effectively (*n=3*). On the other hand, teachers who evaluated their instruction with TPC as successful gave the decision of repeating the same application (*n=4*) (summative evaluation). Physics teacher explained her successful experiences with multimedia use via TPC:

> My subject is physics, which is perceived as one of the most difficult subject in curriculum, especially the topic of momentum. In order to ease learning, with TPCs, I started to provide lots of videos and animations for children in order to watch during the class and support their understanding. I can say that supporting the teaching-learning environment with [multimedia] elements made a positive change in exam results…. So, of course, I'll repeat it in the next year" (Teacher K).

Unlike the limited TPC users, teachers who were more active TPC users in their classes emphasized some formative evaluation steps during the developing of their instruction. Lecture plans of teachers presented that these steps involved asking students' opinion about the software or application they used, students' mid-term exams, and teachers' own evaluation how much the software fit into the content and objectives. Teacher A explained her evaluation;

> I continue to evaluate the instruction that I planned during the process of choosing the software and introducing it with the students. I collect information about the program I bring to the classroom and I observe students' engagement process. Additionally, we are conducting small forums with students about the program we are using. Their opinions help me a lot to see the progress and effect of the software.

Likewise, music teacher explained that he used mid-term exam results of the students in order to improve his instruction,

> … After I introduced students with the music application, I conducted one quiz related with some musical concepts and I saw the students' failure in important terms. Only after these results, I realized the drawback of the application and I supported students with some lecturing on musical terms (Teacher J).

Teachers who were considered as active TPC users presented their decision in summative evaluation as repeating the same instruction in following years ($n=1$), and decision to improve the instruction ($n=2$). Teacher B pointed out the decision of upgrading the instruction, "I assign students to develop a game and we worked on it during some classes but when I turned back I can see the need of organizing the classes more accordingly, maybe with some supportive role-plays." On the other hand, teacher J stated his decision of using the same application with the already improved instruction in following years, "it was a successful instruction, yes, I will repeat it next year."

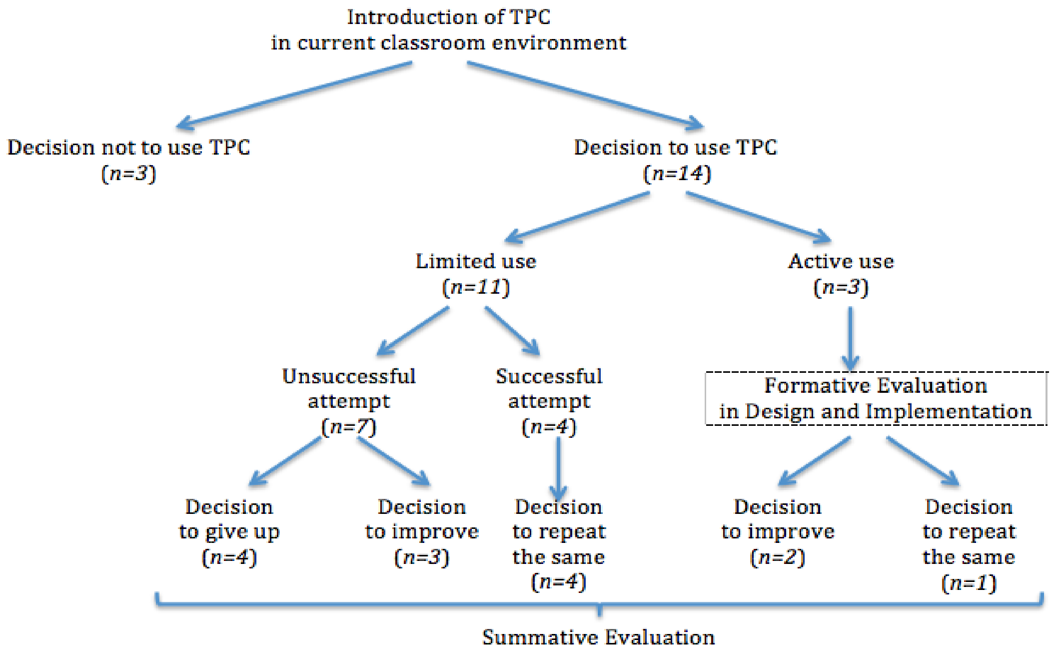

Figure 4.10 Teachers' Evaluation Process of TPC-Used Instruction

The findings of interviews and documents showed that for the decision on the merit or worth of the course in summative evaluation were determined by teacher's own experience (*n=10*). Teacher N, who attempted to use TPC but couldn't be successful explained her final decision of giving up to use: "I want students check some information on the Internet instantly during the class but when I direct them to use their TPC, I cannot take them back to the class. Whole concentration vanishes." Parallel with this, teacher F stated the effect of lack of control on students' work in her decision making, "I thought the effect of videos and animations on students' learning but I realized that whenever I made them watch some videos alone, at least 10% of students were watching some other things. So, I don't believe in positive effect of TPC anymore" (Teacher F). As it was seen, teachers' own perception had more emphasis on the final decision of not using TPC in their classes. However, in order to improve the instruction, teachers indicated their need for more concrete results like students' informal opinions (*n=6*), and students' exam results (*n=8*). Teacher B stated that she consulted students' opinion about the effectiveness of the software and application she picked for the instruction and she emphasized the correct diagnosis made by students related with their own learning, "when we give chance, student can take responsibility of their own learning. I prefer them to feel responsible about the class and I'm consulting their opinions. That also directs me to evaluate my own class" (Teacher B). Likewise, teacher A pointed out to take students' opinions in a written form time to time and also the information given by the exam results, "actually, exam results tells a lot about our instruction and its' effectiveness. In addition to obligation of grading, I also perceive them opportunity for me to improve my lecture and also chance for students to understand their level."

4.3.2 The desired instructional design process in Tablet PC usage. The findings about teachers' instructional design steps of Tablet PC usage in their teaching and learning process when the necessary conditions have been met, were presented considering the following research question:

2.2. What should be the steps of the instructional design, which is followed when the necessary conditions for using TPC in teaching and learning process has been met?

Before presenting the results of data analysis related with this topic, it seems necessary to make clear for the readers that this research question was shaped during the research process. As grounded theory indicated, the main focus of the research was built after the first set of data gathering. Since teachers clarified the drawbacks in introduction of Tablet PC usage into the classroom, they answered the interview questions what they were able to do in the current application of the project (see part 4.3.1), and also they explained what they could do if some conditions did meet related with the TPC enhanced education. These conditions were covered in "4.2.1. Advantage, disadvantage of Tablet PC usage in existing condition and necessary conditions to be met" in detail. In this regard, the present title tried to cover more ideal case for the instruction, which facilitate with Tablet PC use, without discussing about the conditions.

As it was seen in Figure 4.10, most of the teachers (*n=14*) gave a try to use TPC at least once; only little amount of teachers (*n=3*) did not attempt to use TPC, at all. In this point, it can be said that teachers presented attentive attitude toward this new technological innovation in education. However, unmet conditions, and the constraints kept teachers from using the device in beneficial way. In this point, teachers, no matter they used TPC in current system, expressed their desire, their capabilities, and their possible usage of TPC in their instruction, in the case of betterment in necessary conditions. Thus, under this title the data gathered from all interviews conducted with seventeen teachers were presented. Likewise, experts (*n=3*) discussed about the ideal instructional design steps of TPC used classroom. In this regard, the results of both sides of participants' were presented in the same breath by consulting literature. In the light of these data, the results were presented under four main titles: analysis, design and development, implementation and evaluation.

4.3.2.1 Analysis. Data analysis showed that teachers' current application in analysis of their TPC-used instruction was different from their perception about the process of analysis when the necessary conditions met. As applicants in the field, teachers pointed out differences in analysis process in the case of establishment of some essential settings. The instructional design process discussed with teachers and experts was schematized and summarized in Figure 4.11. As it was seen from the figure, teachers indicated their trust on curriculum as a starting point. Although most of teachers (*n=13*) were not complaining about the stepwise nature of Turkish curriculum, they agreed on absence of some points in educational system: "I don't think that we are raising a good generation. Our system is lack of philosophy and proper goals, related with human development" (Teacher G); "There is a great problem today's generation, because their only desire is to have a luxury life without spending any effort. I think, we should start from this point and then come to the technology integration…" (Teacher H); "I don't understand the reason behind bringing TPCs into the classroom? What is the goal? No one put it into word, explicitly" (Teacher F); "I'm supporting the idea of technology integration, but in order for effective use, we need to know what are the major goals of our educational system, and what is the role of the technology in this system to achieve these goals?" (Teacher O). Parallel with teachers' ideas, experts underlined the same halting point:

> Before technology integration we have to discuss about the lack of philosophy and aim in our educational system. Our teachers can use technology, we can give this education but first we have to answer the question of why they should use it? For what reason? After establishing the goals, then a teacher should ask himself or herself, how can I reach this goal? Only in this point, Tablet PC can be an answer… (Expert A).

> Tablet PC cannot change the process of analysis substantially. Of course, some details should be included but the main question is the same: What can I use in order to achieve the educational objectives. Here, Tablet PC can only be one of the options to enrich educational environment. But, teacher shouldn't be restricted by technology use. I guess it should be optional, up to teacher (Teacher B).

In this regard, supporting curriculum by identifying the goals of education and philosophy behind was proposed one of the starting points in instruction. Additionally, the absence of link between TPC use and curriculum was indicated as the shortcoming of the projects. Interestingly, only four teachers indicated the lack of renovation in curriculum related with the technology integration. Experts discusses the absence of TPC in recent curriculum, "since, we cannot come across with Tablet PC in curriculum, it looks very optional to use TPC in the classroom. If teacher is instinctively motivated, s/he may use it any degree s/he wants" (Expert A). Expert C mentioned the problem of that curriculum and FATIH project did not fit into each other: "Our educational program, which frames teachers and teachers become volunteers to be framed. There is no essence of TPC. So, how can we expect teachers to use TPC in their class, while they are following curriculum without questioning" (Expert C). In this vain, it was underlined the place of TPC in curriculum as a media to be used to facilitate teaching and learning. Findings showed the necessity of reorganization of curriculum considering the media and methods brought by FATIH project, however, three experts and four teachers agreed on not to be restricted with some techniques in technology use,

> I guess your curriculum should be more flexible in the sense of giving more decision to teachers…. Especially, in technology use teachers who are more knowledgeable can be really creative and they can create environment where their students are creative. There should be a place of freedom for such teachers (Expert B).

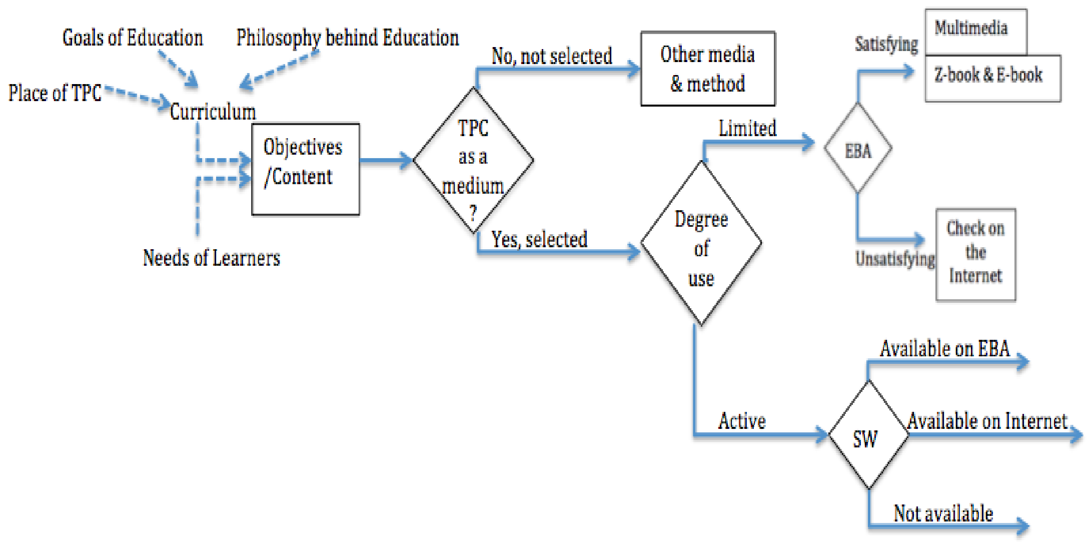

Figure 4.11 The First Part of the Analysis Process When the Necessary Conditions Are Met
Legend: EBA: Eğitim Bilişim Ağı (Education and Informatics Network), TPC: Tablet Computer, SW: Software

Likewise, teachers who defined themselves capable in technology use stated that the necessity of having area of freedom in curriculum, while having suggestions and activity examples as it is presented in current program. Thus, as it is seen from the Figure 4.11, curriculum was starting point only by increasing flexibility and giving freedom to the teacher, who desire it. Moreover, teachers expressed the differences between students, classrooms and schools, which appeared as a point to be aware of and to try to answer: "I am appointed here few months ago. I was teaching in a small school in Kulu [province of Konya] before. I can say that students are totally different and of course, I have to answer these [different] educational needs, now" (Teacher I). It was found that teachers were not ignorant to the educational needs of students and they reflected it to the planning process: "my plan for 9/A and my plan for 9/C are quite different from each other…. The reason is students' needs" (Teacher B). Expert A underlined the importance of the needs of mass for analysis, "If teacher is not aware of the needs of learners, he can easily miss this important point. Because our curriculum does not require any needs analysis." In the light of needs analysis and curriculum, the first step in analysis was defined as selecting objectives. Rather than having content and searching for materials to transmit this content, the flexibility of having objectives and starting from them was favored in findings of the study. Teacher M stated:

> If I would have only goals or objectives to follow, I would prefer other contents too. For example if the goal is to teach the characteristics of Mediterranean climates, then I wouldn't be restricted with Turkey. I could pick another Mediterranean country as content. That could attract students' attention more.

Data analysis showed that taking objectives as a starting point was emphasized only by four teachers, others emphasized content as a starting point. Considering this, in Figure 4.11, both was represented as a first stage. However, all three experts stated the importance of flexibility provided by objective based curriculum in order to define the place of Tablet PC and gave the decision of picking this media to teachers. On the other hand, this new approach brought other requirement related with teacher education. Teacher A and Teacher C indicated the problems of teacher education and the needs of improving teacher quality,

> The reason [of stepwise curriculum and framing teachers with this curriculum] is that we don't trust our teachers. For example, in Finland, they have very flexible curriculum, which allow teachers to develop their own program. But, on the other hand, they give great importance to teacher education. The most successful students become teacher and they are supported with in-service trainings all the time (Teacher A).

As a result, with the conditions of curriculum adaptation and betterment in teacher education, analysis process was begun with selecting objectives. Then, teachers continued their analysis in order to select appropriate media, with the questions of "whether TPC can help me to achieve this objective" (Teacher A, Teacher B, Teacher M, Expert A, Expert B, Expert C), "Can TPC be an effective media to achieve my content" (Teachers of D, E, F, G, H, I, J, K, L, N, O, P, & R). After answering these questions, if teacher did not select TPC they stated that they continued their design by planning lesson with the other media or methods. However, if they selected TPC as a medium, then the decision was made; to what extent this medium was going to be used. Using TPC to make students to watch some multimedia, using z-books an e-books and also utilizing TPC for instant

Internet access was again named as limited usage. Teachers stated that even if all conditions was met, there would be classes which were more suitable for limited use, “even the interaction and necessary infrastructure established, it cannot be result with TPC-based instruction. For some content, I can arrange TPC-based instruction, but still I would prefer to use this device mainly to reach Internet” (Teacher I). In this limited usage, as it was discussed in previous part, teacher would prefer first to check EBA for the documents and if they could not find necessary materials there, then they would consult to the Internet for an appropriate material. On the other hand, for more active usage, more complicated process was founded out. Active use, which mainly pointed out picking suitable software in order to achieve the pre-determined objectives, followed by three main options; case 1: Software was available on EBA (see Figure 4.12), case 2: Software was not available on EBA but found one appropriate program on Internet (see Figure 4.13), case 3: There is no available software (see Figure 4.14). Since software was explained as backbone of the technology, the rest of analysis was built into the different paths followed considering the software.

In case 1, where teachers would find the necessary software on EBA, the website provided by ministry, they stated the comfort they would have with the software which had already been tested,

> …Having varieties of software on EBA suitable for the curricular content would help us to support our classroom without the needs of analysis on hardware or curriculum. I mean, there should be readymade programs which have already checked whether they are suitable for the Tablet PCs or whether they are appropriate for the curricular content (Teacher B).

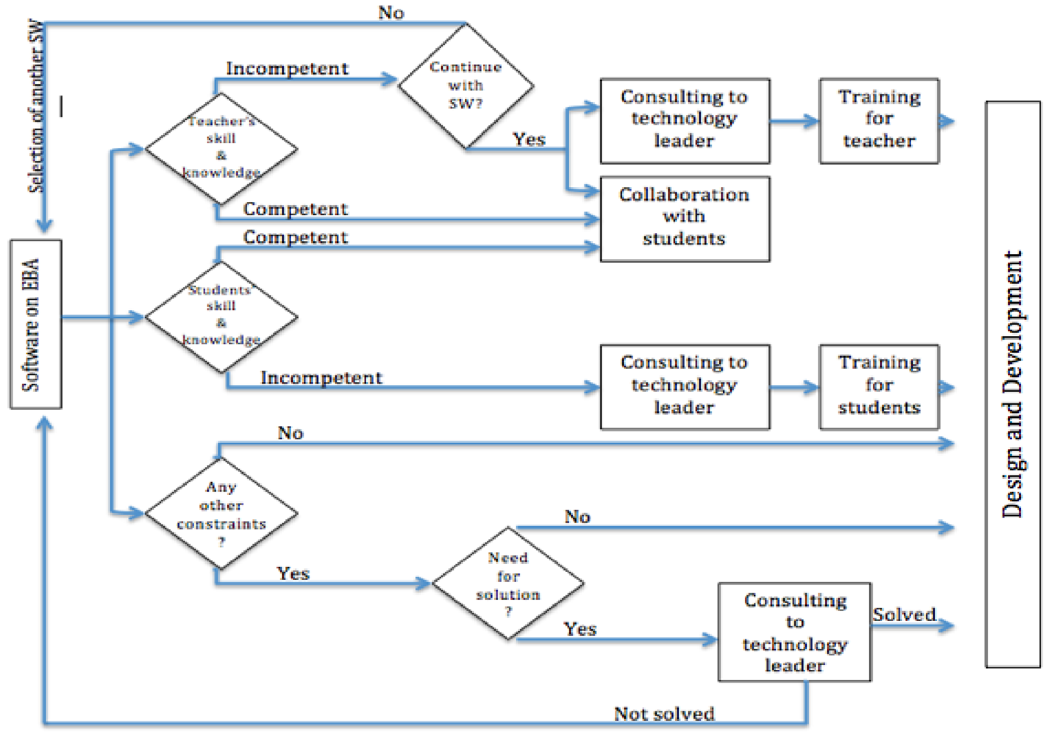

Figure 4.12 Analysis Steps for Case 1: Using Software Available on EBA
Legend: EBA: Eğitim Bilişim Ağı (Education and Informatics Network),
SW: Software

Although, upgrading and enrichment of the EBA website with the suitable software, applications or materials were indicated as one of the main condition, teachers agreed on conducting some analysis related with this software. As it was presented in Figure 4.12, teachers and experts mentioned about some analysis to conduct: Teachers' and students' skills and knowledge and also other possible constraints related with software. In the first analysis, it was questioned whether teachers' skills and knowledge are enough to conduct a lecture using the software. In this point, teachers explained that if their knowledge was not enough, teacher could give up with this software and go back to the EBA market: "Here, options are very important. Teacher has to have chance of selecting among varieties of software related with his/her content in order to achieve the objectives" (Teacher A). However, if teacher wanted to continue with this software, participants of the study indicated the necessity of having one full-time technology leader in school. Teachers pointed out their need for an expert to consult problems related with both software and hardware:

> I feel the need of consulting someone when I have difficulty in designing or implementing some technology in my class. Unfortunately, formators are not enough to direct this process…. I need someone who is expert in adapting some software or application I chose to my class. (Teacher B).

> I think there should be technology leaders in the schools, rather than less-educated formators. It would be great if these people can support us to develop content, to use technology and also to solve technological problems we face…. With some support from an expert, I may use some more complicated systems in my classroom (Teacher O).

> There is a need for trainers in the schools to support FATIH project. I don’t think that in-service trainings were successful to teach us how to integrated technology into the classroom…. [In order to attend trainings] we are leaving school, going a place where we should sit down and listen hours and hours and then, we came back we saw that actually, real life was not as they explained during the seminars. Rather than this, I prefer to have one or two experts in the school, who can help us, help students, or arrange regular trainings for us (Teacher J).

Parallel with teachers, experts did also mention about providing some full-time employee who were qualified in educational technologies and who could support both teachers’ and students’ technology education regularly or when it would be necessary. In this regard, technology leaders could help teachers when they would like to use software they picked from EBA. In addition to asking for help from leaders, some teachers proposed to ask for collaboration with students. This collaboration was suggested for the cases of students’ knowledge was competent regardless of teachers’ knowledge. In such condition, teachers gave value to students’ knowledge of technology and they wanted to include them into the decision making process related with their learning. However, on the occasion where students’ knowledge and skill were inadequate to comprehend how to implement software, teachers underlined the role of the technology leader again in order to provide necessary training for students. As teacher J emphasized, technology leaders could be there as a consultant when the intervention was in need, both by teachers and students. Additionally, teachers indicated to analyze possible constraints, which could be an obstacle on the way of implementation. In the situation of handling these constraints again, teachers' pointed out technology leaders: "Since, I'm not competent, it is not possible for me to know all possible problems in integrating of technology into my classroom…. However, it would be nice to have an expert with whom I could discuss such points" (Teacher B). Thus, after conducting three kinds of analysis (teachers' skill & knowledge, students' skill & knowledge, and possible constraints), teachers explained the possibility of starting to design and develop the instruction.

Case 2, in which teachers stated the possibility of searching the related software or application on Internet when the EBA website was not sufficient, was summarized in Figure 4.13. In this case, since it was not a software controlled by ministry of education and put on the EBA website, they stated the necessity of some additional analysis, such as whether the software was in line with curriculum, and whether the hardware was compatible with the selected software. In these two decisions, teachers mentioned about the role of the technology leader, "the expert in school could help us to select the appropriate software considering hardware and curriculum. My knowledge in technology is not enough to understand whether Tablet PCs are capable to run some software or not" (Teacher M). Then, since not all materials were free on Internet, a budget analysis could be conducted in order to see whether this educational material was affordable for the school or not. In this point, teachers and experts stated the budget reserved for the application of technology in school environment,

> Technology is not something cheap. As we see from FATIH project, it requires a huge budget to establish all those things. However, it will also require a budget to preserve the system…. There will be need to purchase some software, or maybe some additional hardware. I think, for an evolutionary project, it is necessary to establish some budget in school base. Experts in the schools can take the control of this money with administrators (Expert C).

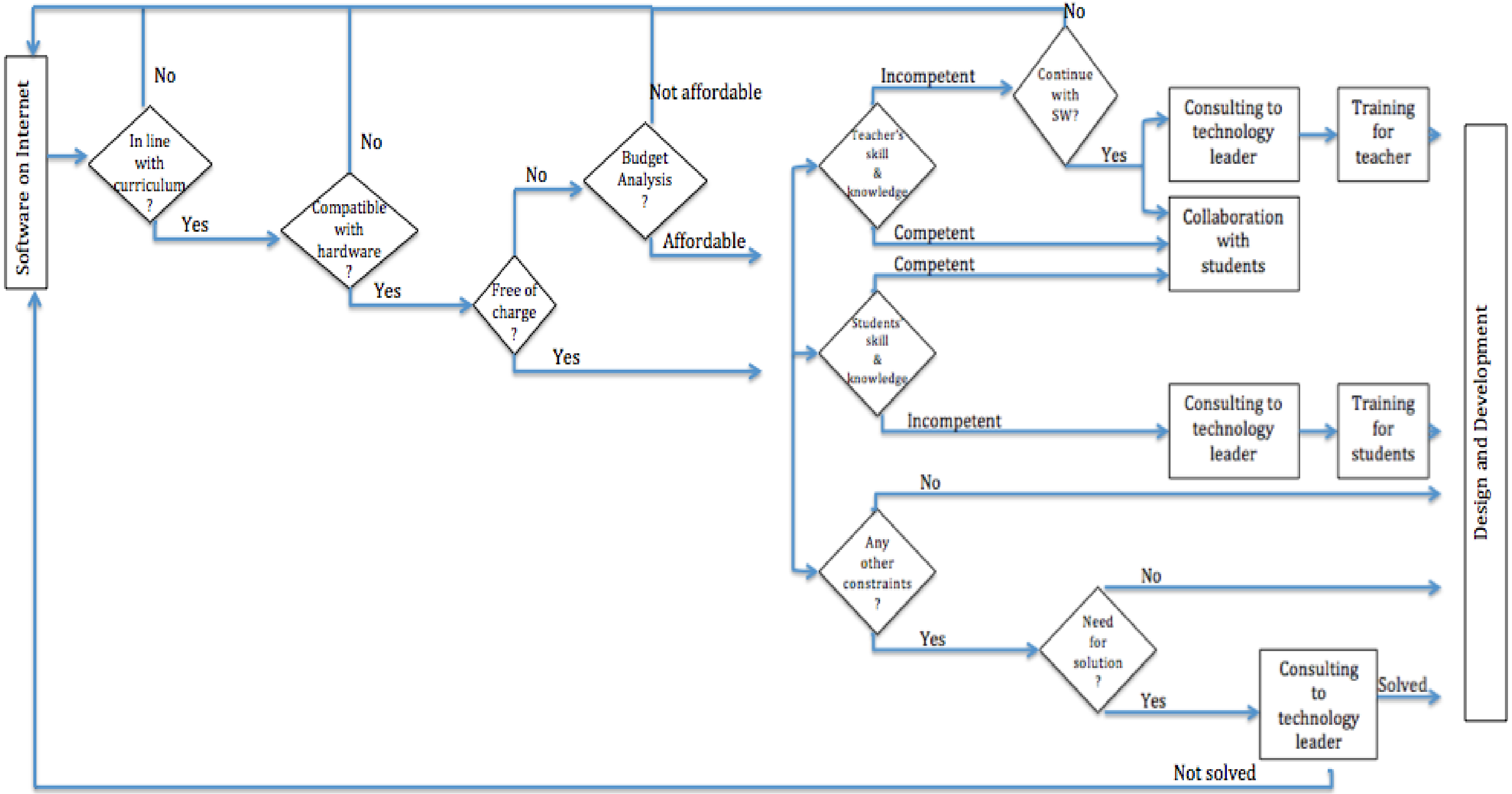

Figure 4.13 Analysis Steps for Case 2: Using Software on Internet

As it was presented in Figure 4.13, the decision diamonds related with curriculum, hardware and budget returning back to the beginning, if the questioning about compatibility or affordability was negative. Teacher A congregated all the responses of the teachers as follows:

> When searching on Internet for software, first, I have to check programs congruent with curriculum, because it has to fit into my curricular goals and my content. If it doesn't fit into my curriculum, why would I spend any further effort on this software? Then, the issue of software-hardware compatibility arises. Standard hardware [Tablet PC] would be helpful for this analysis. If there is a problem in the compatibility, I should give up. Finally, budget is the issue I have to consider. Whether is it free or not? There are very nice programs but they are too expensive…. I don't insist on them because of their high price.

In addition to these analysis in case 2, teachers stated the need of analysis drawn in case 1, which were teacher's skill and knowledge, students' skill and knowledge and analysis of possible constraints. (Since these steps are explained above, they are not repeated here.) In order to conduct these analysis in case 2, the conditions which had to be established are, standardization in Tablet PCs, reserved budget in schools for purchasing software, and technology leaders in schools.

The last case of analysis stated by teachers was presented that there was no readymade software, which could answer students' and teacher's educational needs. In such situation, teacher C stated the cooperation between teachers and technology leader to develop a program, which could support the teaching and learning (see Figure 4.14). However, in the case where more complicated software or application or any digital program was in need, then technology leader could inform the ministry or board of education in order to ask for such a program: "Ministry should have a group of program developer who are working on developing educational software which could answer the need" (Teacher N). As it was seen from Figure 4.14, if technology leader or the program developers working under the ministry would judge the software worth to develop, then the process could be followed by design and development of the material considering the teachers' need. This decision making process was explained by expert B,

…A commission working under ministry of education could accept project proposals, which would have advantages in large scale. In this point, the request from teachers could be gathered for a while and then this commission could give a decision about the necessary programs to be developed and put into service. Then, with the program developers, a project could be started in order to make more software available for teaching and learning environment.

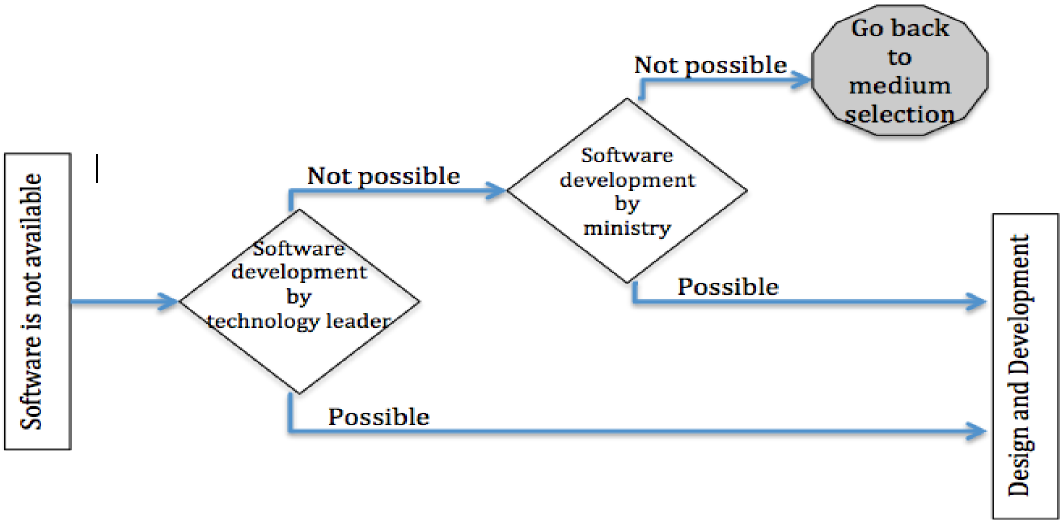

Figure 4.14 Analysis Steps for Case 3: Readymade Software Is Not Available

In case 3, as it was mentioned above, teachers emphasized the necessary conditions to be met as technology leaders in schools, and a system established by ministry to improve new programs according to the needs of the teachers. For example a commission who assigned to follow technology use in schools and arrange development of new programs, software, applications or trainings considering the needs of schools.

Moreover, teachers (*n=10*) and experts (*n=3*) indicated the learning environment analysis in an ideal TPC-used instruction. With the conditions of free 3G, technology education for students and teachers could open the door to carry teaching and learning out of the classroom. In this point, an analysis of students' out-of school environment was explained as an important factor to enlarge the educational opportunities. Teacher A stated the possibility of using out-of school environment as following,

> My class is 40+40=80 minutes, and that's it. Whatever I do is restricted with 80 minutes. However, if students held a TPC connected to Internet and connected to me means that I can expand my class…. In this point, students' home or dormitory environment require more attention, because we have to be sure about the same conditions. I have to know whether each student's life standard is suitable if I ask him or her to open his or her TPC at 8 pm for 10-15 minutes for distant education.

The findings of the study revealed a complex system for the analysis process of TPC-used instruction. Although, specific use of TPC resulted with a specific perception in some parts of the design process, in general, the analysis steps showed parallelism with the literature. The attention drawn to the identification of the curricular philosophy and goals was underlined as main elements of curriculum development. As Ornstein and Hunkins (2004) emphasized the importance of philosophy to provide framework for the organization of whole school system and education: "it helps them answer what school are for, what subjects are of value, how students learn, and what materials and methods to use" (p. 31). In the literature of curriculum and instruction the need of taking philosophical foundation was also discussed as a staring point to establish goals, organization of content, and the whole process of teaching and learning (Dewey, 1938; Tyler, 1949; Ornstein & Hunkins, 2004). In order to specify the objectives or content, learner analysis was proposed in the literature by instructional designer. Dick, Carey and Carey (2005) stated that learner's current skills, preferences, and attitudes needed to be determined along with the characteristics of the instructional setting where the skills would be used to achieve the instructional goals. The current skills showed the gaps in performance of students that revealed the needs of the learners. Kaufman and English (1979) presented needs analysis in order to identify the problem and then selecting appropriate intervention. In the present study, learner's need was also proposed as a starting point, which could lead the instructional objectives, which targeted to the problems.

Since, this study was focused on TPC-use media had already been selected as Tablet PC. However, as Morrison, Ross and Kemp (2006) stated their question related with media selection, what media or other resources were most suitable for the instruction, teachers were giving this decision at the beginning of the design process. In the case of deciding on TPC, then analysis related with software appeared. The software analysis showed similar perception with the instructional strategy and material analysis. As Dick, Carey and Carey (2005) stated the characteristics of media and suitable instructional material needed to be determined for an effective instruction. After deciding on strategy, the availability of existing relevant materials or development of original materials was stages defined for systematic design. Both Posner and Rudnitsky (2006) and Dick, Carey and Carey (2005) proposed factors for identification of workable educational products, either through selecting from among existing materials or developing a suitable one. In this point, instructor and students' competencies and defining the possible constraints were studied as factors in selection the material (Dick, Carey, & Carey, 2005; Keller, 1987; Posner & Rudnitsky, 2006).

4.3.2.2 Design and Development. Data analysis presented that according to the teachers; design and development part of the instruction would show difference when some conditions were satisfied. These conditions were listed as free 3G, Interaction between students' TPCs and teacher's device, establishment of teachers control in interaction, and the technology education provided for both students and teachers, existence of technology leaders in schools and also the enrichment of EBA site (or any other site) with the educational materials, software and applications. In such conditions, teacher expressed their design process for their instruction, as it was illustrated in Figure 4.15. After deciding on software or multimedia materials, whether students need for training or not was questioned. Teachers indicated that if students need for education in order to use software for the class, then this training could be plan together with the technology leader in school. After the designing of this training, teachers said to continue with the questioning process of "how can I use this software/material in order to achieve my goals?" (Teacher B, H, G, M, O); "how should I integrate this material in order to get the best benefit out of it?" (Teacher A, C, F, L, K); or "what should be the place of this software in my class in order to make students achieve objectives?" (Teacher D, E, I, J). After scanning the software or multimedia material with the help of these questions, teachers explained planning the instruction as the next step. In planning, software, other non-digital or digital materials, and teaching learning methods were revealed as supporting parameters. Teacher M summarized the place of the TPC: “It is only a medium, we have to use it whenever it can bring some advantage but I don’t think that there is a need to construct technology-based learning, which includes all curriculum.” Parallel with teachers opinions, three of experts agreed on the perception of TPC as a facilitator and they disapproved the idea of placing TPC into the center of the education: “as an expert in distance education, I can say that there is an exaggeration in the place of TPC in education. TPC can only cover its own place, not more than this” (Expert C). Considering this in TPC-used classrooms, teachers pointed out their decisions, which includes both methods, and other materials. However, if they decided to use TPC, they expressed the possibility of designing both in-school and out-of school context. As mentioned in analysis, if students’ out-of school context was available for teaching and learning activities, teachers underlined the opportunity to enlarge teaching learning environment. At this point, teacher O explained how they could lead students life-long learning, “through distance education, we could seed the basics of learning throughout their life in kids.” Additionally, teachers emphasized the need for back up plan parallel with the main plan, which included TPC usage. This back up was described as an alternative plan for the case of that technology would not function, because of electricity cut, or any other technology problem which could not be solved instantly. This case was exemplified by expert B as following,

> In the old days, we could not hear an excuse such that chalk didn’t work and I couldn’t conduct my class as I had planned. However, with the high-tech classes, this became one usual excuse…. I think teachers should be aware of this problem and, I know it is increasing their workload but, they should be prepared for the possibility of not to be able use the technological device for some reason.

Parallel with expert’s opinion, teacher indicated the need of having a back up plan, which may contain less digital materials, “I have already experienced lots of electricity cut, I had to lecture using only some papers. It will be the problem of the future, too. So there should be plan B, alternative plan, relying on traditional approaches" (Teacher R).

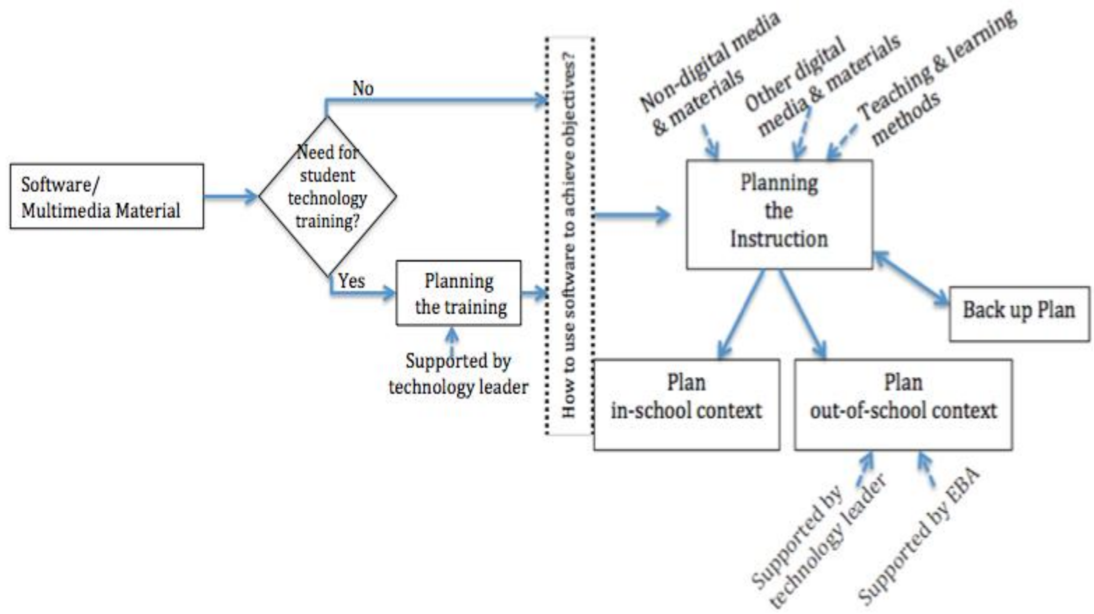

Figure 4.15 Design and Development Process of Tablet PC-Used Instruction, If The Necessary Conditions Are Met

In designing the instruction teachers also discussed the effect of TPC for assessment procedure. Teachers stated that Tablet PC could increase the diversity in assessment tools. In addition to the classical way with paper-pencil and oral examination, through using TPC, in formative assessment, some changes could be done: "With some appropriate software, it can be possible to apply unit-tests which can provide immediate feedback to the students" (Teacher A). Parallel with this idea, Expert B indicated the reduction on teachers' workload with well-designed immediate feedback, "assessment, evaluation of these assessment results took a lot of time of teacher, if the role of providing feedback to students can be transferred to a device, teacher may use that time for other activities" (Expert B). In addition to the software, teachers agreed on using some online test, which could be accessed quickly on EBA o on Internet. Additionally, some teachers (*n=6*) mentioned on the possible effect of Tablet PC on term projects in order to evaluate students' performance, "we already prepared one database using both Tablet PC with PC. It was a nice project for whole class" (Teacher A), "I assigned students a term-project and they chose doing it using

Tablet PC…. It was a good experience to see their knowledge both in technology and in history" (Teacher B). Additionally, teachers emphasized an approach, which kept TPC only as an option for assessment, rather than obligation, "I think Tablet PC should be an option for students who want to use it for their homework or project. Then we can get benefit form it" (Teacher O). Moreover, for nation-wide examinations, teachers proposed the usage of TPC as a device, which can connect to the main system and display exams synchronized with other classes all over the country. However, teachers highlighted not to increase the stress on students through these exams, but to use results in order to see the success, "… although I proposed some nation-wide, let's say, unit exams, I also suspect the poor application which can cause more stress on students. We should protect children from more stress" (Teacher D).

The results of the study were parallel with the literature considering the design and development stages of the instruction. Although some different approaches presented by different designers, the main idea of conducting a careful planning was emphasized as heart of this process (Schwab, 1970). After conducting necessary analysis, Dick, Carey and Carey (2005) proposed to design the instructional strategy, by developing instructional materials, which were used for the instruction. Likewise Posner and Rudnitsky (2006) emphasized instructional planning, which included unit plans considering the objectives and teaching strategies. Parallel with these, Morison, Ross and Kemp (2006) focused on design and development stages separately, and they stated the importance of selecting appropriate instructional strategy , designing the message of instruction and then developing whole instruction considering different teaching and learning techniques. Development of instructional media, and identifying teaching methodologies were also discussed in ADDIE model and İşman Model (İşman, 2011). In this regard, the results of the study were parallel with the literature considering the supporting aspects of instructional planning.

In the literature there were little studies and models, which focused on the contextual elements of the instruction. Dick, Carey and Carey (2005), and also Smith and Ragan (2005) included examination of the context into their models. Additionally

Tessmer and Richey (1997) discussed the role of context in learning and instructional design any they proposed a contextual analysis for the instruction. Although this model was comprehensive enough to cover context-based instructional strategies, it did not cover any virtual context considering the conditions of those years. However, Tessmer and Richey (1997) underlined the importance of including learner's private life, family life and social life in order to extent the teaching and learning. In this regard, the context analysis deliberated in the literature was similar with the results of this study. The findings of the study had also highlighted the need of back up plan. Especially, designers who were dealing with technology emphasized the place of back up plan in teaching and learning environment, in case the technology the technology failed (Piskurich, 2011). Parallel with the findings of present study, Larson and Lockee (2013) advised to prepare backup plan, which was included "materials in a redundant o alternate format, like paper copies of presentations or a DVD of a video that originally planned to stream via the Internet" (p. 88). In case of the failure in main delivery system, technology designers offered to have backup plan, which could provide redundant materials or alternative teaching and learning strategies (Hoffman, 2013; Larson & Lockee, 2013).

4.3.2.3 Implementation. Data analysis showed that implementation of the planned instruction would be easier with the conditions of establishment of interaction in order to gain control on students' work and the existence of technology leader who could guide an help teachers during their implementation if it was necessary. First of all, unlike the current implementation, teachers agreed on allowing students to have their Tablet PCs turned on during the class, if teachers could have the control: "Actually, I cannot claim that ordering student turned off their tablets is something ok. However, the main condition for me to let them use their device is having control over their work on TPCs" (Teacher F). In this regard, meeting with necessary conditions, TPCs could be turned on during the class no matter teacher planned to use Tablet PC. However, when the TPC used-instruction was planned, teachers explained the first step as conducting training for students if it was required. Parallel with teachers' opinion, experts indicated the role of the technology leader both in planning and conducting this training, "like counselors in schools, technology leaders could support students regularly and when it was necessary…. For example, they could take role teaching students to use a particular program" (Expert B).

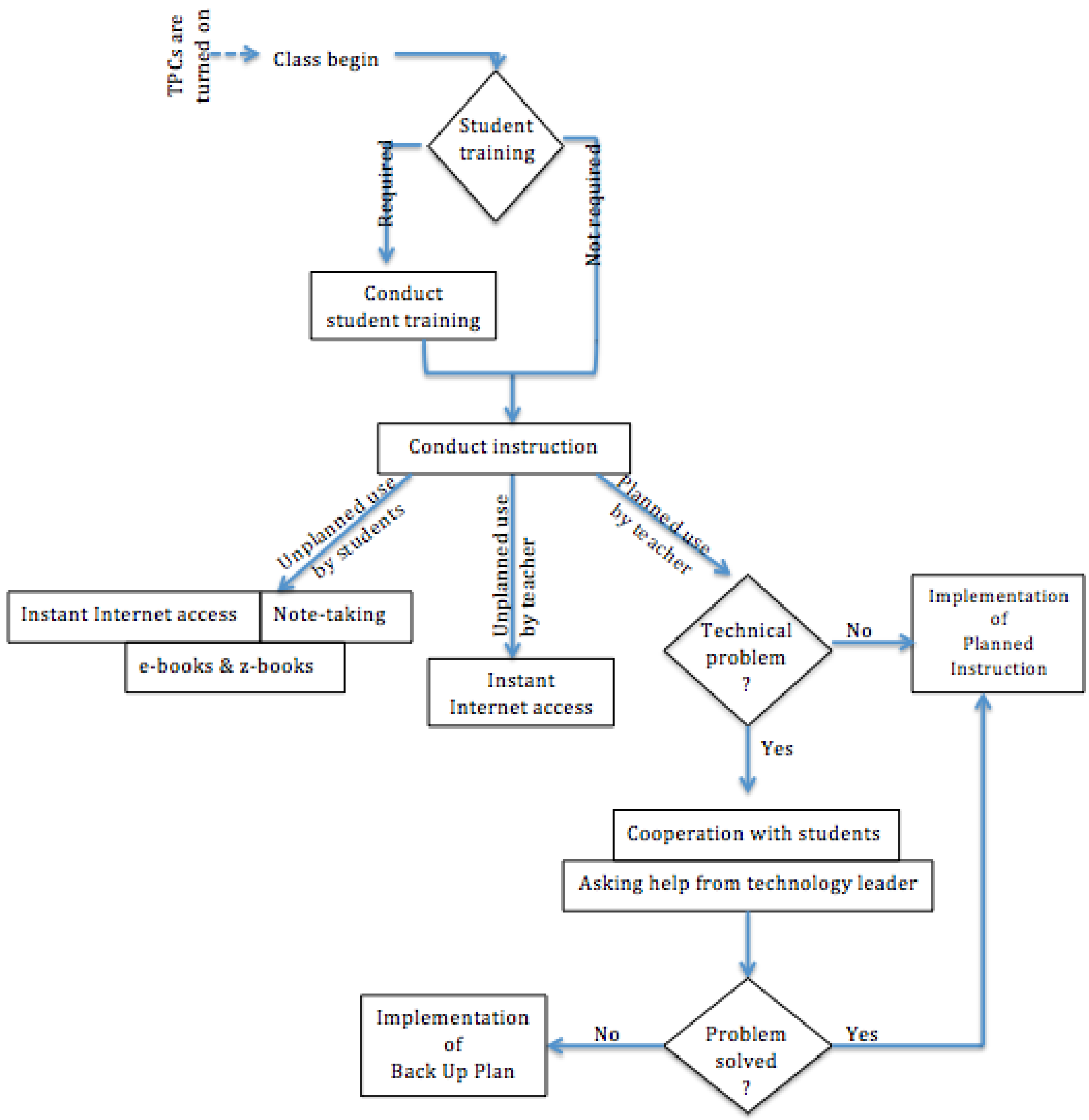

Figure 4.16 Implementation Process of Tablet PC-Used Instruction, If The Necessary Conditions Are Met

After this training, as it was drawn in Figure 4.16, teachers explained the parameters in conducting instruction. Here, they listed three kinds of application; first one was students' usage of TPC, which was not planned by teacher. As it was mentioned in previous research question, students would use TPCs for note taking, accessing to the

Internet and also for using e-books and z-books. The second way of utilizing TPC during the class was unplanned use of teacher that included teachers' assignment of students to instant access to the information on Internet or EBA when it was necessary. The third way was revealed as planned use of TPC, which was designed by teacher before instruction. In this planned usage, teachers expressed the possibility of facing with technological problems. In such case, with a systematic technology implementation, students and technology leaders were appeared as consulting points. Rather than consulting to the other teachers or formators in current system, teachers expressed their desire to have an expert to whom they could consult during their implementation. Teacher K emphasized, "having an expert in school who can come to my aid would make me more courageous against the technological problems. Now, I feel quite weak…" (Teacher F). In addition to the help of technology leader, teachers underlined the importance of using students' technology knowledge and skill to solve the problems. They perceived students, who could help them, "I think, it is necessary to accept that students are at least few step further than us. I'm aware of it and I let them help me" (Teacher B), "students can solve lots of problems related with technical issues, so we have to give a chance to them" (Teacher M). During the implementation, after consulting either students or technology leader, students showed two paths follow, if the problem was solved, they stated the possibility to continue planned instruction; if the problem was not solved, teachers pointed out to conduct back up plan.

Although, implementation was not highlighted as a different step in most of the instruction design models, like, Morrison, Ross and Kemp Model (2006), Dick, Carey and Carey Model (2005), ARCS Model (1987); in present study conducting the instruction was differentiated from the other steps by emphasizing some aspects, like instant use or technical problems. This result was parallel with the ADDIE model, which held implementation as a significant stage in instructional design, which needed to be evaluated just like other steps and revised if it was necessary (Gagne, Wager, Golas, & Keller, 2005). Likewise, Posner and Rudnitsky (2006) discussed the implementation separately than the planning of instruction and they called attention to both beginning of the unit or course, as well as the possible problems could occur during the class, like problems related with teaching and learning environment or difficulties related with students' characteristics. İşman (2011) dealt with the implementation under the category of process both to test the prototype through trying out the planned instruction with students, and to re-apply it after the redesigning of prototype.

4.3.2.4 Evaluation. Data analysis showed that teachers indicated more systematic approach in formative and summative evaluation of their instruction in the case where the conditions they stated had been met. Teachers (*n=11*) agreed on improving the instruction if they experienced any halting point during the implementation. Five teachers expressed the need of formative evaluation regardless of experiencing any problem during the instruction, "a teacher has to be aware of her own instruction in order to make it better" (Teacher B). In this regard, six teachers stated that they would conduct a detailed formative evaluation synchronized with the implementation of instruction, if the conditions were met in order to use TPC for their classes. However, eleven teachers indicated that formative evaluation steps were independent of whether they used TPC or not, "the only point is whether I can use TPC as it should be. Then, of course, my evaluation would be more realistic. Otherwise this is instruction, I'll follow more or less the same stages" (Teacher L); "independent of using TPC, I have to evaluate my own instruction, but the point is ministry doesn't trust me, they don't expect me to evaluate my own instruction, because they don't let me create my own design" (Teacher A). In this regard, more flexible curriculum, and betterment in teacher education, and also supporting teachers' with proper technology education were appeared as the conditions for teachers to conduct their own evaluation more systematically. These points were also underlined with the experts, "for an evaluation designed by teacher, it is necessary to educate teacher accordingly I and then trust him or her to conduct his or her own instruction" (Expert A); "in technology-based education, it is important to identify the problematic sides, and teacher has to be knowledgeable enough to see the roots of the problems" (Expert C). As it was drawn in Figure 4.17, teachers presented a formative evaluation parallel with the implementation, by detecting whether instruction was going as planned or not. If the answer would no, the evaluation process would be started. However, five teachers emphasized whether they would be a need to improve or not,

> Sometimes, the instruction goes as it has planned, but still I feel the need to make it better next time. In such cases, I'm taking notes for myself for the next planning process…. It can be the same for TPC use only if I feel competent in TPC usage" (Teacher L).

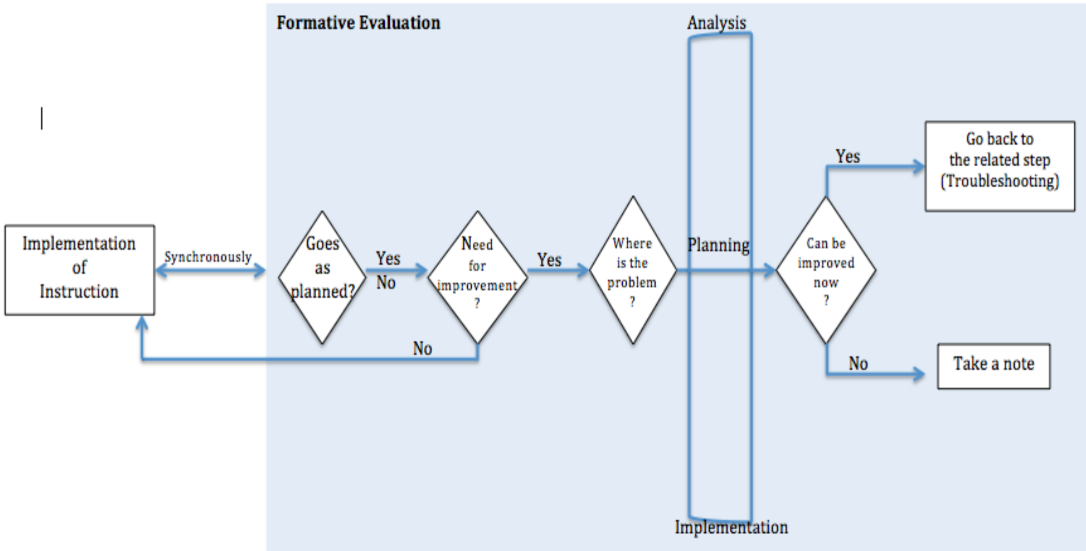

Figure 4.17 Formative Evaluation Steps of Tablet PC-Used Instruction, If The Necessary Conditions Are Met

After the decision for improvement, teachers said the necessity of finding out the problem in instruction, by investigating where it had its source, in analysis (*n=1(teacher)/3 (expert)*), in planning (*n=12(teacher)/3 (expert)*), or in implementation (*n=13(teacher)/3 (expert)*). Here, it found important to draw attention that only one teacher indicated to go back and check analysis process. Although it was not the answer of majority, since experts indicated to go and check every stage in instruction, and also since it was underlined in literature (Dick, Carey, & Carey, 2005; Posner & Rudnitsky, 2006; Smith & Ragan, 2005) this answer was also included to the formative evaluation process. After discovering the problem teachers stated their questioning of whether it would be possible to solve it while conducting the instruction. If it would be, then, teachers stated the need of return back to the related step and start for troubleshooting. However, in the case of deciding that it would not be possible, they indicated the need of taking note for the improvement conducted in future.

Data analysis revealed that there would be four main parameters to consider in summative evaluation if the conditions were met, as it was seen in Figure 4.18. First, teachers (*n=12*) drew attention whether all the objectives specified at the beginning of the instruction were covered? In this point, five teachers focused on teaching and learning of content rather than the objectives. However, this perspective was found more related with the current system, where the content of teaching has been provided for teacher. Here, experts (*n=3*) agreed on focusing on objectives more than content. Expert B underlined the constraint created in evaluation of instructional outcomes if the initial point was content, and he stated the importance of starting wider perspective, which could be drawn by objectives. Expert A congregated this paradigm as following,

> Our educational program proposes a fix content to the teachers. That lead our teachers to check only whether the content was taught or learned by students or not. This is a narrow evaluation. However, if we depart from the objectives, this can provide wider perspective for the evaluation of the whole education…. Then, teachers can evaluate their instruction from wider point of view. They can evaluate different aspects of the instruction.

Furthermore, objective oriented perspective toward the instruction was supported by literature. For example, in ISD Model, Dick, Carey and Carey (2005) proposing to take performance objectives as a starting point. Likewise, Morrison, Ross and Kemp (2006) pointed out to the instructional objectives before the sequencing content, although they made a circler design model. Additionally, the same pattern was investigated in other models like ADDIE and ASSURE model (Li, 2003; Megaw, 2006; Royal, 2007; Sun, 2001). Considering this literature, in this study, the results on evaluating objectives were presented as a starting point for summative evaluation, as it was seen in Figure 4.18. If the objectives were not achieved, teachers indicated to find out which of these objectives could not be achieved and the reason of not being successful. In order to make the final decision, teachers proposed to define the drawbacks and take related notes. However, in the case of objectives were achieved, they told continue with the following step. Second, teachers (*n=12*) focused on both positive and negative side effects of the instruction. Teacher A explained these side effects: “Sometimes, students are learning more than what I teach, because they are concentrating on some different aspects of the program or device that made them live through more than I can plan.” In this point, teacher C expressed her question to evaluate side effects: “what are the outcomes which did not be intended?” Posner & Rudnitsky (2006) explained it as desirable and undesirable side effect of instruction. Here, teachers and experts named these side effects as negative and positive effects. Since these effects were not be intended, this step was defined as awareness step which could help for the summative evaluation, “an experienced teacher should be aware of every outcome of her class. I should be able to know all intended and unintended results…. In order to achieve this I need to evaluate my lessons” (Teacher P). Third, teachers (*n=13*) emphasized their overall satisfaction related with the instruction, as it was mentioned in previous section. And finally, teachers (*n=9*) underlined students overall satisfaction related with the TPC-used instruction. Since, teachers accepted students’ positive perception related with the technology and their capacity to use technological devices, they gave importance for students’ own evaluation of instruction. This point was highlighted mainly teachers who agreed on establishing cooperation with students and involving them to the instructional planning. For instance, teacher J expressed her ideas as following,

> … Students are and will be better than us when issue is technology. Thus, if I’m planning a TPC-based lesson, I guess students’ ideas can be a good guide for me. They can help me to evaluate and improve the teaching and learning environment. I’m already giving them the responsibility of evaluation my class and me. However, I would involve them more if we could achieve more technology integration in our classroom.

In addition to four steps conducted for summative evaluation, teachers indicated using the results of the formative evaluation in order to give the final decision related with the instruction. This final decision was determined under three categories; execute, continue and improve. In order to make this decision, teachers indicated using results from different channels. For formative evaluation, teachers stated that they would get benefit from results of quizzes, which may conduct through TPC-based assessment, teachers' own observation, the information gathered by student-teachers interaction, which would provide data for students' overall satisfaction, and finally the opinions of technology leader, who would involve to the process of TPC usage. In summative evaluation, in addition to the source of information listed above, teacher discussed the possibility of using the results of knowledge based and performance based exams or projects. Teacher B deliberated the place of projects, "if my instruction is parallel with students' end-of-the –term projects, then the quality of these projects reveal the quality of my instruction." Parallel with this, teacher O explained how to interpret exam results, "doing exam is still important for me, because it makes me to see my students, myself, my instruction, my teaching" Likewise Expert A stated the importance of exam or project results both for teacher and student,

> Teacher can see the level of students' knowledge and skill with a well-structured exam and portfolio or project assignment. Also, teacher can judge her own teaching by using these results. However, I think students' own awareness is also as important as teachers' evaluation. With exams, student should be able to understand her or his level, as well.

The results of the study were parallel with the literature. As Scriven (1967) discussed the place of both formative and summative decisions related with the instruction, in the present study, both form of evaluation was founded out for the decision about the TPC used instruction. The results of the study presented a goal-based evaluation, which mainly focused on whether the goals and objectives of the instruction were achieved (Scriven, 1967). This approach was also parallel with the course design approach proposed by Posner and Rudnitsky (2006), who emphasized the necessity of improving the course with some basic question of: "Do all the intended learning outcomes turn out to be actual learning outcomes?" or "What ALOs [actual learning outcomes] were not planned for the course [side effects]" (p. 199). Posner and Rudnitsky (2006) emphasized conducting formative evaluation for troubleshooting and summative evaluation for giving decision about the merit of the course. Using students' achievement, their satisfaction, and also teachers' perception were in the same line with the model proposed by Morrison, Ross and Kemp (2006).

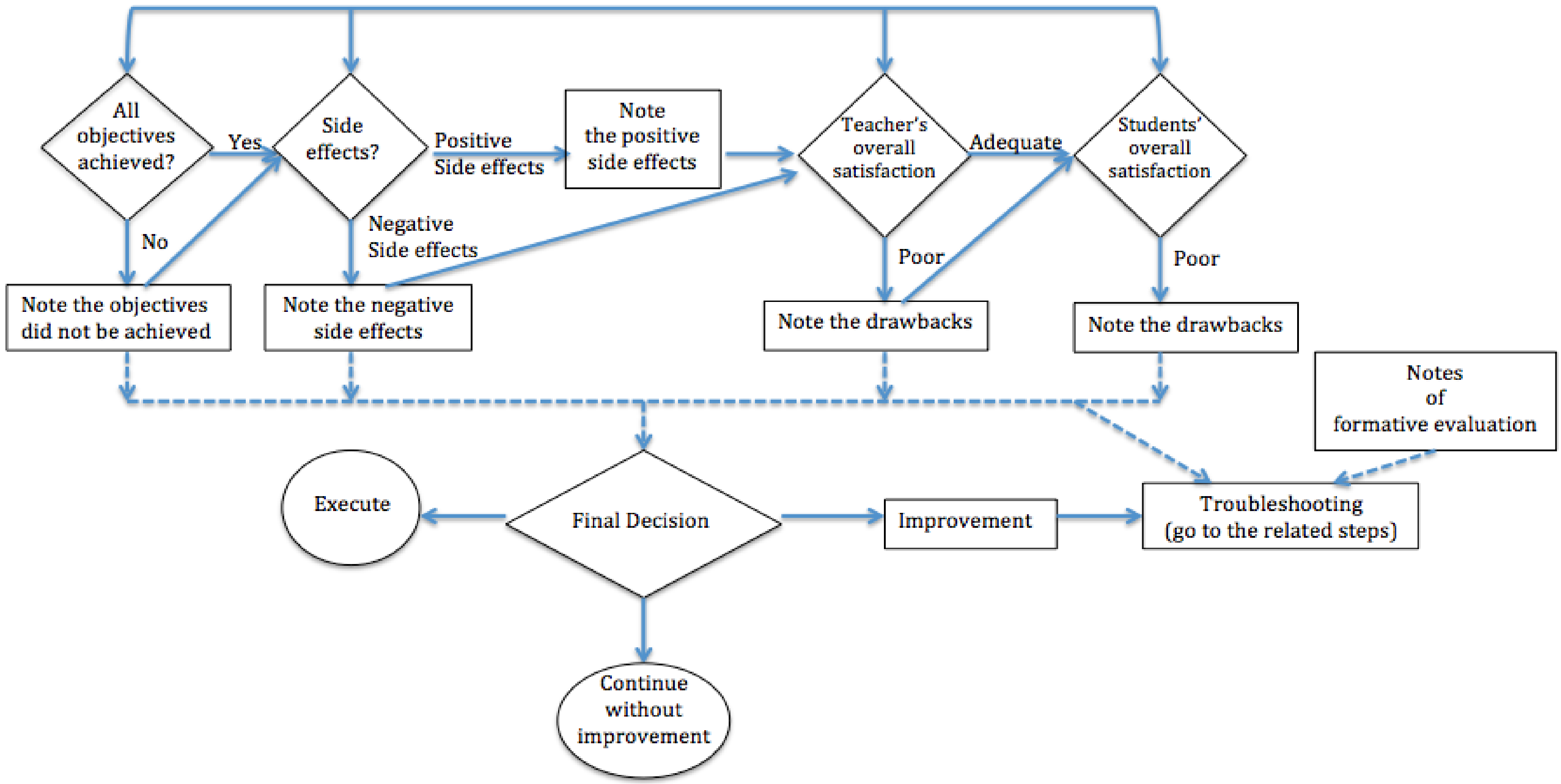

Figure 4.18 Summative Evaluation Process of Tablet PC-Used Instruction, If The Necessary Conditions Are Met

However, different then the present study, these researchers proposed to use these data sources for three kind of decision: decision about improvement, decision about effectiveness and also decision about functionality of instruction over time which was called as confirmative evaluation. This third version of evaluation, introduced originally by Misanchuck (1978), pointed out to the investigation related with the correctness, effectiveness and requirements of the course over a time. Since TPC usage had been introduced only three years ago, it can be the reason of not mentioning on over time evaluation, yet. Moreover, the formative evaluation approach revealed by the results were parallel with the approach of revision of instruction in order to improve the quality (İşman, 2011; Reiser & Dick, 1996; Smith & Ragan, 2005), considering the students' performance and teacher self-evaluation. Likewise Smith and Ragan (2005), İşman (2011) underlined going back to the related step to revise the instruction. This approach was parallel with the teachers' perception, and also experts' opinions, found out in the present study.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

In this concluding chapter, the summary of the study was presented considering the literature, methodology and empirical findings of the study, which were discussed in the previous chapters. Conclusion part was organized according to the research questions in order to reveal the connection between the different findings of the study. It was followed by the recommendations for decision makers, curriculum developers, educational software developers, people in charge in council of higher education and faculties of education, teachers and researchers for further studies.

5.1 Conclusion

This study aimed to investigate introduction of Tablet PC usage in education with FATIH project. Although project was introduced three years ago, the discussion about it and its elements had continued. As it was presented in literature review, FATIH project was consisted of different components, such as infrastructure, interactive white board, distance education and Tablet PC. This study focused on Tablet PC as a central topic of investigation without ignoring the interrelated components of the projects. Tablet PCs became visible with OTPC (One Tablet per Child) projects, after the widespread OLPC (One Laptop per Child) implementations, in last ten years in order to seek for solution of some educational problems or drawbacks (Viriyapong & Harfield, 2013).

In order to develop larger perspective and draw a comprehensive framework for the Tablet PC use, the evolution of technology in education was discussed in the literature review of the dissertation. As it was founded out that the effort of establishing link between technology and educational practice dated back to old times. This history of technology usage and the endeavor of technology integration in education was necessary to draw the theoretical and historical framework which allowed to develop a better understanding and to evaluate contemporary projects in this area. It was perceived as an important point that technology was always part of education and instruction, for varieties of reasons, which could significantly contribute to enhance teaching and learning environment, play role of the medium between teaching content and learner, facilitate the relation between teacher and students. Considering the same kind of purposes in introduction of Tablet PC usage in FATIH project, it may be interpreted as a search for betterment in education. However, in order to use Tablet PCs instructionally functional, the instructional steps in Tablet PC usage should be analyzed in detail. In this regard, it was necessary to examine the current situation of the project and to develop more systematical way of exploration of all instructional components (Akgül, 2013; ERG, 2013; Karabacak, 2012). Considering this point, Instructional Design was selected as a field to investigate the place of Tablet PC in instruction. The reason was the systematic approach proposed by instructional designers in order to explore and present the steps of instruction more clearly. It was evaluated that showing the place of Tablet PC use in instruction could be a productive starting point to develop solutions for the drawbacks in applications. Since the instruction was taken into consideration, the sample of the study consisted of teachers who supposed to be persons in charge of developing and implementation of instruction. Additionally, experts who were in the field of technology and instruction were consulted to understand the theoretical background of the implications. The preliminary results showed that the current application of Tablet PC usage introduced by Tablet PC was different than the expected and desired situation. In this regard, research was focused on two different aspects; first aim became to reveal the current instructional process in classroom, which showed effort to use TPC, and second aim was to investigate the desired and expected instructional design steps, discussed by teachers and experts, in order to use Tablet PC functionally and efficiently. However, in order to reveal the instructional process of Tablet PC use in classroom, as it was pointed out in the literature, teachers' expectations, which shaped their perception toward technology, use, the advantages, disadvantages and necessary conditions to be established were discussed, in the light of the research questions presented in the previous chapter.

In order to answer these research questions, grounded theory was selected as a methodology. Grounded theory method offers flexible guidelines, which includes general principles and heuristic tools more than prescribed rules, for collecting and analyzing qualitative data to construct theories from the data gathered (Charmaz, 2006). Considering the interview process and relating the interview results to each other through different analysis, it was important that grounded theory provided detailed, rigorous and systematic methods of analysis, which can create freedom to explore the research and allow issues to emerge (Bryant, 2002; Strauss, 1987). As it was explained in methodology section, first, preliminary interviews were conducted in order to find out the core categories of the research through utilizing open coding; then, the rest of the interviews were conducted by establishing comparisons between the categories defined by using axial coding. Finally, though selective coding, instructional design models were drawn in order to present the overall theory constructed (see Figure 3.1, for the flow of the research). The steps of the Tablet PC used instruction were presented in the results, Chapter IV. However, in this chapter, the models related with the current situation and desired case was presented as a full model. Initially, model 1, which presented the current situation was discussed, latter, model 2, which built on according to the expected and desired condition teachers and experts mentioned in order to have a functional usage of TPC in teaching and learning process. Before introducing the model, findings related with the expectations from Tablet PC, advantages and disadvantages of introduction of Tablet PC usage in education, and also the necessary conditions to be met in order to increase the advantageous sides of the device for teaching and learning were summarized.

5.1.1 Expectations from Tablet PC usage in education. In the present study, teachers' expectations from Tablet PC were investigated considering to what extent FATIH project met these expectations and also to explore up to what degree Tablet PCs were able to cover these expectations. It was necessary to define the expectations of teachers because from the expressed expectations it was possible to infer how teachers actually understand the features, possibilities, and limitations of the technology in question. Actually, their answers revealed up to what extent they were following the predominant educational discourse about Tablet PC and Tablet PC use in their instruction. Additionally, it should be highlighted that mainly their expectations mainly determined their approach toward instructional design, planning of TPC-used instruction and finally their evaluation of the quality of instruction. As Rudnitsky and Posner (2006) stated that designing and developing the instruction for the course was affected by teachers' attitude. In this regard, to understand teachers' decisions about instruction, it thought important to reveal their expectations from Tablet PC. It was founded out that these expectations were influential in both teachers' current planning of their instruction with using TPC and their opinions on better instruction with Tablet PC through meeting with the necessary conditions.

Results showed that teachers' expectation were similar to the experts' opinion about what could be expected from Tablet PC usage into the classroom. Related with the overall schooling, teachers expressed that Tablet PC could be a solution for heavy school bags and for the wastage of paper-material, and also they perceived TPC as a step for introduction with the technology in school environment. These expectations were similar to the experts' opinions and also literature (Berque, 2006; Çiftçi, Taşkaya, & Alemdar, 2013; Dursun et al., 2013; Güllüpınar et al., 2013; Singer, 2006). Additionally teachers mentioned about their expectations on instructional level as interaction and access to the information, and also enriching teaching and learning environment through the e-content, multimedia and interactive materials. Experts in the study agreed on these instructional expectations of interaction, access and support teaching and learning. The literature on enhancement of instruction through Tablet PC was parallel with the results of data analysis. Actually, when the literature reviewed it was founded that wider expectations on technology was invested, but most of them was criticized by the skeptics in the field. Considering this fact, it could be said that teachers' expectations were realistic enough in order to meet them through establishing some conditions. Only the expectation of increase on students' motivation could be discussed. Although literature pointed out the high level of motivation resulted with technology integration (Dursun et al., 2013; Güllüpınar et al., 2013; Kuzu et al., 2013; Mills, 2012; Price & Simon, 2009), skeptics and the experts in the study stated temporary effect of new technological device in students' motivation (Chen & McGrath, 2003; Cuban, 2001; Newby et al., 2006). Although literature pointed out wide range of expectations invested on technology, like making school change agent, maintain of economic competitiveness, or fundamental change in classroom practice (Brown, 2007; Desimone, 2002; "FATIH project," 2012; Firestone & Corbett, 1988; Newby et al., 2006), the results of the study showed that teachers did not constructed such expectations. The reason can be explained that teacher perceived the instructional effects of Tablet PC rather than the wider picture related with technology use. Additionally, it can be said that after 3 years of experience with Tablet PCs, they interpreted clearly what they could do with this device and what they could not. Thus expectations were shaped by their experiences and they came up with the disadvantages and advantages of TPC use in their teaching and learning processes. These aspects were discussed with the necessary condition to be met in the following title.

5.1.2 Advantages, disadvantages of Tablet PC usage and conditions to be met. After presenting of expectations, advantages and disadvantages of introduction of Tablet PC usage in education, experienced by teachers and predicted by experts were questioned in order to explore the effect of Tablet PC in the instruction. This probe of negative and positive effects of Tablet PC in classroom environment introduced another issue to investigate during the research. That was the necessary conditions to be met in order to use Tablet PC more advantageously and decrease the disadvantages in practice. This new issue was revealed because teachers explained both current situations, where there were some obstacles and drawbacks in front of more functional usage of TPC, and the desired circumstances in which better implementation would be possible through satisfying some conditions, which was named as “necessary conditions” in present study. The findings showed that these conditions were necessary to be met in order to benefit from the features of this technological device. Teachers repeatedly emphasized that in the case of ignoring some important prerequisites for effective TPC usage in classroom and also for developing responsible attitude toward technology use, it was not possible drawing full advantage from any effort in technology integration. It was expressed that the perceived advantages turned into disadvantages by not establishing a well-functioning system through meeting with the necessary conditions.

The findings of the study revealed that the advantages of the TPC could became disadvantage in the classroom practice, when some circumstances had not been met. Teachers and experts emphasized five main categories as both advantage and disadvantage: technology equity versus persistence of inequity, positive and negative effects of access and display, advantages and disadvantages of multimedia, cost benefit versus, wastage, and plusses and minuses of interaction provided by Tablet PC (for schematic representation see Figure 4.1 and 4.2). Findings showed that Tablet PC was an opportunity for technology equity providing free TPC for everyone, free Internet in the school and allowing students, especially from lower socio-economic level, introduce with the technology. On the other hand, the system of FATIH project was stated as an obstacle in front of the equity and actually reinforcing the inequity between different groups of society. The project, which provided the same conditions for every student did not equalize students. For instance, distributing free TPC for everyone, without inspecting students’ economical level, not offering 3G or Internet for the TPCs out of school environment, and lack of sanction for misuse were expressed as disadvantage which were only strengthening the inequity between students. In this regard, the findings of the study pointed out some conditions, which could support TPC usage in teaching and learning environment. First, standard TPCs, all of which have same properties technically, should be distributed to the students with a condition. Rather than providing free TPCs for every student, it founded necessary to inspect the economical statue of students’ families and to define a cost to be covered by the families, considering their economic potential. Free 3G should be precondition for

TPCs in order to make students to get benefit from the device regardless of time and space. That should be supported by a good students education, which is necessary to raise students who can be responsible and who can be a good person and good citizen. Unlike this romantic attitude drawn by some teachers, others stated different kind of sanction or punishment to prevent misuse.

The second advantage of TPC was expressed as providing access and display, which was also emphasized as disadvantage in some respect. Students' access and display of large amount of information instantly and easily was stated as advantageous side of having TPC in classroom environment that supported the instructional process. However, because of the shortcoming of FATIH project, this easy access and display feature of TPC created some disadvantages in classroom environment. Low precautions related with the Internet security and lack of interaction between teacher's device and students' devices allowed students to access any kind of content easily and prevent teacher to control this inconveniency during the instruction. Additionally, inaccessibility of educational materials, which required subscription or premium membership, and some technical problems caused to block the access and display of information were creating problem for teachers in their teaching and learning environment. In order to decrease these disadvantages and increase the advantageous aspect of Tablet PC related with access and display, five different conditions were suggested by the participants. First one was different content filtering regarding the age of pupils, which forbid students to reach the inappropriate content. Second was establishing interaction between students' TPCs and teacher's devices in order to give the control to the teacher. Additionally, proper technology education for teachers and students was recommended to use TPCs more advantageously. In order to arrange these trainings and also to bring solutions for the technical problems, having full time technology leaders in schools was proposed as a condition.

The third advantage was different multimedia forms of animation, video, sound, text, graphic and image, which were accessed easily by using Tablet PC to support instruction. However, again, because of lack of some preconditions, the findings pointed out some disadvantages related with multimedia support. First of all, insufficient e-content, provided by ministry, directed teachers to search on the Internet to find relevant material in order to strengthen the instruction. However availability of e-content in English on Internet and teachers' incompetency in English language resulted with not being able to use multimedia elements, although it was expressed as advantage to enrich teaching and learning environment. Additionally availability of animations, video or text on Internet created an ignorant attitude toward lecturing which was perceived as a threat for teaching. Some teachers who built their instruction only on multimedia materials and students, who trusted these materials more than teachers' lecture, developed an attitude, which was underestimating lecturing and other teaching techniques. Likewise, verification of different form of information obtained on the Internet revealed as threat for the teaching and learning. Because students were not aware of how accurate was the information they accessed, and also teachers were not conscious enough to direct students to the correct sources or to teach them appropriate attitude toward Internet-sources. In this regard, teacher and student technology education appeared as necessary conditions to develop correct perspective toward accessing the information. Additionally, results indicated that EBA website should contain sufficient multimedia material which can answer teachers' instructional needs. Moreover, for more specific needs of teachers or schools, a budget can be reserved for membership of chosen educational websites, or purchasing some materials or software. Thus, establishing these conditions was presented as the way to use multimedia more effectively for the instruction.

The fourth advantage founded out in the study was cost-beneficence in the project, which also resulted with the wastage because of the misuse and drawbacks. The advantage of the TPC in the classroom had the power of providing cost-effective applications through reducing the paper-material usage. Even in the current system, where Tablet PCs were not into use, teachers stated that they got benefit of its access and display feature. As mentioned above, that helped to distribute less photocopied materials. Also, providing some materials, software or Internet side for educational purposes for a majority cost less than personal access. However, not being able to use TPCs effectively in instruction and students' careless attitude and their misuse showed the wastage in TPC distribution. Consequently, supporting student education both in technology and in general, providing teacher education to training them how to use TPCs effectively and also making a proper educational planning where the place of TPC in instruction was obvious founded out as necessary condition to be met in order to get benefit from the relation between technology and education.

The final and most quoted advantage of TPCs was stated as interaction. Tablet PC eases to access and establish interactive platform both for instructional environment and for daily life. The possibility of forming interactive environment with a mobile device provided opportunity to enlarge teaching and learning environment behind the border of classroom and school. The advantages of interaction lied behind three different aspects, interactivity with e-content, with people and software. All three can support teaching and learning environment and enhance instruction, only if some conditions had been met. In current application, teachers indicated that the shortcomings of the project created the inconvenient results for the classroom environment. First of all teachers explained the lack of interaction between the devices of students' TPC and IWBs and their devices. That resulted with the uncontrolled teaching and learning environment, because teachers complained distractive effect of being involved in an interaction all the time, including classroom time. So, teachers stated the need of warning them al the time during the instruction. Additionally, cyber bullying and the fights going on the social media was indicated as another disadvantage of the interactivity supported by the Tablet PCs in school environment. Related with these problems, findings pointed out some conditions like establishing proper interaction between teachers and students' devices in order to provide a control during the instruction. For other problems, teachers were mentioning about the increasing the quality of education and also teaching students their rights and responsibilities in virtual world.

The findings about the advantages and disadvantages of Tablet PC in schooling and in instruction were parallel with the literature. The studies both done in abroad and in Turkey, related with FATIH project, pointed out similar effects of Tablet PC. The first probe, equity and inequity, was highlighted by Cuban (2001) as a sensitive point to consider if a reform movement had been planned. As Akgül (2012) stated rather than providing only Tablet PC for each child, a careful design, development and evaluation of the project was necessary to benefit from the technology. In this regard, the conditions of free Internet, betterment in student education, and teacher education was also highlighted as conditions for getting advantage from the Tablet PC use (Akgül, 2012; FATIH projesi akademisyenler çalıştayı, 2012; Gükrer, 2012; Yılmaz & Çağatay, 2013). The second probe, access and display, was mostly discussed topic on the literature related with the Tablet PC. Related with TPC use, the advantages were listed as reaching information easily, enriching teaching and learning environment through e-content (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Dursun et al., 2013; Güllüpınar et al., 2013; Pamuk et al., 2013) and disadvantages were; lack of technical support and expert for technical problems during the lecture (Çiftçi et al., 2013; Dursun et al., 2013; Pamuk et al., 2013); technical problems of tablets (Çiftçi et al., 2013; Gürol, Donmuş, & Arslan, 2012). The third probe, the effect of multimedia, was emphasized in the studies as an opportunity to evolve educational standards through technology (Collins & Halverson, 2009; Cuban, 2001, McCabe, 1998; Kalogiannakis, 2008). Additionally, the disadvantages of insufficient e-content and language barrier were discussed in previous studies (Bilici, 2011; Dursun et al, 2013; Kuzu et al., 2013; Pamuk et al., 2013). The fourth probe, cost-beneficence or wastage, was not popular discussion related with the Tablet PC in Turkish literature. Although, there was an emphasis on paperless environment and saving tress in foreign literature (Hutsko, 2009; Thinkstock, 2013; Wacom, 2009), in Turkish literature, saving paper with Tablets in education was not a widespread topic of study mentioned only in few studies; as saving paper for green (Okan Üniversitesi, 2012) and on media to save environment through digital devices in education (Ayan, 2012; Coşkun, 2014). However, unlike the results of this study, the conditions appropriate to reduce the cost were not discussed in the literature separately. Only teacher education was mentioned as a pre-condition of using effectively and functionally (Akbaşlı et al., 2012; Cengiz, & Coskunoglu, 2013; Çiftçi et al., 2013; Gürol et al., 2012; Kayaduman, Sırakaya, Seferoğlu, 2011). The results of fifth probe, interaction, were parallel with the literature considering the positive effect of interaction on students that established by the feature of the mobile technologies (ASIJ, 2012; Collins & Halverson, 2009; Eason, 2011; Moore & Dicken, 2006; Sneller, 2007; Mulholland, 2011; Smart Education in Korea, 2011). However, since the interaction did not been established yet in FATIH project, most studies focused on this limitation and they did not emphasized the informal interaction set by students or teacher's personal effort (Okan Üniversitesi, 2012, Dursun et al., 2013; Kuzu et al., 2013). They proposed the importance of interaction to be established between the devices as it was indicated in the present study.

Consequently, as it was seen from the previous studies, the advantages and disadvantages of Tablet PC in teaching and learning were repeatedly studied in order to understand the effect of TPC in education. However, the conditions, which had to be met in order to functional use of TPC in classroom, were not appeared as a topic, which investigated systematically. Especially, it was observed that apart from the academicians' workshops and some critics on the project, the studies on FATIH project were mainly discussing the results of the current application without emphasizing the necessary conditions. However, for this study, the instructional steps of current situation and desired case were studied. It founded important in order to make suggestions related with more functional use of Tablet PCs teaching and learning environment.

5.1.3 MODEL 1: The prevailing instructional design model for TPC usage. In this first model, the prevailing instructional design steps of Tablet PC usage was summarized considering the current situation established in pilot study of FATIH project. In order to draw a comprehensive framework for reader to understand the steps of instruction, present conditions of the FATIH project and TPC usage were reviewed briefly. After that the instructional design model, which schematized the prevailing process of instruction, was discussed.

FATIH project, for which pilot studies had been started in 2011-2012 second semester, had finished third year. In pilot schools, infrastructure and electrical systems were settled down, apart from some expections, because of the economical problem in company who was responsible for infrastructure works (Mert, 2014;

TeknolojiGündem, 2014). The classrooms of the schools were equipped with IWB, and normal white board was kept. Pilot schools had smart document camera and multifunctional printer for the use of teachers. All teachers and students in 9th degree had Tablet PCs; in three different brands belong to different companies Samsung, Vestel, and LG. In Tablet PCs, there are activation codes in order to reach server to use EBA market and limited Internet. These codes are also used to make the devices confidential for each student and teacher. The connection between IWBs and Tablet PCs had not been established. In addition to the hardware, basic software to take note, browse on Internet and open e-books and z-books were activated in TPCs for the use of students. Also, EBA market was introduced for the educational use in order to reach books and other multimedia materials, which are quite limited according to the findings of the study. Moreover, teachers in pilot schools attended to in-service trainings for 30 hours in order to learn how to use IWBs and TPCs for their instruction. However, both results of the study and literature pointed out the insufficiency of these trainings in order to adapt technology into the instruction teachers (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Cengiz, & Coskunoglu, 2013; Çiftçi, Taşkaya, & Alemdar, 2013; Gürol, Donmuş, & Arslan, 2012; Kayaduman, Sırakaya, & Seferoğlu, 2011). Finally, curriculum and teacher's guide books did not been reviewed considering the technology use in classroom. Educational programs have not been included the information about how to use IWBs and TPCs in specific lessons as media to facilitate the instruction (ERG, 2013). Thus, IWBs and TPCs usage depends on teacher's intrinsic motivation and her personal effort.

In the current situation of FATIH project, presented above, it was founded out that Tablet PC use in the classroom depended on teacher's expectations, advantages and disadvantages they lived through throughout three years. In this study, among seventeen teachers, only ten of them indicated their preference to use TPC as a medium to facilitate teaching and learning environment. Only three of teacher among ten stated their effort to find available software or application to bring into the classroom. Other seven teachers' implementation was limited with the multimedia and z-books. On the other hand, seven teachers expressed that they ignored the presence of TPC during their lesson. Even three of them forbade students to turn on their devices during their classes emphasizing the distractive effect of TPCs. Considering these results, instructional design steps of current situation of TPC usage in a pilot study of FATIH was presented in Figure 5.1. Here, it was see the instructional process, in which teachers decided to support their class with TPC use.

As it was seen from the Figure 5.1, teachers' starting point to decide about their instruction is curriculum. Since the content to be taught is specified in curriculum, teachers' decision-making process had been started by choosing their teaching methodology or media, if they did not want to follow the lecture planned in curriculum. Thus, at the beginning of the planning, by selecting TPC as a medium, TPC-used instructional design had started. Otherwise teachers had been planning their instructional without TPC, about which the details were not presented. After selection of TPC, the next decision was about the degree of usage. Teachers, who were using TPC only for reaching some documents on EBA or Internet, the degree of usage was called as "limited," for others, who were providing software or application suitable to facilitate their lecture, the degree of usage was named as "active." For limited usage, the following decision was whether the materials, i.e. books, videos, animations, texts, on EBA website was satisfying or not. If it founded as satisfying, teachers were included these multimedia documents or z-books into their lesson plan, if supplements on EBA was not founded enough, teachers searched on Internet for suitable resources. On the other hand, for more active usage, three teachers explained their decision on software and mobile application. Since it was not provided any kind of software for educational purposes in the scope of FATIH project yet, teachers mentioned about their effort to find suitable software for TPCs in order to support positively the teaching and learning environment. However, in this step, the main concern was expressed the expense of software on Internet. Two teachers among three active TPC users stated their preference as selecting free application, while one of them was clarifying the budget analysis she conducted to provide software for her students. If the software was defined as not affordable, then teacher the search for new software had been started. However, in the case where software was affordable or free, he instruction proceeded by decision about whether software and hardware were compatible. If the TPCs provided in FATIH project were not suitable for the selected program, software selection had been stated over again, but if the devices were suitable, then teachers analyzed whether learners' skill and knowledge were qualified too use this software or not. When teachers decided that learners' pre-existing knowledge was enough or they could be supported with a short training, then, teachers continued with the planning of their TPC-utilized lecture. In current situation, it was also revealed that teachers expressed their confidence on developing their own power point presentations for their classes. Especially, when the readymade materials were not satisfying, teachers stated their decision of preparing their own presentation. In the following phase, materials regardless of readymade or developed were integrated to the plan proposed in curriculum, through following questions of "how to use all these materials? In which part of the lecture should I introduce and use these materials and to what extent should I use them to facilitate my lecture?" After scanning and screening the materials with the help of these questions, teachers began to develop their instruction considering the other non-digital materials and also teaching learning techniques. For the technology integrated lectures, teachers emphasized the necessity of developing a back up plan for the case of possible technical problems, which could be occur during the implementation. For instance, teachers exemplified the technical problems as electricity cut, Internet cut, problems related with TPC or IWB, which resulted with not to be able to use devices. After designing and developing the instruction, the implementation of TPC used instruction started. Unlike the teachers who forbade using TPC during the classroom, students were allowed to keep their devices turned on during the class for active usage of TPC. However, when TPCs were turned teachers stated the same point of complaint, which was students' misuse of TPCs. That included students' engagement with TPCs any reason, which were not parallel with teachers' purposes and planning. This issue was important for instruction because teachers expressed their solution of confiscate students' Tablet PC if warning had not functioned. Teachers stated that they were not returning back TPCs, although students could not continue to follow TPC-used lecture, without their devices on their desks. While dealing with misuse problem, teachers conducted their planned instruction. In addition to the planned part of TPC use, there was also unplanned use of TPC, which covered students use of TPC for educational purposes, such as to access Internet to search for class related issues, and to use e-books and also to take notes. This unplanned usage was supported by teachers in order to help students to connect link between TPC and education. Notwithstanding, teachers focused on the planned side of their instruction, which could be interrupted with some technical problems. The results of the study showed that these problems created a big frustration in teachers that affected their decision to use TPC in their instruction. When such complications had occurred, teachers were asking help from students, other teachers and formators. However, they stated that generally it was not possible to find immediate solution for such technical problems and in order not to spend whole class hour to resolve the issue, they generally skipped the TPC usage and continue with their backup plan. For the case, which was named as "miracle" for teachers, when the solution was possible, teachers implemented their planned instruction. At the end of the instruction, teachers conducted their assessment to evaluate both their students and their instruction. They stated that both students and their satisfaction were important to give the final decision about the TPC use instruction. The frustration teachers lived through because of technical problems, students' achievement in exams and their engagement during the instruction, and also teachers' personal observations and opinions were the important indicators to give the final decision. Considering these aspects, teachers judged whether the instruction was unsatisfying, less satisfying or satisfying. The verdict of "unsatisfying" was resulted with terminating the instruction, and generally not even attempting again to use TPC (see Figure 4. 10, in previous chapter). The result of the evaluation named as "satisfying" was followed by the decision of repeating the same instruction. Lastly, the instruction defined as "less satisfying" was followed by the step of improving the instruction. In order to improve the instruction teachers indicated that they returned back and checked only the planning part of the instruction. They questioned the degree and place of TPC usage during their lecture. Actually, the back up plan designed in the same phase was also as a result of the improvement of previous instructions.

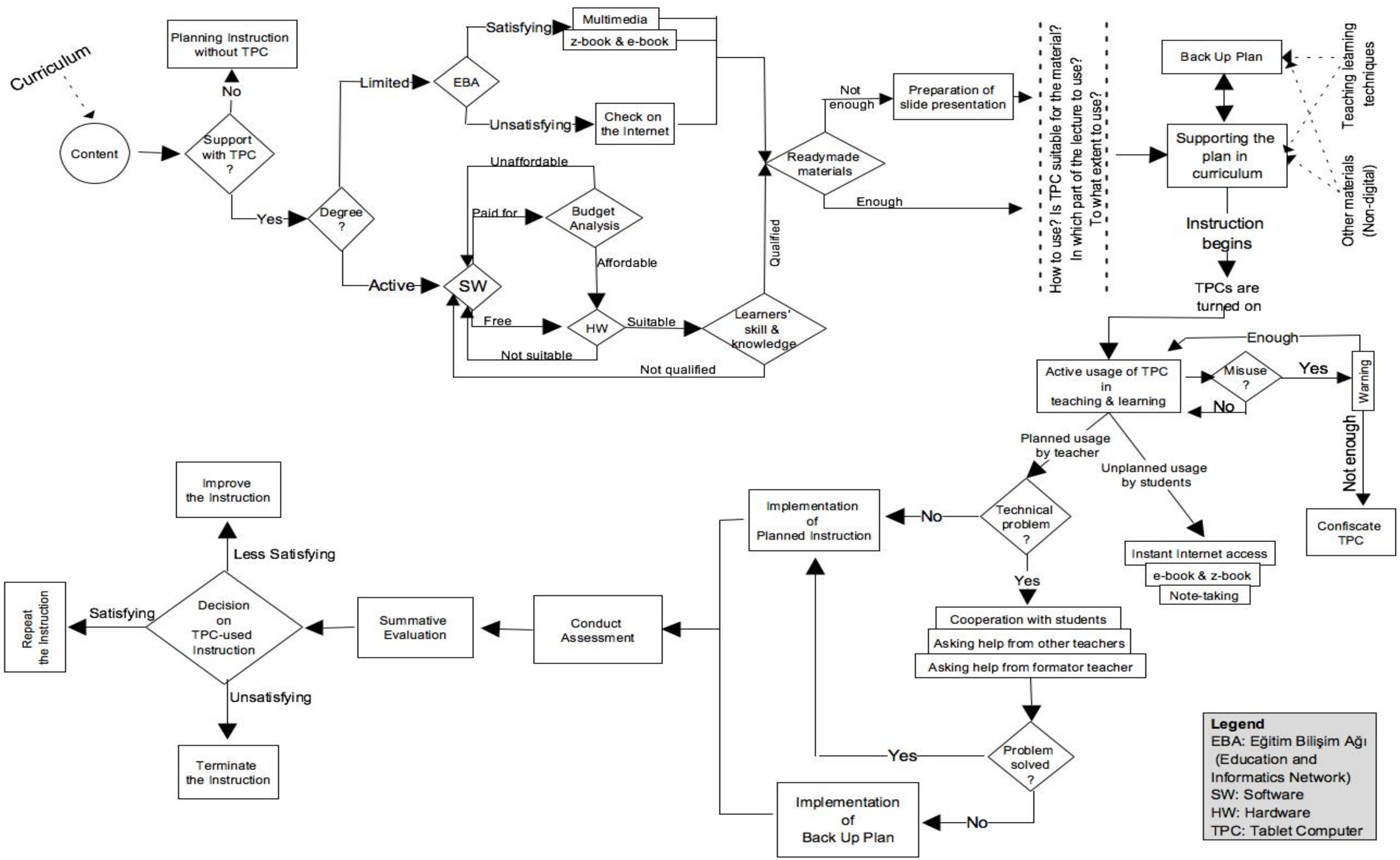

Figure 5.1 The Prevailing Instructional Design Model for TPC Usage

5.1.4 MODEL 2: The optimal instructional design model for TPC usage. In this second model, the optimal instructional design process, which pointed out the usage of TPC instructionally functional and actively was presented. On the basis of data analysis of the research, and literature reviewed related with the instructional design processes and also studies conducted on FATIH project and educational system, this model was proposed as one of the optimal model to gain as much benefit as possible in order to answer the needs of education and to achieve goals of FATIH project. It had to be underlined that this model was suggested considering the necessary conditions, which were discussed by the participants of the study and approved by the literature. In the light of the findings, the model, shown in Figure 5.2, was constructed as one of the possible model to direct teachers and decision makers for more functional use of Tablet PC in education. Before explaining the model, it found essential to summarize the necessary conditions discussed throughout the study.

In order to get benefit from the existence of Tablet PCs in the classroom and to use this smart machine as advantageously as possible for the instruction, teachers and experts pointed out the following conditions to be met,

1. Revision of curriculum: The results indicated to revise the curriculum considering the goals of the education and philosophy behind education. The condition, mostly highlighted by the participants of the study, was the quality problem in raising individuals, which fostered the problems in Tablet PC usage. Additionally, data analysis indicated the lack of presence of TPC in curriculum as a part of educational technology. It was expected that curriculum would put more emphasis on TPC and inform teachers how this technology could be productively used in instructional design processes. Moreover, in contemporary program, some teachers expectation on having objective-based curriculum, which was supported by experts was chosen as a condition to give more responsibility on teachers.

2. Teachers and Student Technology Education: Proper technology education provided both for teachers and students was revealed as a necessary conditions to be

met in order to use Tablet PCs efficiently in teaching and learning environment. However, in planning these trainings, rather than some in-service training for teachers who had to travel another place to attain, teachers appreciated the efforts done in their own workplace. Likewise, for students, more systematic trainings on the features of device and software were required. In this regard, technology leadership system was offered as a condition.

3. Technology Leaders in Schools: The findings of the study showed the need of full-time field expert technology leaders, who could support teachers and students' technology education and who could help teachers in designing their TPC supported instruction and also in resolving the technology based problems in schools. An employee playing the role of the technology counselor was revealed as a condition to enable the TPC used instructional design model to operate as efficiently as possible.

4. Sufficient E-content on EBA: In order to use TPC in instruction, one of the main conditions was sufficient free e-content provided by ministry of education or board of the education suitable for the curricular goals. Diversity in e-content, which is appropriate for TPC, would ease the teachers' decision on TPC use. Also, proving free and qualified software and application for educational purposes would encourage teachers who preferred to use TPC in their instruction.

5. Budget for School and Software Developer Team: In the case of absence of appropriate educational software, which could be used in TPCs, two conditions were discussed: first, a technology budget allocated for schools to give decision to purchase some software, and second, a software developer team working under ministry, which could evaluate the requests and offers coming from schools and develop some software which could answer the needs.

6. Revision of Tablet PCs: Conditional distribution of standardized TPCs with 3G and appropriate software were presented as conditions to follow the optimal instructional design model, proposed in this study. Rather than distributing free TPCs for every student, an economical planning was appeared as a condition in order to

make students to take the responsibility of their own devices and to decrease the misuse. Furthermore, distribution of TPCs equipped with common hardware and suitable instructional software and also with 3G was necessary condition to support TPCs usage both in and out of the classroom. Considering these conditions, an optimal instructional design model for TPC usage in education was proposed, as presented in Figures 5.2, 5.2.1, 5.2.2, 5.2.3 and 5.3.

The starting point of the instructional design model was determined as objectives rather than the content, unlike it was indicated in previous model. In definition of objectives, curriculum and needs of the learners were two main sources to consult. However, as it was discussed under conditions, in the instruction, a revision of curriculum considering the goals and philosophy was suggested. Additionally, it was expected that curriculum would put emphasis on TPC and inform teachers how this technology could be productively used in instructional design processes. After selecting objectives for the instruction, design process continued by decision about whether to use TPC as a medium for teaching and learning or not. In the case of not using TPC, the instructional planning without TPC was done which was not explained in detail, since such design was not in the scope of the study. Considering this, the model was expanded on selection of TPC use for the instruction. This was followed with another decision of in what extent to use TPC for teaching and learning. In this point, two possible ways were proposed. First, a limited way that was restricted with using TPC only to reach and display some video, audio, text or graphical material or animation. Here, the first source to consult was appeared as EBA (or any other side provided by ministry of education and board of education). If the materials provided on EBA were satisfying, teachers could select any multimedia material or e-book to enrich their teaching and learning. However, if EBA website was not founded as sufficient, teacher go and check the sources on Internet in order to find the necessary documents and materials.

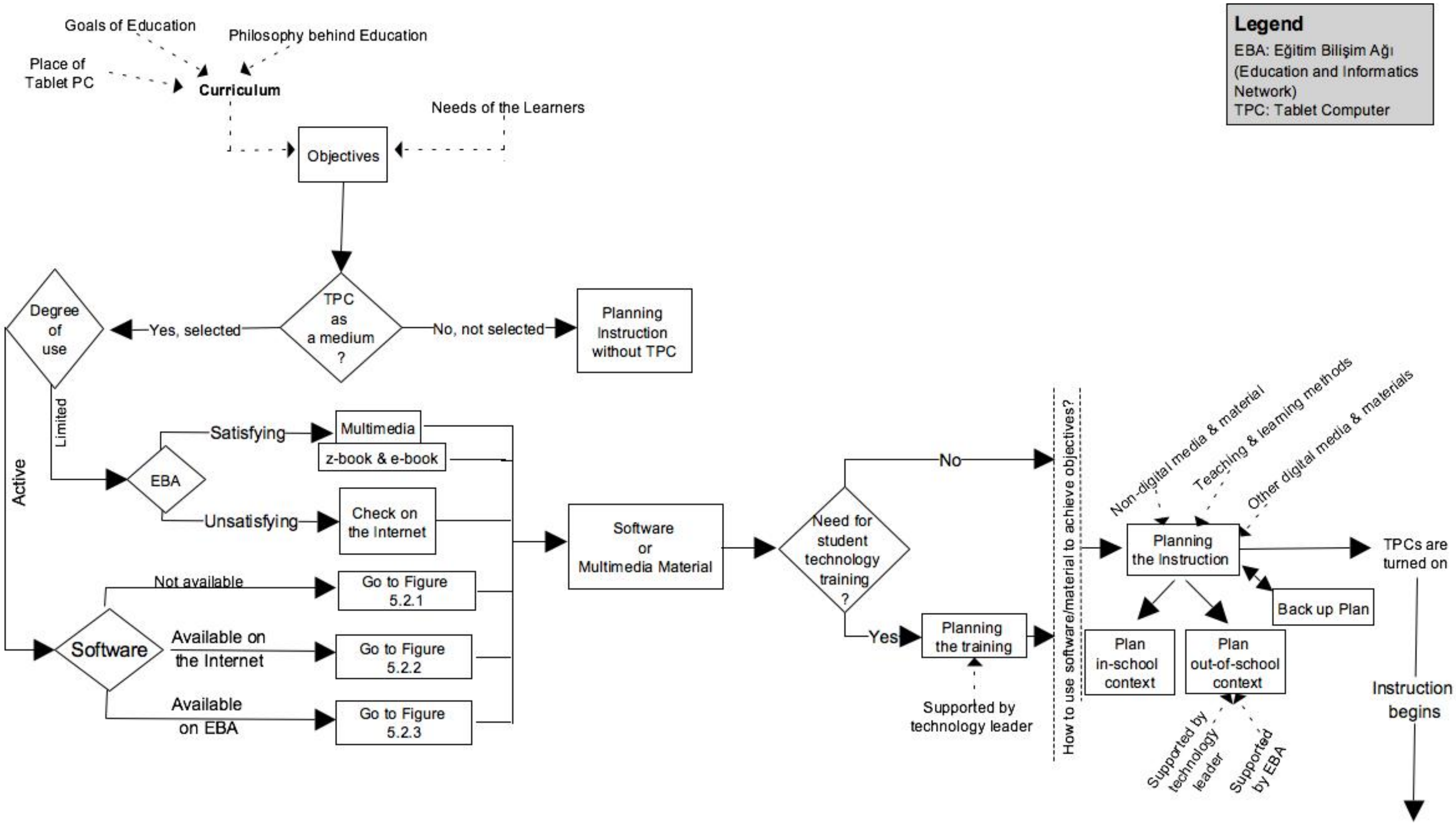

Figure 5.2 The Optimal Instructional Design Model for TPC Usage in Education: Part 1: From Analysis to Design and Development

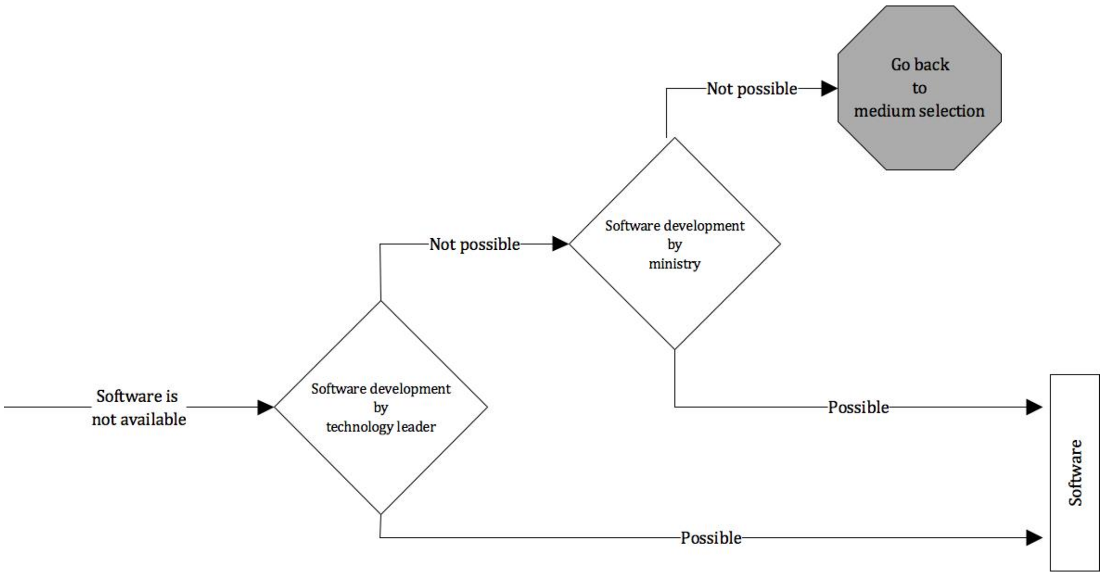

Figure 5.2.1 Analysis Steps for Case 1: Readymade Software Is Not Available

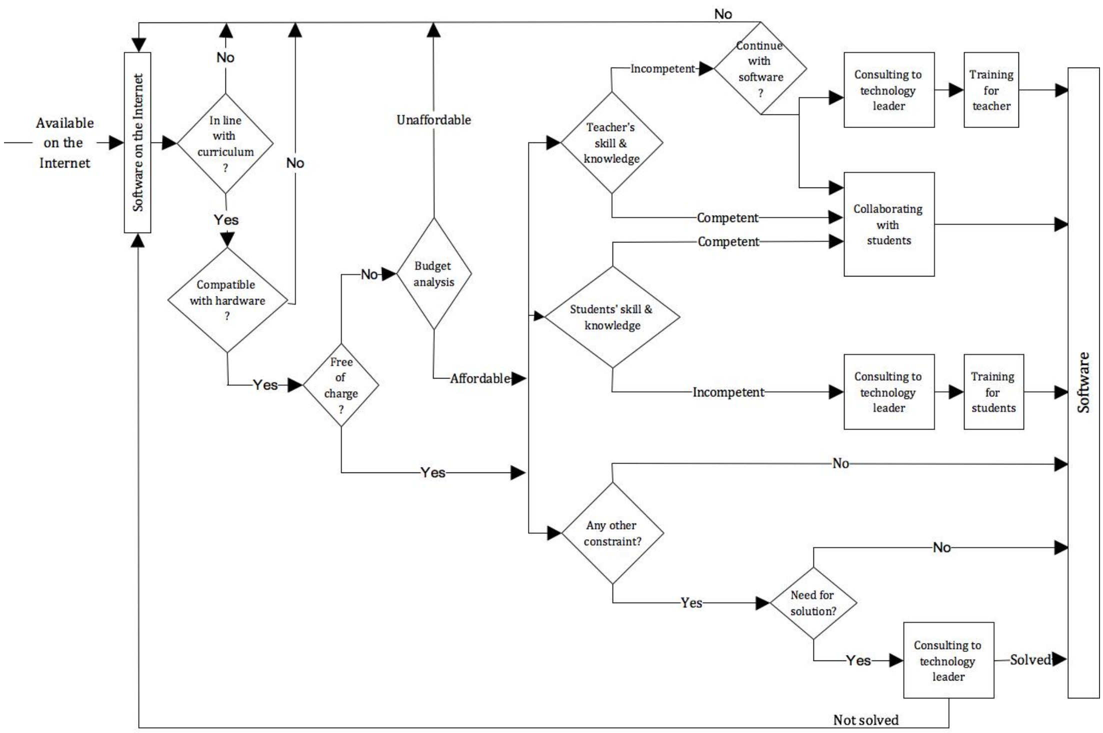

Figure 5.2.2 Analysis Steps for Case 2: Using Software on the Internet

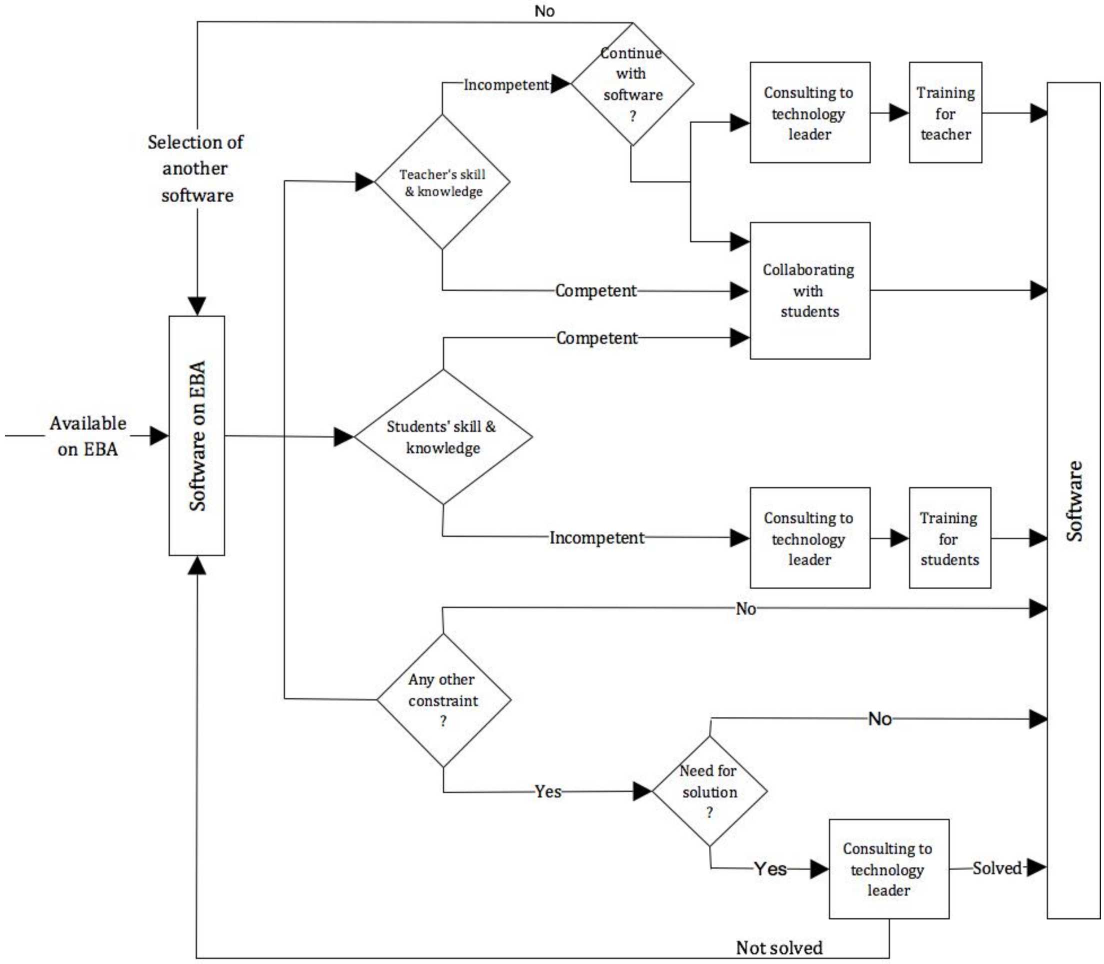

Figure 5.2.3 Analysis Steps for Case 3: Using Software Available on EBA

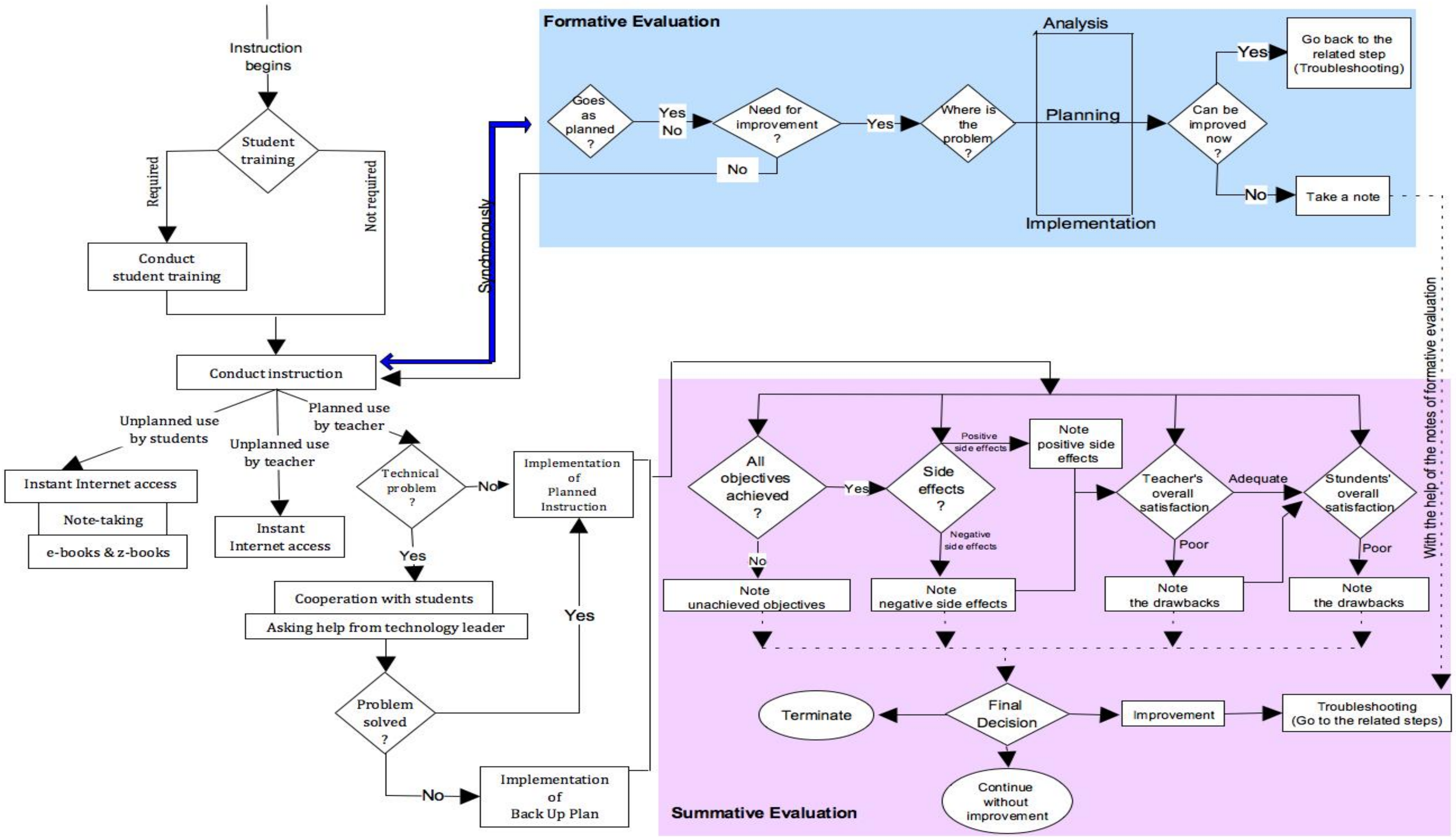

Figure 5.3 The Optimal Instructional Design Model for TPC Usage: Part 2: From Implementation to Evaluation

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The second way to use TPC in classroom was defined as more active usage, which comprised software usage, rather than only using some audio-visual materials. In selecting software, three different paths were detected according to the availability of program. The first path was followed when there was available software neither on EBA nor on Internet (see Figure 5.2.1). In this situation, technology leader was proposed as a person to consult in order to develop that software if it was possible. If not, the role of technology leader was defined to inform ministry or a specialized group working under ministry the need of such software and tries to supply software for teacher. However, in the event of negative return from ministry, the model was directed teacher to go back to medium selection and to decide over again possible media. The second path was followed when there was software available on Internet (see Figure 5.2.2). Rather than using available program on EBA, was explained as third path, for software adapted from Internet required some necessary analysis like whether software was in line with curriculum or not, whether it was compatible with the TPC's and existing hardware, and also whether it was free of charge or not. If all three analyses returned back with a positive answer than teachers continued with the other analysis. However, the adverse outcomes directed designer to go back and check for the new software. The software, which was not free on Internet, the model suggested to conduct budget analysis with technology leader to find out whether it was affordable with the budget of the school and also whether it was worth to spend money on. These investigates were proceeded with the analyses of competency of teacher's and students' skill and knowledge to use software, and also possible constraints related with the usage of software. In the case of incompetency of teacher and students to use the program, technology leader was consulted to arrange trainings and solutions. Here, the competency of both teacher and students could direct teacher to establish collaboration with students and to decide together on the usage of software. The third path, which was the first path to check in the implementation, was revealed as reaching software on EBA (see Figure 5.2.3). Since the materials on EBA needed to be prepared and analyzed according to the curricular goals, teachers would skip lots of steps in analysis, as they mentioned in second path. Here, teachers were expected to examine their own skills and knowledge to be able to use the software and also students' competencies. Additionally, the possible constraints were founded out as a step to decide during the analysis. Again, the negative outcomes were resulted with going on checking back the site, while the positive answers directed toward defining and fixing the software. Thus, for the teachers who would like to use software or application in TPC, they would consult three sources. First one was EBA, then Internet and then, technology leader and as a final step to the ministry program development group.

After detecting the material or software to use with TPC in analysis phase, according to the results of the analysis on students' competencies, here in development stage, the first plan to develop was discussed as the technology-training plan for students. Then the planning of the instruction was conducted regarding the objectives of the program. Through screening the software with the question of how to use software/material to achieve objectives, both in-school context and out-of school context was built. In addition to the selected material or software, other non-digital or digital media or materials, and teaching and learning methods also supported the design process. While planning the technology used instruction, the necessity of developing a back up plan, which would use in the case of experiencing technical problems, was highlighted. After finalizing the design and development, instruction was started by allowing students keep their TPCs turned on.

Implementation stage was started with student training if it was required (see Figure 5.3). Then the designed and developed instruction was conducted. Here, parallel with the planned use of TPC, unplanned use of students for immediate access to information, and e-books or for taking note on TPC was revealed. That was supported with unplanned use of teacher through directing student to Internet-EBA or any other sources for again instant access to require information. Keeping the effect of unplanned us in mind, the planned TPC used instruction was done as it was planned if there was no technical problem. In the case of facing with problem during implementation which prevented teacher to conduct lesson, then the cooperation with students and technology leaders were appeared as ways for solution. If the solution founded, planned instruction was followed; if not, the back up plan was consulted. During the implementation, this model offered to conduct formative evaluation in order to detect drawbacks of the system. Formative evaluation was shaped under the question of whether the implementation was going as it had planned. Deciding on the need for improvement the instruction directed the designer to find out problem and conduct necessary improvement if it was possible during the implementation. If the betterment of instruction was not possible, it was recommended to take related note for the decision in summative evaluation.

After completing the implementation of the instruction, model suggested to conduct a detailed summative evaluation. Here, the final decision about the instruction was given considering four points; whether all objectives was achieved, was there any unplanned side effects of the instruction, how was the teacher's and students' overall satisfaction related with the instruction? After evaluating these four points with the results coming from students' assessments, teacher's observations and teacher-students interaction, teachers asked to have a final decision whether to execute, repeat without improvement or improve the instruction. The decision of improvement was resulted with the troubleshooting on which the notes of formative evaluation were also taken into consideration.

5.2 Implications and Recommendations

This study focused on revealing the current usage of TPC in instruction based on teachers' experiences and their perceived advantages and disadvantages based on their participation in FATIH project. Additionally, considering these experiences and expectations, an instructional design model was proposed in order to use TPC instructionally functional in teaching and learning environment. Through modeling these processes, a gap was detected between the current and desired implications. This last part was constructed to inform the different groups of addressees of the study, considering this gap and results of the study. In this vein, five groups were addressed: Policy makers, curriculum developers, educational software developers, people in charge in council of higher education and faculties of education, and teachers. This part was finalized by proposing some of the recommendation for further research.

5.2.1 Recommendations for policy makers. In this part of recommendation, the policy makers in FATIH project were targeted, because the study revealed some drawbacks and problems in Tablet PC usage in the project. Considering these points, the following recommendations were proposed for the policy makers:

1. The results of the study and also some other evaluation reports reveal that project has not been functioning as it was planned four years ago. In this regard, more systematic planning is required in order to implement all the components of the project functionally. This planning needs to be followed by systematic evaluation process in order to detect the problems immediately after implementation.

2. In the project, revision and adaptation of the curriculum is proposed as one of the important constituent. However, the absence of emphasis on technology usage in curriculum makes the implementation mainly depend on teacher's motivation. In this point, there can be two ways to follow. First way, approved in this study, is transforming the curriculum from being too prescriptive to more goal oriented and objective-based. That would allow teachers to exercise their professional autonomy and construct their own instruction without being too narrowly framed by the curriculum as much as current practice. Second way, not supported in this study but easier to adapt existing educational program, is to include IWB and Tablet PC usage in the existing curriculum as possible media for classroom and also to provide some examples for their usage.

3. In the study, it is found that teachers need more technical support than offered by formator-system, which is expressed as incapable for fulfilling their needs. Considering the results of the study, a technology leadership system would be recommended. That includes providing one or two technology leaders who are experts in educational technology and educational programming rather than having limited training on technology. They should be full-time employees, not teachers, who provide service as consultants for organizing trainings to teachers and students, for solving technical problems, and also for developing programs for instruction by collaborating with students and teachers.

4. In educational technologies, since software design is as much important as providing hardware (Empirica, 2006; Korte & Husing, 2007; Pelgrum, 2001 Severin & Capota, 2011), it is necessary to didactically enrich the educational materials, software and applications, provided by the ministry for the use of teachers and classrooms. In this study, it is revealed that EBA website does not contain sufficient e-content for each school subject. In this regard, a formation of program-developing expert group is suggested in order to deal professionally with this insufficiency in the project. Enrichment in e-content and software could also have positive effect on teachers' and students' technology use in teaching and learning activities.

5. In addition to e-content provided by ministry, this study points out some of the teacher's needs to have specific software for their own class. For this case, rather than government holding all the competence in its hands, it would be beneficial if schools themselves would be granted at least limited scope of competence to make their own decisions on which software and e-contents they need to purchase in order to use it in educational process effectively. By establishing a technology-budget for schools, controlled by administrators and technology leaders, schools could competently decide on their own needs without knocking the ministry's door for every little issue.

6. In project, reorganization in Tablet PC distribution is recommended. Rather than providing free TPC for every pupil all over the country, a progressive price policy by which parents would financially participate on the basis of their income or general financial status would be more justified. That would significantly reduce the cost government has to invest in the project and also increase the perceived value of TPCs. In distribution of TPC, project ignores open high school students. Although open education in high school was not the focus of this study, it is believed that this tool could also support their teaching and learning positively. Thus, it is recommended to consider open high school students as one of the future stakeholders in the project. Additionally, the distributed TPCs should be standardized. Rather than signing contract in different biddings with different companies who are providing TPCs with different characteristics, one type of TPCs need to be selected according

to the expectations from TPCs in education. Moreover, to make students benefit from flexibility and mobility of the device, 3G or Internet available from spots out of the school should be provided.

7. The policy makers should also systematically establish and provide necessary infrastructural conditions to ensure that all stakeholders can actually use and implement the TPCs in the instructional processes effectively. In other words, all the schools should be equipped with strong enough Wi-Fi or at least 3G signal which would allow teachers and students to use their TPC devices during the lessons.

8. The literature on Tablet PC points out that such devices can also foster life-long learning (Ellis-Behnke et al. 2003; Dallas, 2012; Mendelsohn, 2012; Nie, Armellini, Witthaus, & Barklamb, 2011; Steif & Dollar 2009; Stickel, 2009). In this sense they can have positive effect not only for the students but also for his or her family members (siblings, parents, and other people who may live in the same household). To support personal development of family members, distance education centers are recommended in the scope of the study. Through establishing such centers, which include varieties of documents and e-learning facilities, not only improvement of students but also family members can be achieved. Especially, it can be a significantopportunity for women who could not find the opportunity to attend school, and for girls who were taken out from school in their early age. From this perspective it seems that Tablet PC usage in FATIH project could have the potential to achieve a large scope transformation in the society.

5.2.2 Recommendations for curriculum developers. In this part of the recommendation, following recommendations were proposed for the curriculum developers:

1. In addition to the need of emphasis on IWB and Tablet PC usage in curriculum, the findings of study point out a more important aspect: quality of education. Overemphasis on misuse and irresponsible attitude of students toward their own devices underline the human quality in education. In this regard, before adapting

curriculum for FATIH project, it looks necessary to review the goals, needs and philosophy of Turkish national education. It may be more crucial to support students' individual development in order make them competent technology users who present ethical and empathetic behavior both in real and virtual environment.

2. As it was revealed in the optimal instructional design model proposed in this thesis, objective-based and more flexible curriculum design is recommended to allow teachers more creativity and autonomy in the process of planning and implementing TPC based instruction, as well as more accountability and responsibility which is inevitable part of such autonomy. Since the schools of this country differ considerably in quality as well as in their infrastructural conditions, the main decisions on how to use and in what extent to use educational technology should not be additionally restricted in advance. Taking such decisions should be allowed to the teachers, but at the same time it would also require high quality of teacher education and training which would equip teachers with necessary knowledge and skills (some may say: competence) to encourage them to perform needs analysis process and other steps of the instructional design. This point was further discussed under the Title 5.2.4.

3. Rather than top-down approach, followed in curriculum development and in FATIH project, a bottom-up approach should be favored in order to get more benefit from the teachers and their experiences. In interviews, teachers questioned whether their complaints would be conveyed to the ministry. This shows their need to be heard. Considering this, the revision of curriculum for FATIH project should involve teachers in order to detect the problematic points from the perspective of practitioners.

5.2.3 Recommendations for educational software developers. In this part, following recommendations were proposed for the educational software developers:

1. As it mentioned in literature review, the effort of equipping schools with computers is dated back to the 1990s (DPT, 2004; MEB, 2002), but we face the

constant lack of quality educational software. In the scope of FATIH project, hardware is provided by government but software part of the project showed to be insufficient. In this regard, it is recommended to develop educational software to support Tablet PC usage in education. In addition to some comprehensive software, small educational applications suitable for TPC usage can provide drill and practice for students in subject matter, like English vocabulary or Turkish idioms.

2. In the effort of software development, the possible productive effects of games on children should not be neglected. Since pupils have great tendency to play games in any form, that can be used for teaching and learning, without forgetting the importance of quality of games. In this point, with some nation-wide projects, students can be involved to strategy development process in games. In collaboration with students, subject matter experts and teachers, didactically functional games in Turkish can be produced.

3. Program developers can consider developing module- system, in-line with the curriculum, for each school subject. A module covers a topic of a selected subject or few subjects and can include exercises, videos, animations, exams, forums and some interactive platform in order to help teacher to reach varieties of materials and documents. Additionally, such modules can provide exam results from different schools or classroom, which would allow teachers to compare their pupils' results.

4. The qualified programs can be purchased by the government for the use of teachers and students all over the country. In addition to this system, schools can decide which programs to buy for their students using the budget allocated by the government. Similar progressive price policy as we already proposed it in the context of providing TPC devices could also be considered in this case.

5.2.4 Recommendations for council of higher education and faculties of education. In this part, following recommendations were proposed for council of higher education and faculties of education:

1. Studies in the literature point out to the low competencies of teachers in using ICT tools in education (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Cüre & Özdener, 2008; Yılmaz, 2011). However, technology adaptation projects like FATIH are forcing teachers to use these tools. In this regard, the expected level of qualification in ICT usage in faculties of education can be reorganized considering the goals of FATIH project. Rather than giving all responsibility to the shoulder of the teachers, teacher education can be supported by the necessary skills to use IWB and Tablet PC functionally enough for the instruction.

2. Not only competencies of teachers in ICT usage but also their overall quality is a serious matter of discussion (OECD, 2009; TALIS, 2009; OECD, 2011). Studies highlight the need to raise teachers to whom we could trust as field experts and instructional designers (Şahin, 2005) in order to improve the quality of education and performance of students (Hanushek, 2008; Neal, 2011). In this regard, starting with initial selection of students who want to enter the faculties of education, to raising them as a qualified teachers, system should be reviewed and improved in order to have teachers who can plan their own instruction effectively, implement it and evaluate the results to improve the education and instruction. This seems an essential step in raising teachers who can adapt themselves to the developing technologies and integrate them into their instruction.

5.2.5 Recommendations for teachers. In this part, following recommendations were proposed for the teachers:

1. This research puts teachers in the center of the study, because of the nature of the topic chosen to investigate. While conducting research by focusing on teachers' instructional process, their expectations and perception related with the place of TPC in teaching and learning process, were discovered. Teachers who attended some extra computer literacy courses expressed their courage in using TPCs, while teachers whose training was limited to the in-service education were repeating their hesitation to use this technological device. Since this finding was supported by literature (Askar & Usluel, 2003; Cüre & Özdener, 2008; Kayaduman, Sırakaya, &

Seferoğlu, 2011), it can be recommended to teachers to improve their computer competencies not only by in-service trainings but also by some other personal efforts. As Prensky (2001) discusses,contemporary generations of children are “digital natives” and to understand their language teachers are required to develop their own digital skills and knowledge.

2. Although the Turkish national curriculum is quite prescriptive and allows limited flexibility to the teachers, it still leaves the door open for teacher’s own planning. In this point, rather than preparing only the unit-based yearly plan at the beginning of the school year, it is highly recommended to design TPC used instruction by considering the different components of analysis, design, implementation and evaluation. This can help teachers to perceive their instruction more clearly, resolve the problematic points and evaluate their instruction as a whole in order to improve it.

3. The study reveals that there are few teachers who are more competent in technology usage in their classroom. These teachers are early adapters as Rogers (2003) explains in his model of diffusion of innovation. In using Tablet PC for education, these teachers can be pioneers to guide other teachers. In this regard, it is recommended to construct teams in the leadership of such teachers in order to help other teachers, at least early majority (in Rogers, 2003), to utilize TPC in their classroom environment at least in a limited degree. This may help to change the students’ perception about TPC as a teaching-learning tool more than a toy to play games.

5.2.6 Recommendation for further research. In this part, following recommendations were proposed for the researchers who will conduct further studies:

For further research that will be conducted on the instructional design process of Tablet PC usage, the following recommendations shall be considered:
1. In the present study, the information was gathered only from one pilot school of

FATIH project in Ankara. This school, Hasan Ali Yücel Anadolu Öğretmen Lisesi, is located in the city center and both students and teachers who attend it and teach in it are selected on the basis of national exam results. In this regard, it can be expected that their practice is not necessarily reflecting that of other schools in different regions and areas of the country. Thus, the same study can be repeated with teachers in different schools.

2. This study did not involve students or stakeholders from ministry of education. It was limited by teachers in a pilot school, experts in the field and one administrator responsible for the implementation of FATIH project in the school. However, to evaluate the development of an instructional design model, it would be necessary to gather data from students, parents and siblings in order to see the effects of Tablet PC at home. Through conducting detailed interviews, the changes in students' perceptions and behavior toward teaching and learning can be investigated.

3. As it was emphasized in conclusion part, the model proposed in this study is one of the possible models for improving the Tablet PC-used instruction. It should not be perceived as the only possible or ideal ID model for Tablet PC usage, but rather as a starting point to investigate Tablet PC use in teaching and learning environment. Regarding this, it is recommended to conduct such research in order to widen the perspective and discuss the advantages and disadvantages of Tablet PC as a medium for teaching and learning. Through repeating the studies on ID and Tablet PC, it is thought that instructional component of technology integration can be strengthened.

4. In this qualitative study, for establishing prolonged engagement and for having detail data from interview, different visits to school was arranged. By getting permission from the administrators, an introductory meeting was arranged with teachers to explain the presence of researcher and the aim of the study. This informal meeting was important to break ice and to know teachers who want to involve the study. After finishing the data collection, another meeting was scheduled for September to inform teachers about the results of the study. The same way was recommended to the researcher who would like to conduct such a long research in a

school with teachers. This makes a mutual benefit: researcher is getting the necessary data in friendlier environment, and teachers are getting benefit of the results immediately after the research.

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APPENDICES

Appendix A: The Relation between Research Questions and Methodology

Research Questions	**Data Needs**	**Data Sources**	**Data Collection Instruments/ Tools**	**Analysis Method**
R.Q 1. What kind of expectations is invested in contemporary technology of Tablet PCs in the field of compulsory education?				
1.1 What are the teachers' expectations related with introduction of Tablet PC in compulsory education in Turkey?	Qualitative Data	Literature Teachers	- Interview Schedule for Teachers	Literature Review Open Coding Axial Coding
1.2 Up to what degree does the usage of Tablet PC meet with the expectations in teachers' opinion?	Qualitative Data	Teachers	Interview Schedule for Teacher	Open Coding Axial Coding
1.3 What are the reasons behind the unmet expectations of Tablet PC usage in classrooms?	Qualitative Data	Literature Teachers Expert Opinion The Media	- Interview Schedule for Teachers and Expert Document Analysis	Literature Review Open Coding Axial Coding
1.4 What can be considered as the advantages and disadvantages of Tablet PC usage in classrooms?	Qualitative Data	Literature Teachers Expert Opinion	- Interview Schedule for Teachers and Experts	Literature Review Open Coding Axial Coding

1.5 What conditions should be established in order to use Tablet PC instructionally functional and advantageously in teaching-learning process?		Literature Teachers Expert Opinion The Media	- Interview Schedule for Teachers and Expert Document Analysis	Literature Review Open Coding Axial Coding
R.Q.2. What Instructional Design Process should be followed in order to adapt instructionally functional and advantageous practice of Tablet PC usage in compulsory education?				
2.1 What are the instructional design steps followed by teachers to use Tablet PC technology in current teaching and learning process?	Qualitative Data	Teachers Teachers' Documents (Syllabi, plans, exam papers-programs) The Media	Interview Schedule for Teacher Document Analysis	Axial Coding Selective Coding (Comparative Analysis)
2.2 What should be the steps of the instructional design, which is followed when the necessary conditions for using TPC in teaching and learning process has been met?	Qualitative Data	Teachers Expert Opinions	Interview Schedule for Teachers Interview Schedule for Experts	Axial Coding Selective Coding (Comparative Analysis)

APPENDIX B: THE INTERVIEW SCHEDULE FOR EXPERTS

Date:

Time:

Hello, my name is Gökçen Özbek, from Middle East Technical University, department of Curriculum and Instruction. I am here to conduct an interview with you about Tablet PC integration in compulsory education. I am studying what are the expectations from Tablet PC integration in compulsory education and also the instructional design steps followed in order to satisfy those expectations. My hope is to distinguish real and possible expectations from the mythical ones and to find out the instructional design steps, which can answer the real expectations. I hope my findings will help the stakeholders working in Tablet PC integration and also teachers who are going to design their instructions accordingly. So, I really need your expertise and opinions in the field.

I would like to inform you that this interview contains 10 questions with some sub-questions and it will take approximately 1 hour.

I would like to tape our conversation, if it is OK for you.

Do you have any question that I can answer before we start?

QUESTIONS ABOUT EXPECTATION FROM TABLET PC

1. What are the expectations from Tablet PC usage in the education?

Alt Q1. Through integration of Tablet PC into education, what kinds of outcomes are possible to achieve?

PROMPT: Which of these expectations are more reasonable considering Tablet PC integration?

2. To what extent can these expectations be attributed to the technology of Tablet PC

itself?

Alt Q2. Which expectations can be satisfied by only using Tablet PC machine in education?

Alt Q2.1. In order to satisfy which expectation, is the advantages/features of Tablet PC enough?

Alt Q2.2. What is the role of the Tablet PC in meeting these expectations?

PROMPT: Are the features of Tablet PC, like possibility of reaching and gaining information faster, or establishing interaction between students, helpful to satisfy expectations?

3. To what extent are these expectations related with other factors then only Tablet PC itself?

Alt Q3. What is the role of the other factors in satisfying these expectations?

PROMPT: To what extent do the outside factors, like teachers' skills and knowledge to use Tablet PCs, learners' motivation to use such technology to acquire quality knowledge, play role in satisfying expectations?

4. What conditions should be established, in order to satisfy these expectations?

QUESTIONS ABOUT INSTRUCTIONAL DESIGN STEPS

In this part of the interview, I would like to discuss the differences in Tablet PC integrated instruction then non-integrated ones. I prefer to follow the instructional design steps of Analyze, Design, Development, Implementation and Evaluation; in order to investigate what differences make Tablet PC in each stage.

Analysis

5. What are the factors to analyze for a teacher who conducts his/her class regarding the Tablet PC?

Alt Q5. In Tablet PC integrated instruction, which aspects of education should be analyzed before developing the instruction?

PROMPT: How instructional design shows difference in Analyze phase when Tablet PC is integrated?

Is there any difference in the steps of Analysis? (i.e. establishing instructional problem, instructional goals and objectives, analyze learning environment, analysis of learner's existing knowledge and skills, and so on.)

What can be the elements in analysis, unique for the Tablet PC integrated instruction?

Design

6. How should a teacher design the Tablet PC integrated course?

PROMPT: How instructional design shows difference in Design phase when Tablet PC is integrated?

Is there any difference in the steps of Design? (i.e. selecting appropriate delivery method, determine training structure, establishing evaluation methodology, selecting exercises, content, and so on.)

What can be the elements in designing, unique for the Tablet PC integrated instruction?

Development

7. What are the steps of development phase in Tablet PC integrated instruction?

Alt 7. How should a teacher develop the instruction s/he planned considering the Tablet PC integration in her/his class?

PROMPT: How instructional design shows difference in Development phase when Tablet PC is integrated?

Is there any difference in the steps of Development? (i.e. selecting appropriate delivery method, determine training structure, establishing evaluation methodology, selecting exercises, content, and so on.)

What can be the elements in designing, unique for the Tablet PC integrated instruction?

Implementation

8. What are the steps of implementation phase in Tablet PC integrated instruction?

PROMPT: How instructional design shows difference in Implementation phase when Tablet PC is integrated?

Is there any difference in the steps of Design? (i.e. selecting appropriate delivery method, determine training structure, establishing evaluation methodology, selecting exercises, content, and so on.)

What can be the elements in designing, unique for the Tablet PC integrated instruction?

Evaluation

9. How should the formative and summative evaluation be conducted in Tablet PC integrated instruction?

PROMPT: How instructional design shows difference in Implementation phase when Tablet PC is integrated?

FURTHER QUESTION

10. Would you like to mention any other factor, which can be important in designing instruction to satisfy the expectations we have discussed?

APPENDIX C: THE INTERVIEW SCHEDULE FOR TEACHERS (ÖĞRETMEN GÖRÜŞME FORMU)

Tarih:

Saat:

Merhaba, ben, Gökçen Özbek. Orta Doğu Teknik Üniversitesi, Eğitim Programları ve Öğretim bölümünde doktora yapıyorum. Sizinle, FATIH projesi kapsamında öğrencilerinize ve size dağıtılan tablet bilgisayarların öğretimde kullanımı hakkında görüşmek istiyorum. Bu görüşme kapsamında, size genel olarak şu noktalarda sorular soracağım: Tablet bilgisayardan beklentileriniz, tablet bilgisayarı derslerinizde nasıl kullandığınız, tasarım aşamasında nelere dikkat ettiğiniz ve, varsa önerileriniz. Katkıda bulunduğunuz bu çalışmanın, paydaşlara, ve öğretmenlerimize faydalı olmasını umuyorum. Bu noktada sizin deneyim ve bilgilerinize danışmak istiyorum

Bu görüşmenin, 9 ana sorudan ve birkaç alt sorudan oluştuğunu, ve ortalama 1 saat sürdüğünü belirtmek isterim. Bu görüşme sonrasında, sizden görüşmeye dair deneyiminizi ve/veya eklemek istediklerinizi kısaca yazmanızı rica ediyorum. Görüşme sonrasında, sizden aldığım bilgileri, toparlayarak sistematik bir halde tekrar sizin onayınıza sunacağım. Eğer yanlış anlaşılan, eksik kaldığını düşündüğünüz bir nokta olursa, düzeltmenizi isteyeceğim.

İzninizle, veri kaybı olmaması için görüşmeyi kaydetmek istiyorum.

Başlamadan önce bana sormak istediğiniz bir nokta var mı?

DEMOGRAFİK BİLGİLER VE HAZIRLIK SORULARI

Kişisel bilgilerinizi sorarak başlamak istiyorum:

İsim Soy-isim:

Cinsiyet:

Yaş:
Öğretmenlik yapılan alan:
Öğretmenlik deneyimi:

a. FATIH projesinden önce tablet bilgisayarınız var mıydı?
b. FATIH projesi kapsamında dağıtılan tablet bilgisayarları dersinizde kullanıyor musunuz?
c. FATIH projesi kapsamında dağıtılan tabletleri ders dışı işleriniz için kullanıyor musunuz? Ne amaçla kullanıyorsunuz?
d. Bilgisayar, akıllı telefon, vb. kullanıyor musunuz? Ne amaçla kullanıyorsunuz?
e. Dersiniz için araştırma yaparken ve/veya materyal hazırlarken hangi teknolojik araçları kullanıyorsunuz? Bu hazırlık için ne kadar süre ayırıyorsunuz?
f. Genel olarak FATIH projesini nasıl değerlendiriyorsunuz?

TABLET BİLGİSAYARDAN BEKLENTİLERE DAİR SORULAR

1. FATIH projesi kapsamında öğrencilere dağıtılan tablet bilgisayarlardan, kendi dersiniz adına beklentileriniz nelerdir?
Alt S1. Tablet bilgisayar entegrasyonu ile, hangi çıktıların elde edilebileceğini düşünüyorsunuz?
    1.1. Bu beklentilerinizi, tablet bilgisayarlar ne ölçüde karşılayabiliyor?
    1.2. Bu beklentilerinizi karşılamada tablet bilgisayarlar ne ölçüde yetersiz kalıyorlar?
2. Sizin ve öğrencilerinizin tablet bilgisayara sahip olmasının, sizin dersiniz için genel anlamdaki avantajları nelerdir?
3. Sizin ve öğrencilerinizin tablet bilgisayara sahip olmasının, sizin dersiniz için genel anlamdaki dezavantajları nelerdir?
4. Tablet bilgisayarların etkili kullanılabilmeleri için yapılması gerekenler, oluşturulması gereken koşullar, sizce, nelerdir?

ÖĞRETİM TASARIMI BASAMAKLARINA DAİR SORULAR

Analiz

5. Sizin ve öğrencilerinizin elinde tablet bilgisayar olması, dersiniz için yaptığınız hazırlıklarda ne gibi bir değişikliğe neden oldu?

Alt S5. O günkü dersinizi planlarken tablet bilgisayar kullanacaksanız, neleri göz önünde bulunduruyorsunuz?

PROMPT: Analiz basamaklarında tabletler bir farklılık yaratıyor mu? (öğretim problemini, hedefleri belirleme, öğrenme ortamı analizi, öğrencilerin bilgi ve becerileri, vb.)

Tasarım ve Geliştirme

6. Dersiniz için gerekli olan içerik, metot, kullanacağınız alıştırmalar, veya ölçme-değerlendirme süreçlerini belirlemede tablet bilgisayarların herhangi bir etkisi oluyor mu?

AltS6. Eğer, o günkü derste tabletleri kullanmaya karar verirseniz, dersinizi tasarlarken ve materyal geliştirirken kullanacağınız stratejiler veya kararlar nasıl değişiklik gösteriyor?

PROMPT: Tasarım ve Geliştirme basamaklarında tabletler bir farklılık yaratıyor mu? (uygun öğretim metodunu seçme, öğretimin nasıl başlayıp biteceğini planlama, değerlendirme sürecine karar verme, ve gerekli alıştırma-egzersizleri geliştirme, içerik belirleme)

Uygulama

7. Sizin ve öğrencilerinizin elinde tablet bilgisayar olması, dersinizi işlerkenki süreçte bir farklılık yarattı mı?

AltS7. Dersinizde tablet bilgisayar kullanıyor olsaydınız, veya kullandığınız zamanlarda, dersin uygulanması sürecinde ne gibi farklılıklarla karşılaşırdınız/karşılaşmıştınız?

PROMPT: Uygulama basamaklarında tabletler bir farklılık yaratıyor mu? (Yapılan planın uygulanması, tasarlanan materyallerin kullanılması, vb.)

Değerlendirme

8. Sizin ve öğrencilerinizin elinde tablet bilgisayar olması, dersinizin genel değerlendirmesini yaparken uyguladığınız stratejilerinizde bir değişiklik yarattı mı?
AltS8. Ders programınızın bir bölümünde veya tamamında tablet kullanımının etkisini nasıl ölçüyorsunuz/ölçerdiniz?

PROMPT: Değerlendirme basamaklarında tabletler bir farklılık yaratıyor mu? (geliştirilen dersin çıktılarına ulaşıp ulaşamadığı, öğrenci performansları, öğretmenin değerlendirilmesi, kullanılan yöntem, teknik ve tabletin değerlendirilmesi, vb.)

EK SORULAR

9. Sizce, belirttiğiniz beklentileri karşılamada tablet bilgisar içeren bir dersi planlarken önemli olabilecek fakat şimdiye dek bahsetmediğimiz başka unsurlar var mıdır?
Benim görüşmemiz kapsamında soracaklarım bu kadar. Sizin son olarak eklemek istediğiniz bir şeyler var mı?
Katılımınız için çok teşekkür ederim.

APPENDIX D: DOCUMENT ANALYSIS FORM

1. Type of the document:
2. Date of document:
3. Author of document:
4. Source of document:
5. For what audience was the document written:
6. Potential prejudice of document: related with expectations: related with design: others
7. Issues handled:
8. Potential benefits for the study: related with expectations: related with design: others
9. Comments:

APPENDIX E: THE APPROVAL FROM METU HUMAN RESEARCH ETHICAL COMMISSION

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

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11.06.2014

Gönderilen : Prof. Dr. Ercan KİRAZ
Eğitim Programları ve Öğretim Bölümü

Gönderen : Prof. Dr. Canan Özgen
IAK Başkanı

Canan Özgen

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz Eğitim Programları ve Öğretim Bölümü öğrencisi Gökçen Özbek'ın "Development of An Instructional Design Model for Integration of Tablet PC Use in Education" isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

11/06/2014

Canan Özgen

Prof.Dr. Canan Özgen
Uygulamalı Etik Araştırma Merkezi
(UEAM) Başkanı
ODTÜ 06531 ANKARA

APPENDIX F: TURKISH SUMMARY

EĞİTİMDE TABLET BİLGİSAYAR KULLANIMI İÇİN BİR MODEL GELİŞTİRME: BEKLENTİLERDEN GERÇEKLİKLERE

1. Giriş

Yüzyıllar boyunca değişerek gelen teknolojinin tanımı ve kapsamı, özellikle 20. Yüzyılla birlikte bambaşka anlamları içermeye başlamıştır (Schatzberg, 2006). Yunan temelli dil bilim çalışmaları, teknoloji kavramını logos (bilim) ile techne (beceri, sanat) olarak tanımlasa da, bu çalışma Alman ekolünden devşirilen "Tecknik" kavramını temel almaktadır, çünkü "Tecknik" kavramı ile anlamsal olarak başka bir perspektif kazanan alan (Borgmann, 2006), bu çalışmanın kapsamı olan bir bilimsel aracın uygulamada kullanımı ile kültürde değişim yaratma sürecini daha doğru bir şekilde yansıtmaktadır.

Teknolojinin kültürde yarattığı değişim ve bu değişimin neo-liberal fikirlerle desteklenmesi sonucu, teknoloji, okulları şekillendirecek güce ulaşmış ve rekabetçi sistemde söz sahibi olabilecek bireylerin yetişmesi için ortam sağlamıştır (Schatzberg, 2006). Sanayi devrimi ile hız kazanan bu süreçte bilgisayarların çalışma masamızın üzerinde kendine yer bulması artık ivmelenerek giden bu akışın dizüstü bilgisayarlar, akıllı telefonlar ve tabletler olarak kendini sürekli yenilemesini sağlamıştır. Bu hıza paralel olarak, her yeni teknolojik araç eğitimde yansımasını bularak kendi söylemini yaratma çabasına girmiştir. Örneğin, 2000'lerin başındaki "Her Çocuğa Bir Bilgisayar" (OLPC-One Laptop per Child) projeleri sadece 10 yıl içinde şekil değiştirerek "Her Çocuğa Bir Tablet" (OTPC-One Tablet per Child) ismini almıştır. Bu projelerin yaygınlaşmasında ve her yeni teknoloji ile isim değiştirerek okulların kapısını çalmasında yatan temel nedenler vardır. Ekonomik ve rekabetçi markete dair nedenleri bir kenara bırakırsak, temel neden teknolojinin eğitimin sorunlarını çözmek için iyi bir araç olarak algılanmasının yanı sıra, çocukların yüzyıla dair düşünme biçimini geliştirmeleri, bilgilerini bu yönde yapılandırmalarını sağlamaktır (Scardamalia & Berieter, 1991).

2010'larda şun anki şeklini ve işlevselliğini kazanan Tablet bilgisayarların (Ogg, 2010; The Microsoft Tablet PC, t.y.) eğitimde kullanılmaya başlaması ile şekillenen alan yazın, pek çok olumlu sonucu vurgulamaktadır: Daha etkili öğrenme ortamının oluşturulması (Carruthers, 2010), öğrencilerin dikkat yoğunluğunu ve süresini yükseltmesi (Koile & Singer, 2008), öğrencilerin bilişsel (Carruthers, 2010; Linden, 2008), üst bilişsel, duyuşsal ve socio-kültürel becerilerini geliştirmesi (Enriquez, 2009; Li, Pow, Wong, & Fung, 2009), öğrenmeye dair motivasyonu desteklemesi (Koile & Singer, 2008; Amelink, Scales, & Tront, 2012), işbirliğini ve daha zevkli bir öğretim ortamını sağlaması (Carruthers, 2010; Nugroho, & Lonsdale, 2010). Bütün bu çalışmaların yanı sıra, diğer bir taraftan teknolojinin sınıflarda bulunmasının tek başına yeterli olmadığının ve başarı için pek çok pedagojik ve didaktik prensibin sağlanması gerektiğinin altını çizen bir literatür bulunmaktadır (Cuban, 2001; Frank, Zhao & Borman, 2004; Levin & Wadmany 2008; Norris et al. 2003; Robertson et al. 2006; Wells 2007). Vurgulanan temel unsurları Wong ve Li (2006), şu şekilde sıralamaktadır: (1) öğretmen tutumu, (2) beceriler ve öğretim yöntemleri, (3) değerlendirme, (4) kaynaklar, (5) okul kültürü, (6) profesyonel gelişim ve (7) liderlik. Bu unsurlar göz önünde bulundurularak, Tayland ve Etiyopya'da sunulan eğitimde tablet entegrasyonu değerlendirildiğinde araştırmalar, eksik öğelerin öğretmenlerin tablet bilgisayarı kullanamaması ve öğrencilerin tableti sadece oyun aracı olarak görmesi ile sonuçlandığını göstermektedir (Nugroho & Lonsdale, 2010; One Tablet PC per Child: Education for All, t.y). Cuban (2001)'in belirttiği gibi sınıflarda sunulan yüksek teknoloji karşısında eğitim yavaş ve geri kalabilmektedir.

Eğitimde teknolojiye yapılan yatırımların ve planlanmaların işlevselliğini kazanabilmesi için bütüncül bir bakış açısı ile pek çok bileşenin göz önünde bulundurulmasının önemli olduğu düşünülmektedir. Bu düşünceden hareketle, bu çalışmada 2010 yılında Türkiye eğitim sistemine Fırsatları Artırma ve Teknolojiyi

İyileştirme Hareketi (FATIH) projesi ile tanıtılan tablet bilgisayarların öğretimde kullanımı incelenmiştir. Proje sınıflara etkileşimli tahta sağlanması, her öğrenci ve öğretmene tablet dağıtılması, ve okullarda gerekli elektrik ve Internet altyapısının oluşturulmasını kapsamaktadır. Bu donanımın yanı sıra projede, yazılım, e-içerik, öğretim programında yenilik, hizmet-içi eğitim desteği, ana bileşenler olarak sunulmaktadır ("Proje Hakkında," 2012). 2011 yılında pilot okullarda sağlanan alt yapı ve donanım çalışmaları ile başlatılan projede yapılan değerlendirme araştırmaları uygulamanın aksayan noktalarını gözler önünde sermektedir. Projenin, yazılım ve eğitim yönünü destekleyecek bileşenlerin eksikliği, pedagojik ve öğretim sorunları, teknoloji kullanımının istenilen düzeyde olmadığını ve beklentileri karşılamada geri kaldığını göstermektedir (Bilici, 2011; Dursun, Kuzu, Kurt, Güllüpınar & Gültekin, 2013; FATIH Projesi Akademisyenler Çalıştayı, 2012; Koparan & Güven, 2012; Kuzu, Kurt, Dursun, Gu□llu□pınar & Gu□ltekin, 2013; Pamuk, Çakır, Ergun, Yılmaz & Ayas, 2013). Bu bağlamda, uygulamaları daha iyi yönetebilmek için tablet bilgisayar kullanılan öğretim sürecini daha yakından ve daha geniş bir perspektiften incelemenin, henüz pilot aşamasında olan projenin daha etkili bir şekilde değerlendirilip doğru bir şekilde geliştirilmesi açısından önemli olduğu düşünülmektedir. Bu nedenle, bu çalışmada FATIH projesindeki tablet kullanımı öğretim tasarımı boyutundan incelenmiştir. Dick ve Carey (2005)'in belirttiği gibi bu alan, öğretimin bileşenlerini analiz etmek, bileşenlerin arasındaki karşılıklı ilişkileri ortaya çıkarmak ve bunları etkili bir eğitime ulaşabilmek için sistematik olarak sunmayı içermektedir. Dolayısıyla, bu çalışmanın temel amacı, sınıfta tablet bilgisayar kullanımına dair etkili bir öğretim tasarımı modeli geliştirmektir. Bu temel amaç kapsamında, çalışmada aşağıdaki alt amaçlara ulaşmak hedeflenmektedir:

a. Eğitimde tablet bilgisayar kullanımına dair var olan genel söylemi araştırmak.
b. Öğretmenlerin tablet bilgisayardan beklentilerini saptamak.
c. Var olan sistemde tablet bilgisayar kullanımının avantajlarını ve dezavantajlarını sınıflandırmak.
d. Tablet bilgisayarın öğretimsel olarak etkili olabilmesi için gerekli olan

koşulları incelemek.

e. Tablet bilgisayarın öğretim basamaklarındaki yeri ve önemini ortaya çıkarmak.

Bu amaçlar dahilinde bu çalışma aşağıdaki araştırma soruları üzerinden temellenmektedir:

1. Zorunlu eğitimde, günümüz teknolojisi olan tablet bilgisayara dair beklentiler nelerdir?
   - 1.1 Zorunlu eğitimde Tablet bilgisayar kullanımına dair öğretmenlerin beklentileri nelerdir?
   - 1.2 Tablet bilgisayar bu beklentileri ne ölçüde karşılayabilmektedir?
   - 1.3 Beklentilerin karşılanmamasının altında yatan sebepler nelerdir?
   - 1.4 Öğretimde Tablet bilgisayar kullanımının avantajları ve dezavantajları nelerdir?
   - 1.5 Öğrenme ve öğretme sürecinde, tablet bilgisayarın işlevsel ve faydalı kullanımını sağlayacak koşullar nelerdir?
2. Zorunlu eğitimde tablet bilgisayarın işlevsel ve faydalı kullanımı için takip edilmesi gereken öğretim tasarımı basamakları nelerdir?
   - 1.1 Var olan öğrenme ve öğretme süreçlerinde tablet bilgisayar kullanımında takip edilen öğretim tasarımı basamakları nelerdir?
   - 1.2 Öğrenme ve öğretme sürecinde tablet bilgisayar kullanımı için gerekli olan koşulların sağlanması ile oluşturulacak öğretimin tasarım basamakları neler olmalıdır?

1.2 Çalışmanın Önemi

Tablet bilgisayarın sınıflardaki kullanımını öğretim tasarımı açısından irdeleyen bu çalışma sonucunda ortaya çıkan sonuçların FATIH projesindeki yetkililere veri sağlamak ve uygulamadaki öğretmenlere rehberlik edebilmek açısından önemli olduğu düşünülmektedir. Bu çalışmanın Türkiye'deki tablet bilgisayar kullanımının öğretim basamaklarındaki yeri ve önemini sistematik olarak araştırması açısından alan yazına katkısı olduğu düşünülmektedir. Bu araştırmanın FATIH projesine olumlu katkı sunmayı amaçlayarak önem arz ettiği düşünülürken, gerek yurt içi gerek de yurt dışı alan yazın için şu noktalarda anlamlı görülmektedir:

a. Teknolojik araçların eğitimde kullanılmasına dair beklentileri analiz edip, genel söylemi ortaya çıkartarak skeptik bir bakış açısı ile bu beklentilerin Türk eğitim sistemindeki yerini tartışması
b. Öğretim tasarımı modelleme ile eğitimde tablet kullanımı arasında bir köprü oluşturması
c. Sistematik alan yazın taraması ile gelecek çalışmalara yol göstermesi

2. Alan Yazın Taraması

Öğretimde tablet kullanımına dair daha geniş bir perspektif çizebilmek adına yapılan alan yazın taraması, eğitimde teknoloji kullanımının tarihinin erken döneme dayandığını göstermektedir. Tarih öncesinde keskin bıçaklarla çizilen mağara resimleri ile başlayan bilgi aktarımı (Akurgal, 1993), Antik Yunan'da yerini parafinli tabletlere ucu keskin tahta kalemlerle yazı yazılan ve abaküsün kullanıldığı eğitim ortamlarına bırakmıştır (Dunn, 2011). Ortaçağda, abaküs hala önemli bir eğitim teknolojisi iken tahta kalemler yerini süslü fildişi yazma araçlarına bırakmış ve okuma-yazmayı kolaylaştırıcı tahta tabletler yaygınlaşmıştır (Lepi, 2012). Bu yavaş gelişim 18. ve 19. Yüzyılda gözle görülür bir şekilde değişmiş ve yaygınlaşan parasız resmi okullar ile mürekkepli kalemler, mekanik hesap makinaları, ve kara tahtalar sınıflara girmiştir (Akyüz, 2010; Dun, 2011). 20. Yüzyıl ise eğitim teknolojileri açısından etkili bir çağ olmuş ve eğitim öğretim ortamları radyo, televizyon, tepegöz, projeksiyon makinaları ve ardından da bilgisayar ile tanışmıştır (Ball & Bogatz, 1970; Bogatz & Ball, 1971; Özdil, 1985; Van Meer, 2003). 2000'lere bilgisayarlarla giren sınıflar, çok kısa bir zamanda akıllı cevaplama aygıtları, laptop, Ipod, doküman kamerası, Internet, akıllı telefon, sosyal medya ve etkileşimli mobil uygulamalarla buluşmuştur (Lepi, 2012). Tüm bu süreç tabletleri de öğretim ortamına taşımış ve 1:1

sisteminin devamı olan, her çocuğa bir tablet kampanyalarına ön ayak olmuştur. Tayland, Amerika, Etiyopya, Hindistan ve Hollanda'da yürütülen OTPC projeleri ve Afganistan, Brezilya, Mısır, Kenya, Meksika, ve Filipinlerdeki Global Öğrenme Portalı (GLP-Global Learning Portal), ve UNESCO'nun Lübnan, Beyrut ve Fransa'da yürüttüğü "dijital ayrımla mücadele" (combat the digital divide) ve Kore'deki akıllı eğitim (smart education) projelerinden sonra, Türkiye'de aynı yaklaşımla zorunlu eğitimde tablet bilgisayar entegrasyonu FATIH projesi ile hedeflenmektedir.

2.1 Eğitimde FATIH Projesi

"Yarını bugünden yakalamak" sloganı ile ortaya çıkan FATIH projesi eğitimde teknoloji fırsat eşitliğini sağlamayı ve öğretimde bilgi ve iletişim teknolojileri kullanımını yaygınlaştırmayı hedef alarak proje sürecinde 42.000 okula Internet ağ bağlantısı, 570.000 sınıfa etkileşimli tahta ve 11.000.000 öğrenciye tablet sunma sözü vermiştir. Bunun yanı sıra, beş temel bileşen olarak ortaya konan amaçlar şu şekildedir:

"1. Donanım ve Yazılım Altyapısının Sağlanması
2. Eğitsel e-İçeriğin Sağlanması ve Yönetilmesi
3. Öğretim Programlarında Etkin Bilgisayar Teknolojileri (BT) Kullanımı
4. Öğretmenlerin Hizmet-içi Eğitimi
5. Bilinçli, Güvenli, Yönetilebilir ve Ölçülebilir BT Kullanımının" ("FATIH Project," 2012).

2010 yılında projenin tanıtılması ile başlatılan süreçte, ilk pilot çalışmalar 2012 yılında 17 farklı şehirdeki 52 okulda, 1000.000 etkileşimli tahtanın sağlanması, 3362 okula Internet alt yapısı sağlanması ve 36.000 öğrenciye ve 13.000 öğretmene tablet bilgisayar dağıtılması ile başlatılmıştır. Bu çalışmaları, 81 ilçede kurulan 110 uzaktan eğitim merkezi ile öğretmenlere verilen 30 saatlik hizmetiçi eğitim takip etmiştir. Ayrıca, e-içerik ihtiyacın karşılamak üzere Eğitim Bilişim Ağı (EBA) adında bir web sayfası kurulmuştur (eba.gov.tr). 2013 yılında, etkileşimli tahta bulunan ve tablet dağıtılan okul sayısı 271'e yükseltilmiştir (Akgül, 2013).

Projenin toplam bütçesi, dönemin başbakan yardımcısı Ali Babacan tarafından 7-8 milyar dolar olarak açıklanırken (“Fatih projesinde maliyet,” 2012); CHP İzmir milletvekili bütçenin 10 yılda 40 milyar doları aşacağını açıklamıştır (Baransu & Çelik, 2012). Proje kapsamında şimdiye kadar üç ihale yapılmış olup, birinci ihaleyi alan General Mobile firmasından tanesi 599 TL olmak üzere 4000 tablet alımı yapılmış ve Vestel firmasından 84.921 adet etkileşimli tahta toplam 339.6 milyon TL karşılığında satın alınmıştır (Kustur, 2012). İkinci ihalede, yine Vestel’den 49.000 tablet alınmış ve son ihalede, Telpa A.Ş. (Samsung distribütörü) firmasından toplam 409 milyon TL karşılığı 65.000 tablet, Vestel firmasından 999.7 milyon TL karşılığı 347.367 etkileşimli tahta, OYTEK firmasından 96.5 milyon TL karşılığı 13.645 adet A3 yazıcı ve 28.351 adet A4 yazıcı satın alınmıştır.

Ekonomik boyut, projenin devlet bütçesindeki yerini ve finansal karşılığını göstermek açısından önemli bulunmuştur. Ayrıca farklı ihalelerle satın alınan tabletlerin farklı özellik göstermesi, ve oluşan problemlerde her firmanın yalnızca kendi ürününden sorumlu olmasının proje ile ilgili sorunların anlaşılmasına dair temel bir bilgi olduğu düşünülmektedir.

2.2 Teknolojiden Beklentiler: Savunanların Savları ve Şüphecilerin Savları

Teknolojinin eğitimde kullanılmasına dair beklentiler, üç temel başlıkta incelenmiştir. Birincisi, teknolojinin değişim öznesi olacağına ve ekonomik rekabet edebilirliliği daim kılacağına dair beklenti. Okullardaki teknoloji entegrasyonunun savunucuları teknoloji ile değişen kültür ve ekonomi için okulun olabildiğince yeni teknolojileri adapte ederek gelişen dünyaya ve ekonomik sisteme uyum sağlayabilecek bireyler yetiştirmesi gerektiğini öne sürmektedirler (Brown, 2007; Curriculum Corporation, 2006; Newby, Stepich, Lehman ve Russell, 2006). Bu savın karşısında duran skeptikler ise teknolojinin öneminin sürekli tekrar edilmesinden doğan bir söylem oluştuğunun altını çizerek, okul sisteminde yarını yakalamak adına yapılacak hızlı reformların etkili olamayacağını, çünkü okulun bir kare bulmaca gibi iç içe geçmiş bir çok bileşenden oluştuğunu vurgulamaktadırlar (Collins &

Halverson, 2009; Cuban, 2001; David, 2009). İkinci beklenti, teknolojinin öğrenme ve öğretmede sorunlara çözüm olarak görülmesidir. Bu savı destekleyenlere göre, teknoloji eğitimdeki standartları yükselterek, aktif ve işbirlikçi öğrenme ortamı, zengin öğrenme materyalleri sunarak öğrenenlerin konu öğrenimi, algı seviyeleri, problem çözme becerilerine olumlu katkısı olacağını savunmaktadırlar (Boster, Meyer, Roberto & Inge, 2002; Simonson & Maushak, 2001; Dunleavy & Heinecke, 2007; Lewis, 2004; Maushak, Chen, & Lau, 2001; Sivin-Kachala, 1998; Tracey & Young, 2006). Fakat, bir diğer taraftan şüpheciler, belirtilen beklentilerin karşılanabilmesi için öğrenci sayısının (Mann, Shakeshaft, Becker, & Kottkamp, 1999; Scardamalia & Bereiter, 1996; Sivin-Kachala, 1998), donanım ve yazılım tasarımının (Empirica, 2006; Korte & Husing, 2007; Pelgrum, 2001), öğretmenin adaptasyonu ve uzmanlığının (Becta, 2004; Cuban, 2001; Lim & Khine, 2006; Sivin-Kachala, 1998) yanı sıra var olan teknolojinin kullanıldığı öğretimin kalitesi ve uygulanna metodlojinin uygunluğunun (Baker, Gearthart & Herman, 1994; Mann vd., 1999) çok daha önemli olduğunun altını çizmektedirler. Son olarak, üçüncü grup beklentide, teknolojinin eğitimin köklü sorunlarına çözüm olup olamayacağı tartışılmıştır. Burada entegrasyon taraftarları, teknolojinin iş dünyası, bilim, eğlence gibi sektörlerdeki çözümlerinden hareketle, teknolojinin eşitlik, başarı, kendi başına öğrenme, ve hayat boyu öğrenme konularında bireylere kapılar açabileceğini öne sürmektedirler (Collins ve Halverson, 2009; Seels ve Richey, 1994). Diğer bir taraftan, skeptikler bu çözümlerin sadece okullara teknoloji getirmeyle çözülemeyeceğini bunun toplumun bütününü kapsayan çok sistemli ve çok boyutlu bir reform süreci olduğunu belirtmektedirler (Cuban, 2001; Koparan & Güven, 2012).

2.3 Eğitimde Tablet Kullanımına Dair Avantajlar ve Dezavantajlar

Eğitimde teknoloji kullanımının yarattığı beklentilere dair var olan tartışmaların ardından, bu başlık altında, tablet bilgisayar kullanımına ilişkin bu beklentileri yaratan avantajlar ve diğer taraftan şüphecilerin fikirlerini destekleyen dezavantajlar FATIH projesinin değerlendirme sonuçları ile birlikte sunulmuştur. Yapılan araştırmalarda, tablet bilgisayarın motivasyon üzerinde olumlu etkisi olduğu (Price &

Simon, 2009; Mills, 2012), zaman ve mekandan bağımsız öğrenmeyi sağladığı (Nie, Armellini, Witthaus & Barklamb, 2011), eğitim öğretim sürecini destekleme potansiyeli olduğu (Enriquez, 2010; Gorgievski, Stroud, Truxaw, & DeFranco, 2005; Koile & Singer, 2006; Phillips, & Loch, 2011; Sneller, 2007), etkileşimli ve işbirlikçi öğrenmeye olumlu etkisi olduğu (Moore & Dicken, 2006; Sneller, 2007; Rawat, Riddick, & Moore, 2008; Romney, 2010; Ellington, Wilson, & Nugent, 2011; Jones, & Sinclair, 2011; Loch, Galligan, Hobohm, & McDonald, 2011; Mulholland, 2011) gibi sonuçlara ulaşılmıştır. Var olan alan yazına parallel olarak FATIH projesinde tablet bilgisayar kullanımının Türk eğitim sistemindeki olumlu çıktılarından bazıları şöyledir: öğrencinin dikkatini çekerek motivasyonu teşvik etmesi (Dursun vd., 2013; Güllüpınar, Kuzu, Dursun, Kurt, Gültekin, 2013; Kuzu vd., 2013), öğrenme-öğretme ortamını zenginleştirmesi (Akbaşlı, Taşkaya, Meydan, & Şahin, 2012; Dursun vd., 2013; Çiftçi, Taşkaya, & Alemdar, 2013; Pamuk, Çakır, Ergun, Yılmaz, Ayas, 2013), bilgiye ulaşımı kolaylaştırması (Çiftçi, Taşkaya, & Alemdar, 2013; Dursun vd., 2013; Güllüpınar vd., 2013; Kuzu vd., 2013). Bunların yanı sıra, tablet bilgisayarın öğrencilerin ağır okul çantalarına çözüm olabileceği de alan yazında yer almaktadır (Çiftçi vd., 2013; Dursun vd., 2013; Güllüpınar vd., 2013)

Alan yazında eğitimde tablet kullanımına dair bahsedilen dezavantajlardan bazıları şu şekilde sıralanmıştır: Sınıfta öğrencilerin dikkatini dağıtması (Bacon, 2013; Lanir, 2012; Mares, 2012; Schumacher, 2013), eğitim için kullanılacak uygulama ve e-içerik eksikliği (Goodwin, 2012; Purcell, Entner & Henderson, 2010; Shuler, 2012), tabletin teknik eksiklikleri; klavyenin olmaması, ekranının kolay hasar göstermesi, tamirat masrafları, hassaslığı, ve veri girişine elverişli olmaması (Bacon, 2013; Garfield, 2005; Jones, 2012; Mock, 2004; Oh & Gwizdka, 2010; Sherber, 2014; Smith, 2005). Bu çalışmalara parallel olarak FATIH projesinde yer alan tabletlere dair belirtilen dezavantajlı durumlardan bir kaçı şöyle sıralanmıştır: E-içerik ve z-kitap yetersizliği (Bilici, 2011; Dursun vd., 2013; Kuzu vd., 2013; Pamuk vd., 2013), tablete dair teknik problemler (Çiftçi vd., 2013; Gürol, Donmuş, & Arslan, 2012), ve sınıf yönetimine dair sorunlar (Gürol, Donmuş, & Arslan, 2012; Kuzu vd., 2013).

2.4 Öğretim Tasarımı

Alan yazında tartışılan son başlık, öğretim tasarımı modelleri ve bunların teknoloji entegrasyonunu çözümlemede ya da planlamada kullanımı olmuştur. Bu kapsamda, ADDIE (Analiz, Tasarım, Geliştirme, Uygulama ve Değerlendirme) modelinin yanı sıra, Ragan ve Smith (2005) Sistem Modeli, Dick, Carey ve Carey (2005) Modeli, ve Morrison, Ross ve Kemp (2006) Modeli sunulmuştur. Bunların yanı sıra, teknoloji kullanımı ve entegrasyonu için geliştirilen ASSURE modeli, aşamaları (öğrenen analizi, kazanımların belirlenmesi, metotların seçimi, medya ve materyallerin kullanımı, öğrenen katılımı ve değerlendirme) açıklanmıştır (Heinich, Molenda, Russel, & Smaldino, 1996). Keller (1986) tarafından geliştirilen ARCS modeli önerdiği öğrenme döngüsü ile sunulmuştur. Ayrıca, Shih's Mobil Öğrenme Modeli (Shih & Mills, 2007), Xianzhong, Rensheng, Fend ve Zhongmei (2008) tarafından geliştirilen e-öğrenme sistem modeli, ile Sitti, Sopeerak ve Sompong (2013) tarafından tasarlanan pbCONNEC modeli tartışılmıştır.

3. Yöntem

Çalışmanın amacı olan tablet bilgisayar eğitim sürecini yakından irdelemek ve tablet bilgisayarın uygun ve etkili kullanımına dair bir model geliştirme çabasından hareketle, bu çalışmanın yöntemi olarak kuram oluşturma (grounded theory) seçilmiştir. Kuram oluşturmak için etkili bir nitel araştırma yöntemi olan kuram oluşturma (Glaser & Strauss, 1967), araştırmanın çatısını esnek bir şekilde oluşturabilmek ve çok çeşitli kavramların irdelenmesini sağlayabilmek için sistematik bir yol sunar (Bryant, 2002; Strauss, 1987). Bu çalışmada, Strauss (1987; Strauss & Corbin, 1998) tarafından şekillendirilen kuram oluşturma takip edilmiştir.

3.1 Araştırma Süreci

Araştırma süreci ODTÜ Etik Komitesinden gerekli iznin alınması ile başlatılmıştır. Çalışma için uygun okul seçildikten sonra, gerekli izinler alınarak okulda çalışmanın tanıtımına ilişkin öğretmenler ve idarecilerle bir toplantı düzenlenmiştir. Çalışmanın akışı Strauss (1987) kuram oluşturma ekolünün önerdiği doğrultuda üç temel bölümde ilerlemiştir: açık, eksen ve seçici kodlama. Birinci bölümde, alan yazından, ve öncül uzman ve öğretmen görüşmelerinden yararlanarak kilit kavramlar (key concepts) belirlenmiştir. Bu kavramlar ile şekillendirilen görüşme formları oluşturulduktan sonra kolay ulaşılabilir durum örneklemesi ile öğretmen görüşmelerine başlanmış ve temel kategorilere ulaşabilmek için, karşılaştırma ve hatırlatıcı notlar (memo-writing) tekniği ile açık kodlama yapılmıştır. Çalışmanın kavramlarına dair ilk şekil açık kodlama ile verildikten sonra, çalışmanın ikinci kısmında en uygun katılımcıları belirlemek için yapılan amaçlı örneklem ile ortaya çıkan her bir temel kategori için yeterli veri toplanmaya çalışılmıştır. Bu bölümde yine karşılaştırma ve hatırlatıcı notlar ile eksen kodlama yapılmıştır. Bu bölüm veri doyumuna ulaşılana kadar tekrar edilmiş, böylelikle toplam 17 öğretmenle görüşme yapılmıştır. Var olan her bir kategoriye dair yeterli veri elde edilmesinden sonra, seçici kodlama ile kuram geliştirme kısmına geçilmiş ve hem var olan hem de optimal duruma ilişkin iki tane model geliştirilmiştir. Daha sonra, çalışmanın kendi içindeki kuramsal doyumu sorgulandıktan sonra, araştırma sonlandırılmıştır.

3.2 Çalışmanın Veri Kaynakları

Bu çalışmayı oluşturacak temel veri kaynakları öğretmen ve uzmanlarla derinlemesine yapılan görüşmelerdir. Bunun yanı sıra, Strauss ve Corbin (1990)'in önerdiği gibi alan yazın, ve katılımcıların sunduğu materyal ve dokümanlar, ayrıca medyada FATIH projesine ilişkin yer alan haberler incelenerek çalışmayı desteklemek için kullanılmıştır.

Kuramsal Örneklem ve Araştırmanın Katılımcıları

1. Aşama: Kolay Ulaşılabilir Durum Örneklemesi: Araştırma kapsamında, FATIH projesinin pilot okullarından biri olan Ankara Hasan Ali Yücel Anadolu Öğretmen Lisesi, seçilmiştir. Kolay ulaşılabilir durum örneklemesi ile belirlenen 3 öğretmen ilk görüşmeler için seçilmiştir (bkz. Tablo 1, seçilen öğretmenler: Öğretmen A-B ve D). Yine aynı örneklem ile seçilen bilgisayar ve öğretim tasarımı alan uzmanı, eğitim bilimleri ve öğretim yöntemleri alan uzmanı, ve uzaktan eğitim uzmanı olmak üzere üç uzman ile görüşmeler düzenlenmiştir.

2. Aşama: Amaçlı Örneklem: Bu örnekleme yöntemi ile seçilen diğer 13 öğretmen ve 1 okul idarecisi ile yapılan görüşmelerde ortaya çıkan kategorileri tanımlayabilecek ölçüde veri toplanmış ve toplanan verinin yeterli görüldüğü noktada araştırma sonlandırılmıştır.

Tablo 1

Öğretmenlerin Demografik Bilgileri

Öğretmen	Branş	Deneyim (yıl)	Cinsiyet	FATIH projesinden önce tablet sahibi mi?
Öğretmen A	Bilgisayar	11	K	EVET
Öğretmen B	Tarih	21	K	EVET
Öğretmen C	Resim	18	K	EVET
Öğretmen D	İngilizce	22	E	HAYIR
Öğretmen E	Matematik	11	K	EVET
Öğretmen F	Biyoloji	17	K	HAYIR
Öğretmen G	Türk Dili ve Edebiyatı	18	K	EVET
Öğretmen H	Türk Dili ve Edebiyatı	24	K	HAYIR
Öğretmen I	Almanca	12	K	HAYIR
Öğretmen J	Müzik	23	E	HAYIR
Öğretmen K	Fizik	11	K	HAYIR
Öğretmen L	Kimya	21	K	HAYIR
ÖğretmenM	Coğrafya	25	E	HAYIR
Öğretmen N	İdareci	22	K	HAYIR
Öğretmen O	İngilizce	17	E	HAYIR
Öğretmen P	Meslek Bilgisi	15	E	HAYIR
Öğretmen R	Felsefe	20	E	HAYIR

Not. K: Kadın, E: Erkek

3.3 Veri Toplama Yöntem ve Araçları

Bu araştırmada, veri toplamak için görüşme formları ve doküman analizi formu geliştirilmiştir (bkz. Ek B, C ve D). Çalışmanın katılımcıları olan öğretmenler ve uzmanlar için ayrı ayrı geliştirilen görüşme formları, uzman değerlendirilmelerinden sonra uygulanmıştır. Çalışma kapsamında öğretmenlerin materyal ve dokümanlarını değerlendirmek ve medyada yer alan haberlerin araştırma sürecinde kullanılabilirliğini ölçmek için doküman analiz formu geliştirilmiştir.

3.4 Veri Analizi

Strauss (1987)'un önerdiği kuram oluşturma yaklaşımına paralel olarak bu çalışmada, açık, eksen ve seçici kodlama olarak üç tür kodlama yapılmıştır. Bu kodlamalar sırasında, veriyi özetlemek, yorumlamak ya da veriye ilişkin gözlemlenen durumu ayrıntılı açıklamak adına hatırlatıcı notlar tekniğinden faydalanılmıştır. Aynı zamanda, özellikle öğretmen görüşmelerinde elde edilen veriler sürekli olarak birbiri ile karşılaştırılarak benzerlikleri, ayrıldıkları noktalar ve oluşturdukları kategoriler sorgulanmıştır.

3.5 Çalışmanın Geçerliliği ve Güvenirliliği

Nitel araştırma yöntemi ile oluşturulan bu çalışmada, geçerlilik ve güvenirliliği sağlamak için alınan önlemler şu şekilde sıralanmıştır: Araştırmacının önyargılarını tanımlama, çeşitleme, katılımcı teyidi, meslektaş teyidi/ek kodlayıcı ve ayrıntılı betimleme. Bu bağlamda, veri toplamaya başlamadan önce araştırmacı kendi önyargılarını belirlemek adına, öngördüğü öğretim tasarımı modellerini belirlemiştir. Kodlama ve yorumlama sırasında, çizilen bu taslak modele yaklaşma eğilimi olup olmadığı ek kodlayıcılar yardımı ile de test edilmiştir. Veri çeşitlemesine ulaşabilmek için, veri kaynakları, öğretmen, uzmanlar, alan yazın ve medya olarak çeşitlenmiştir. Kodlamaların ve bulunan sonuçların katılımcıların cevaplarından uzaklaşamadığını teyit etmek için kodlama sonrası her bir katılımcıya cevapları ulaştırılmış ve teyit etmeleri istenmiştir. Aynı zamanda, iki meslektaşın yardımı ile açık kodlama üç kişi tarafından yapılmış, eksen ve seçici kodlamada ise araştırmacının yapılandırdığı sonuçlar yine iki meslektaş tarafından kontrol edilerek geri bildirim vermeleri istenmiştir. Son olarak veri analizinde ve bunların bulgular bölümünde sunulmasında ayrıntılı betimlemeye başvurularak okuyucunun süreci ve varılan sonucu daha net anlaması için olabildiğince çok alıntılara başvurulmuş ve araştırma süreci detaylı anlatılmıştır.

3.6 Sınırlamalar

Bu çalışma, FATIH projesi pilot okulları kapsamında seçilen Hasan Ali Yücel Anadolu Öğretmen Lisesi'nde görev yapan 14 öğretmen ve 1 idarecinin yanı sıra, öğretmenlerin tavsiyesi ile ulaşılan başka pilot okuldan 2 öğretmen; bilgisayar ve öğretim teknolojileri, eğitim bilimleri ve uzaktan eğitim alanlarından seçilen 3 uzman; öğretmenlerin sundukları dokümanlar ile medyada FATIH projesi ile ilgili haberlerle sınırlandırılmıştır.

3.7 Sınırlılıklar

Çalışma temelde tek bir okulda gerçekleştirilmiş ve katılımcılar amaçlı örneklem yöntemleri ile belirlenmiştir. Bu nedenle çalışmanın bulguları genellenememektedir. Bu durum çalışmanın güvenirliliğini kısmen tehdit etmektedir. Araştırmacının, çalışma süresince hem veri toplama, hem veri analizi ve yorumunda aktif rol alması, alınan geçerlilik güvenirlilik önlemlerine rağmen, belli ölçüde çalışmanın iç güvenirliliğini tehdit edebileceği düşünülmektedir.

4. Bulgular

Bu çalışmanın bulguları araştırma sorularına göre şekillendirilmiş olup dört başlık halinde sunulmuştur: Eğitimde tablet kullanımına dair beklentiler; tablet bilgisayarının eğitimdeki kullanımına dair avantajlar ve dezavantajlar ve işlevsel kullanımı için gerekli olan koşullar. FATIH projesi ile halihazırdaki koşullarda öğretimde tablet kullanımına dair bulguların öğretim tasarımı modeli halindeki sunumu ve optimal koşullar gerçekleştiğinde tablet kullanımına dair öğretim tasarımı modeli sonuçlar bölümünde tartışılmıştır.

4.1 Eğitimde Tablet Kullanımına Dair Beklentiler

Bu bölümde öğretmenlerin eğitimde tablet kullanımına dair FATIH projesinin üç yıl önce uygulanmaya başlaması ile oluşan beklentileri, bu beklentilerin ne ölçüde karşılabildiği araştırılmıştır. Çalışma sonuçları öğretmenlerin beklentilerinin temel olarak bir kaç noktada toplandığını göstermiştir. Bunlardan ilki "etkileşim." Bu boyutta, öğretmenler sınıf-içi, sınıf-dışı etkileşimin yanı sıra, etkileşimli etkinlik ve değerlendirme yapabilme, ve tüm bunları yaparken öğrencilerin tabletleri üzerinde kontrol sahibi olmaya dair beklentilerinin olduğunu belirtmişlerdir. Öğretmenin tableti veya sınıftaki etkileşimli tahta ile öğrencilerin ellerindeki tablet arasında beklenen etkileşim sağlanamadığı için bu noktada öğretmenler beklentilerinin hiçbirinin karşılanmadığı üzerinde durmuşlardır. İkinci boyut, "ağır okul çantalarına çözüm." Öğretmenler öğrencilerin kitap ve defterlerle dolu okul çantaları yerine tek bir teknolojik aletle bu kitap ve defter sorunsalının çözülmesini beklediklerini söylemişlerdir. Bu konuya dair beklentilerinin projenin başında karşılandığını belirten öğretmenler, çocukların tabletleri etkili olarak kullanamadıklarını belirterek, tekrar kitap ve defter taşımaya başladıklarından bahsetmişlerdir. Üçüncü boyut "Zengin öğrenme ortamı." Bu boyuta dair, zengin e-içerik, çoklu ortam desteği, etkileşimli materyaller ve ölçme-değerlendirmeye dair çeşitlilik alt boyutlar olarak incelenmiştir. Bunların arasından, sadece ölçme-değerlendirmede internetten test indirerek çözme veya çocuklara e-mail ile sınavları, alıştırmaları göndermede tabletin yarattığı kolaylık vurgulanarak öğretmenler beklentilerinin büyük ölçüde karşılandığını söylemişlerdir. Üzerinde sıklıkla durulan bir diğer boyut "teknoloji ile tanışmadır." Öğretmenler, projenin uygulamasındaki sıkıntıların bu boyutta sorunlar yarattığını söylemekle beraber, düşük gelirli ailelerden gelen ve henüz kişisel bir dizüstü bilgisayar edinme şansı olmamış öğrenciler için tabletlerin önemli olduğunu belirtmişlerdir. Beşinci boyut, "kullanılan kağıt miktarının azaltılması." Tabletin iyi bir görüntüleme aracı olduğunu söyleyen öğretmenler, şu andaki sistemde tabletleri etkili olarak kullanamadıklarını belirtmekle birlikte, projenin başında öğrencilere daha az kağıt-test ve alıştırma dağıttıklarını söylemişlerdir. Fakat, bu avantajlı durumu tabletlerdeki sorunlar nedeniyle çok uzun süreli tutamadıklarını anlatmışlardır. Altıncı boyut, "öğrencilerin motivasyonlarının artması." Bu boyutla ilgili olarak, öğretmenlerin derse dair motivasyonlarının artmasını beklerken, öğrencileri sadece tableti kullanmaya dair motive olduklarını vurgulamış ve beklentilerinin genel olarak karşılanmadığını söylemişlerdir. Yedinci boyut, "öğrenmede esneklik." Tabletin yer ve zamandan bağımsız öğrenmeyi teşvik edeceğine dair beklentilerinden bahseden öğretmenlerin yarısı bu beklentinin okulda Wi-Fi bağlantısı olmasından dolayı karşılandığına dair örnekler verirken, diğer yarısı tabletlerin eğitim-öğretim aracı olarak görülmediğini, kullanımın oyun aracı olma ile sınırlı olduğunu söylemişlerdir. Beklentilere dair son boyut "bilgiye erişim." Öğretmenler beklentilerinin en çok bu boyutta karşılandığını belirtmiş ve öğrencilerin tabletlerin okul için sağlanan Internet'e bağlanmaları ile çok çeşitli bilgiye anında ve hızlı bir şekilde ulaştıklarını anlatmışlardır.

Öğretmenlerin belirttikleri beklentilere benzer şekilde çalışmaya katılan uzmanlar da eğitimde tablet bilgisayardan beklenebilecek noktalardan bahsetmişlerdir. Ortaya çıkan beklentiler öğretmenlerin altını çizdikleri ile paralel olmakla birlikte yalnızca değerlendirme noktasında uzmanlar tabletin bir farklılık veya çeşitlilik yaratacağı konusunda şüphelerini belirtmişlerdir. Uzaktan eğitim uzmanı, e-eğitim kriterlerinin oluşturulması ve etkili bir şekilde uygulanması ile tablet bilgisayarın etkileşimli ve otantik ölçme-değerlendirme ortamları sağlayabileceğini vurgulamış, fakat diğer alan uzmanları bir değişim olmayacağı yönünde fikirlerini belirtmişlerdir.

4.2 Eğitimde Tablet Kullanımı: Avantajlar, Dezavantajlar, Koşullar

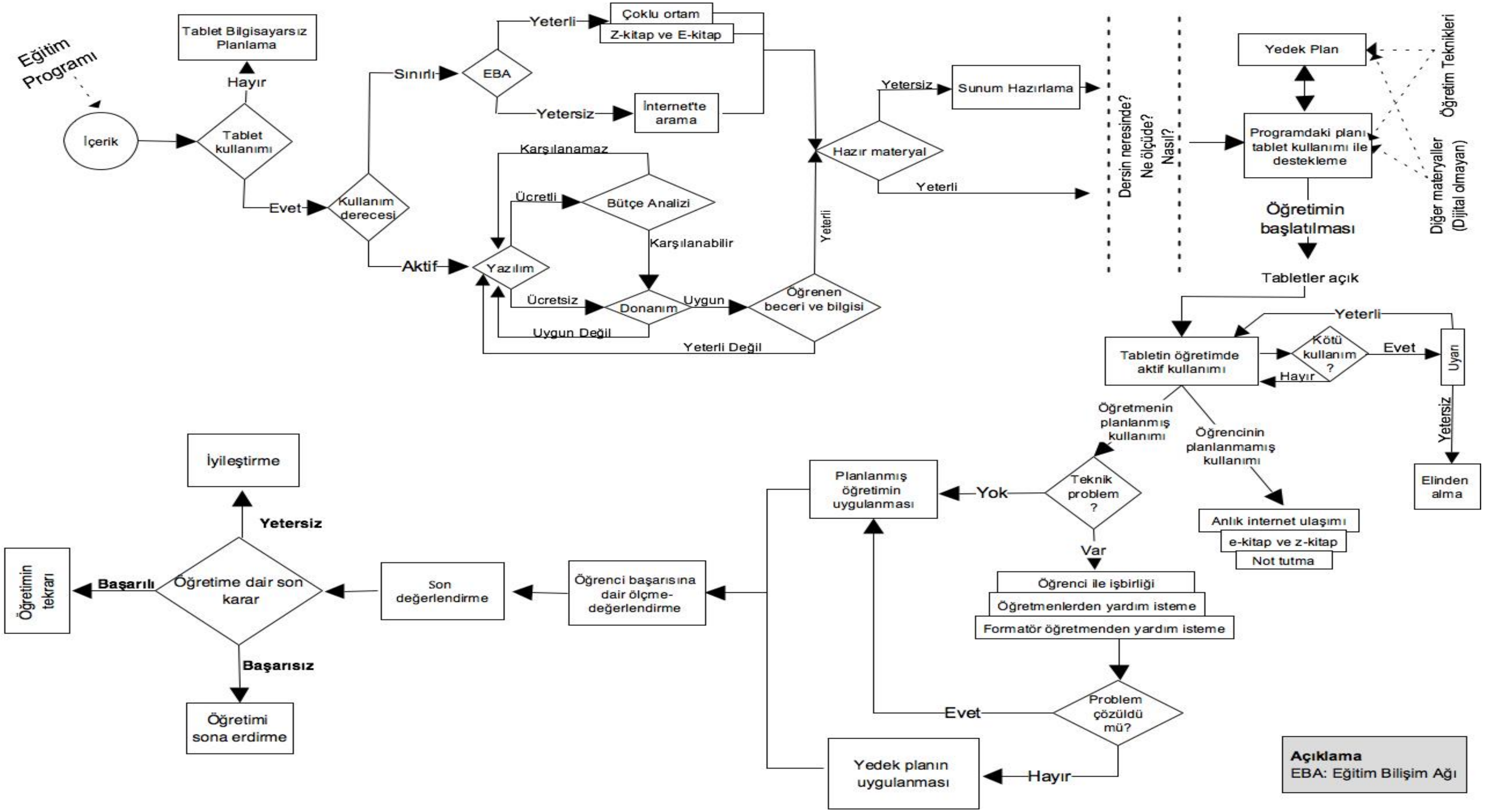
Projede üç yıl boyunca yer almış kişiler olarak öğretmenler, tablet bilgisayar kullanımının kendi sınıfları ve kendi dersleri için oluşturduğu faydalar, zararlardan bahsetmiş ve daha etkili bir kullanım için hangi koşulların oluşturulması gerektiğini listelemişlerdir. Bu noktada sonuçlar beş farklı boyuta işaret etmiştir. Her boyuta dair yaşanan avantajlar ve dezavantajların yanı sıra, oluşturulması gereken durum tartışılarak öğretmenlerin çözüm önerileri alınmıştır. Bu bağlamda birinci boyut, "teknoloji eşitliği karşısında teknolojik eşitsizliktir." Burada, FATIH projesinin tablet bilgisayar dağıtımı ile yarattığı eşitlikler ve sistemdeki sorunlar nedeniyle oluşan eşitsizlikler tartışılmıştır. Tabletlerin ücretsiz olarak dağıtılması, okulda bütün öğrencilerin Internet erişimi olması ve teknoloji ile tanışma imkanı yaratması, eşitliği destekleyen alt boyutlar olarak bulunmuştur. Fakat bir diğer taraftan, tabletlerin ekonomik durum gözetmeksizin herkese ücretsiz dağıtımı, tabletlerde okul dışı kullanım için 3G olmaması, ve öğrencilerin hali hazırdaki teknoloji tanışıklığı ve kullanma becerilerindeki farklılık var olan eşitsizliği desteklediği ortaya çıkarılmıştır. Bu konuda çözüm için oluşturulması gereken durumlar, koşullu dağıtım, her öğrencinin tek tip tablete sahip olması, ve öğrenci eğitimine ağırlık verme olarak bulunmuştur. İkinci boyut, "erişim ve görüntülemedir." Büyük miktarda bilgiye hızlı ve anında erişim sınıflarda öğretimin yararına kullanılabilirken, bu şekilde bilgiye erişim, güvenli olmayan Internet kullanımı, öğrenciler üzerinde kontrol eksikliği, teknik problemler, ve eğitim materyallerine ulamak için gerekli izin ve ödemelerin yapılmamış olması, bu sürecin dezavantajlı noktaları olarak saptanmıştır. Bu durum için, uzmanlar ve öğretmenlerin önerdiği koşullar, içerik filtreleme, tahta ve tabletler arası etkileşimin kurulması, ve teknoloji eğitimi olmuştur. Üçüncü boyut, "çoklu ortam." Bu boyutta, öğrencilerin çoklu ortam araçlarına ulaşımı eğitim-öğretimi destekler özellik gösterirken, EBA tarafından yeterli e-içeriğin hazırlanmamış olması, öğrencilerin bilgiye ulaşmalarının öğretmenlerin dersi üzerindeki olumsuz etkisi ve yine öğrencilerin ulaştıkları bilginin güvenirliliğini kontrol etme konusundaki yetersizliği dezavantajlı noktalar olarak saptanmıştır. Bu durum karşısında oluşturulması gereken koşular, EBA tarafından sağlanacak e-içerikler, okullara ayrılacak teknoloji bütçeleri, ve teknoloji eğitimi olarak bulunmuştur. Dördüncü boyut, "mali kazanç ya da israf." Bu boyutta, kağıt ve materyaller için ayrılan maliyetin düşmesi kazanç olarak nitelendirilmiş, bunun karşısında öğrencilerin tabletlere önem vermemesi ve araçların sık sık zarar görmesi israf olarak belirtilmiştir. Burada, daha iyi bir planlama, tabletin eğitimdeki yerini net bir şekilde belirleme, ve öğrenci-öğretmen eğitiminde kalitenin arttırılması önemli koşullar olarak bulunmuştur. Son boyut, "etkileşim." Öğrencinin e-içerikle, yazılım ve diğer insanlarla etkileşimi tabletin avantajlı alt boyutlar olarak bulunurken, etkileşimli tahta ile tabletlerin birbirini görmemesi, tabletin sınıftaki varlığının öğrenci üzerindeki dikkat dağıtıcı etkisi ve siber kabadayılık dezavantaj olarak bulunmuştur. Önlem için oluşturulması gereken koşullar, tahta-tablet etkileşiminin sağlanması, öğrenci teknoloji eğitimi ve öğretmen eğitimi olarak sunulmuştur.

5. Sonuç

Teknolojinin eğitimde kullanımı ve okulların teknolojik gelişmeleri takibe dair çabası yüzyıllar öncesinde dayanmaktadır (Lepi, 2012). Alan yazında görüldüğü gibi bu çabalar eğitim dünyasında ve iş dünyasında çeşitli beklentiler yaratmaktadır. Fakat Cuban (2001)'in belirttiği gibi okullardaki teknoloji entegrasyonu çabalarında başarı yine eğitimin bileşenlerinde saklıdır. Bu noktadan hareketle bu çalışma FATIH projesi ile öğrencilere dağıtılan tablet bilgisayarın öğretimdeki yeri üzerine bir araştırmadır. Çalışmanın iki asal boyutu vardır. Birincisi, hali hazırda var olan sistemde tablet bilgisayar kullanımı. Bunun için öncelikler öğretmenlerin tabletten ne bekledikleri, nasıl avantajlar elde ettikleri ve varsa tabletin yarattığı dezavantajlar sorgulanmıştır. Bundan hareketle, şekil 1'de görülen, tabletin mevcut öğretimde kullanımına dair model oluşturulmuştur. İkinci asal boyut ise optimal, ideal tablet bilgisayar kullanımını. Bunun için öğretmenlerin beklentileri, alan yazın ve uzman görüşleri ile sorgulanmış, en ideal beklentiler seçilmiştir. Ayrıca tabletin yarattığı avantajlı durumları maksimum boyuta çıkartıp dezavantajlı durumları minimalize edecek koşullar saptanmış ve tüm bu verilen ışığında, şekil 2 ve 3'te görülen optimal model oluşturulmuştur. Aşağıda bu modeller ayrı ayrı açıklanmaktadır.

5.1. Model 1: Tabletin Mevcut Öğretimde Kullanımı

Mevcut sistemde, şekil 1'de görüldüğü gibi öğretim tasarımı eğitim programı ile başlamaktadır. Programdan öğretilecek içerik alındıktan sonra, programda tablete dair bir vurgu olmadığı için öğretmenler, tablet kullanıp kullanmayacaklarını karar vermektedirler. Kullanmaya karar vermeleri ile başlayan tabletli öğretim tasarımda öncelikle ne ölçüde bir kullanım olacağı kararı verilmektedir. Bu noktada sınırlı bir kullanımı tercih eden öğretmenler, öncelikle EBA markete girip aradıklarının olup olmadığına bakmaktadırlar. Eğer EBA burada yeterli ise sunulan çoklu ortam materyalleri ya da z-kitaplar kullanılmakta, yetersiz ise yine çoklu ortam materyalleri için Internet'te arama yapılmaktadır. Diğer bir taraftan sadece üç öğretmen tarafından sürecin anlatıldığı aktif tablet kullanımı bir yazılım ya da uygulama kullanmayı içermektedir, ve bu noktada öğretmenler, yazılımın ücretli olup olmadığını donanımla uyuşup uyuşmadığını ücretli yazılımları finanse edip edemeyeceklerini ve son olarak da kendi bilgi ve becerilerinin bu yazılımı kullanmaya yetip yetmeyeceğini analiz etmektedirler. Daha sonra materyalin ya da yazılımın seçilmesi ile bu materyalin eğitim programındaki içeriğe nasıl entegre edileceği üzerine bir planlama süreci başlamaktadır. Bu planlama diğer öğretim teknikleri ve materyallerden de yararlanarak yapılırken süreçte olabilecek her hangi bir aksamaya önlem olarak yedek plan da geliştirilmektedir. Öğretim planının ve yedek planın hazır olması ile uygulama tabletlerin öğretim süresince açık olması ile başlatılmaktadır. Uygulama sırasında, öğrencilerin kötü kullanımı, tabletten dersi takip etmek yerine başka uygulamalarla meşgul olmaları sorunu uyarı ve daha üst düzeyde öğrencinin elinden tableti alma ile çözülmektedir. Uygulama sırasında, kendi planladıkları tablet kullanımı dışında öğrencilerin olumlu tablet kullanımını da belirten öğretmenler, kendi planlarını herhangi bir teknik problem oluşmadığı veya teknik probleme kolayca çözüm bulunduğu zamanlarda devam edebilmektedirler. Oluşan teknik problemin, öğrencilerden alınan yardım, teknoloji konusuna hakim öğretmen veya formatörlerden alınan yardımla çözülememesi durumunda, yedek plan devreye girmektedir. Ölçme değerlendirmenin uygulaması ile sonlanan bu aşama yerini öğretimin değerlendirildiği son aşamaya bırakmaktadır. Bu noktada, başarısız bulunan öğretim sonlarılırken başarılı öğretimin aynen tekrarlandığı, az başarılı bulunan uygulamalarda da iyileştirmeye gidildiği görülmektedir.



Şekil 1 Tabletin Mevcut Öğretimde Kullanımına Dair Tasarım Modeli

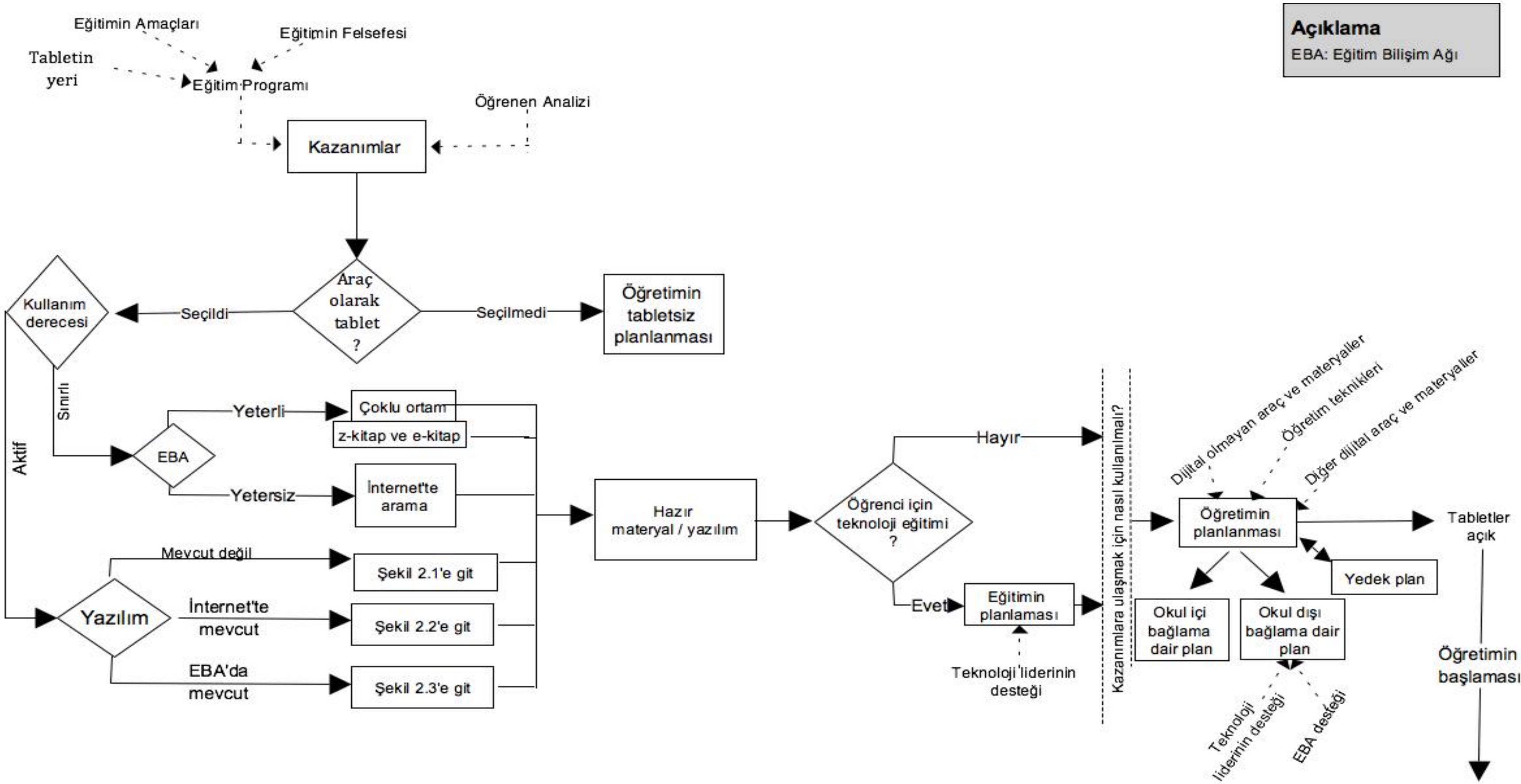
5.2 Model 2: Tabletin Öğretimde Optimal Kullanımı

Çalışmada ortaya çıkan koşulların sağlanması ile öğretmenler tarafından ve uzmanlar tarafından belirtilen öğretim basamakları, tablet kullanımına dair optimal bir model oluşturmuştur. Şekil 2 ve 3'te sunulan bu model, kullanılabilecek ideal modellerden biri olarak sunulmaktadır. Başka çalışmaların, farklı boyutları ele alarak daha farklı modeller ortaya çıkartabileceği kabul edilmektedir.

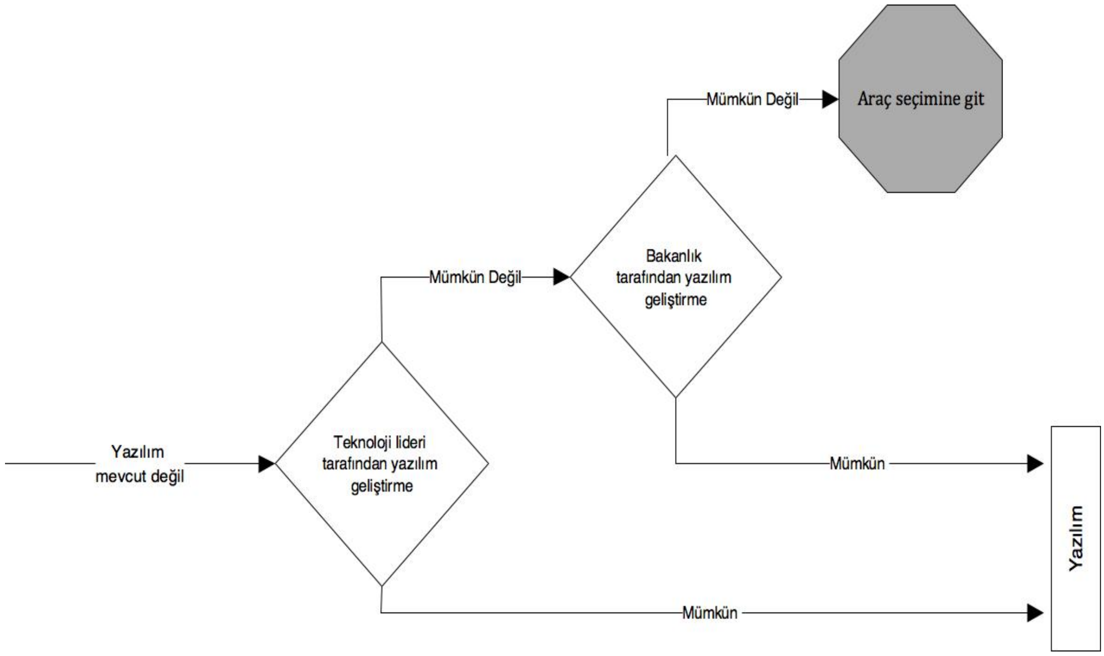
Bu çalışmada ortaya çıkan modele göre, öğretim tasarımı süreci yine eğitim programı ile başlamaktadır. Daha esnek ve her bir noktanın tanımlanmadığı ve kazanımların sunulduğu programdan elde edilen kazanımlar bu tasarımın başlangıç noktasını oluşturmaktadır. Öğrenen analizi ile desteklenen kazanım belirlemeden sonra, yine tablet bilgisayarın öğretim aracı olarak seçilmesi ile kullanım oranına karar verilmektedir. Snırlı kullanım, bir önceki gibi öğretmeni EBA market ve Internet'e çoklu ortam elemanı bulmaya yönlendirirken, yazılım ve uygulama kullanmayı içeren aktif kullanım istenen materyalin EBA'da, Internet'te bulunması veya bu kanallarda bulunmamasına göre değişen farklı yollar önermektedir. İstenen materyalin hiçbir kanalda olmaması, şekil 2.1'de görüldüğü gibi bu yazılımın teknoloji lideri tarafından geliştirilip geliştirilemeyeceği ya da bakanlık tarafından sağlanıp sağlanamayacağı üzerine analizlere yönlendirmektedir. İstenen yazılımın EBA'da mevcut olmaması ama Internet'te mevcut olması durumunda, şekil 2.2'de görüldüğü gibi yazılımın eğitim programı ile paralel olup olmadığı, donanım ile uyumu, ücretli olup olmaması gibi temel analizlerin yanı sıra, öğretmen, öğrenci bilgisinin yeterli olup olmadığına dair çeşitli analizler önerilmektedir.

Öğretmen ve öğrenci bilgi ve becerisinin yetersizliği konusunda okulda bulunan teknoloji liderinden destek alarak bir sonraki aşamada bu teknoloji eğitiminin planlaması yapılmaktadır. Yazılımın kullanımına dair olası başka kısıtlama veya sorunları kontrol ettikten sonra yazılım öğretimin planlanmasında kullanılmak üzere hazır hale gelmektedir. Aktif kullanımdaki son durum, EBA'da oluşturacak zengin dokümantasyon ile yazılıma ve uygulamaya bakanlığın sunduğu bir kanaldan ulaşmadır. Bu noktada, pek çok analiz hali hazırda bakanlık tarafından yapılmış olacağı için, öğretmen, öğrenci bilgisi ve olası sorunlara karşı yapılacak bir analizin yeterli olabileceği ortaya çıkarılmıştır.

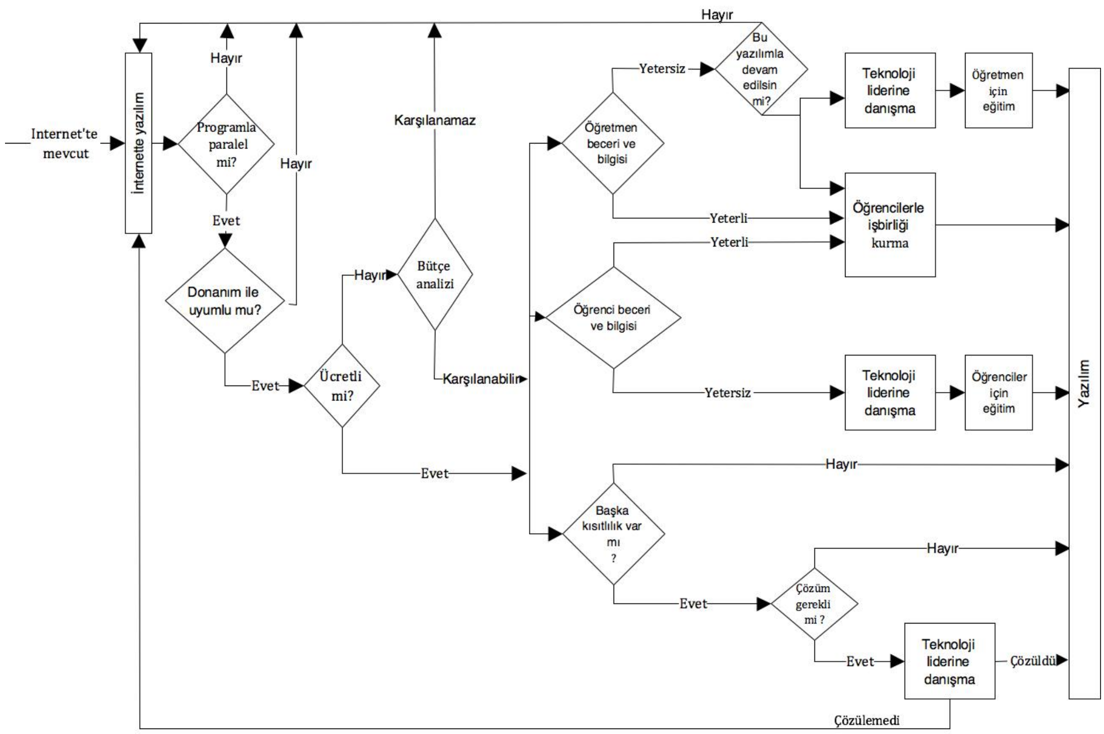
Materyalin veya yazılımın belirlenmesinin ardından, öğretimin dijital olan veya olmayan diğer materyallerle ve öğretim yöntem ve teknikleri ile desteklenerek planlanması gelmektedir. Bu planlamada olası teknolojik aksaklıklar için yine yedek plan süreci devreye sokulmaktadır. Burada yapılan tasarım ve geliştirmenin ardından, tabletlerin açık olduğu uygulama süreci başlatılmaktadır. Uygulama sürecinde gerekli öğrenci teknoloji eğitimleri verildikten sonra herhangi bir teknik problem yoksa uygulama aynen, varsa yedek plan işlenmektedir. Bu süreçte, öğretmenin ve öğrencinin plansız tablet kullanımı da farkında olunması ve desteklenmesi gereken olumlu bir noktadır. Uygulama ile eş zamanlı olarak yürütülen ara değerlendirme süreci uygulanın planlı olarak gidip gitmediğine dair bir soru ile başlatılmakta ve iyileştirmenin gerekli olup olmadığının sorgulanmasının ardından problemin nerede olduğunun saptanarak mümkünse sorun gidermenin başlatılmasını önermektedir. Sorun gidermenin mümkün olmadığı durumlarda son değerlendirme için gerekli noktaların alınıp uygulama ile devam etmesi istenmektedir. Uygulama sonrası takip edilecek aşama son değerlendirmedir. Burada bütün tasarıma dair son karar kazanımlar ışığında, öğretimde oluşan yan etkilerin analizi ve öğretmen öğrenci tatminin değerlendirmesi ile verilmektedir. Eğer karar iyileştirme yönündeyse sorun giderme süreci, ara değerlendirmeden gelen bilgiler de hesaba katılarak başlatılmaktadır. Kararın, öğretimin sona erdirilmesi veya aynen tekrarlanması yönünde olduğu durumlarda ise her hangi bir iyileştirme sürecine girmeden değerlendirilmenin bitirilmesi belirtilmektedir.



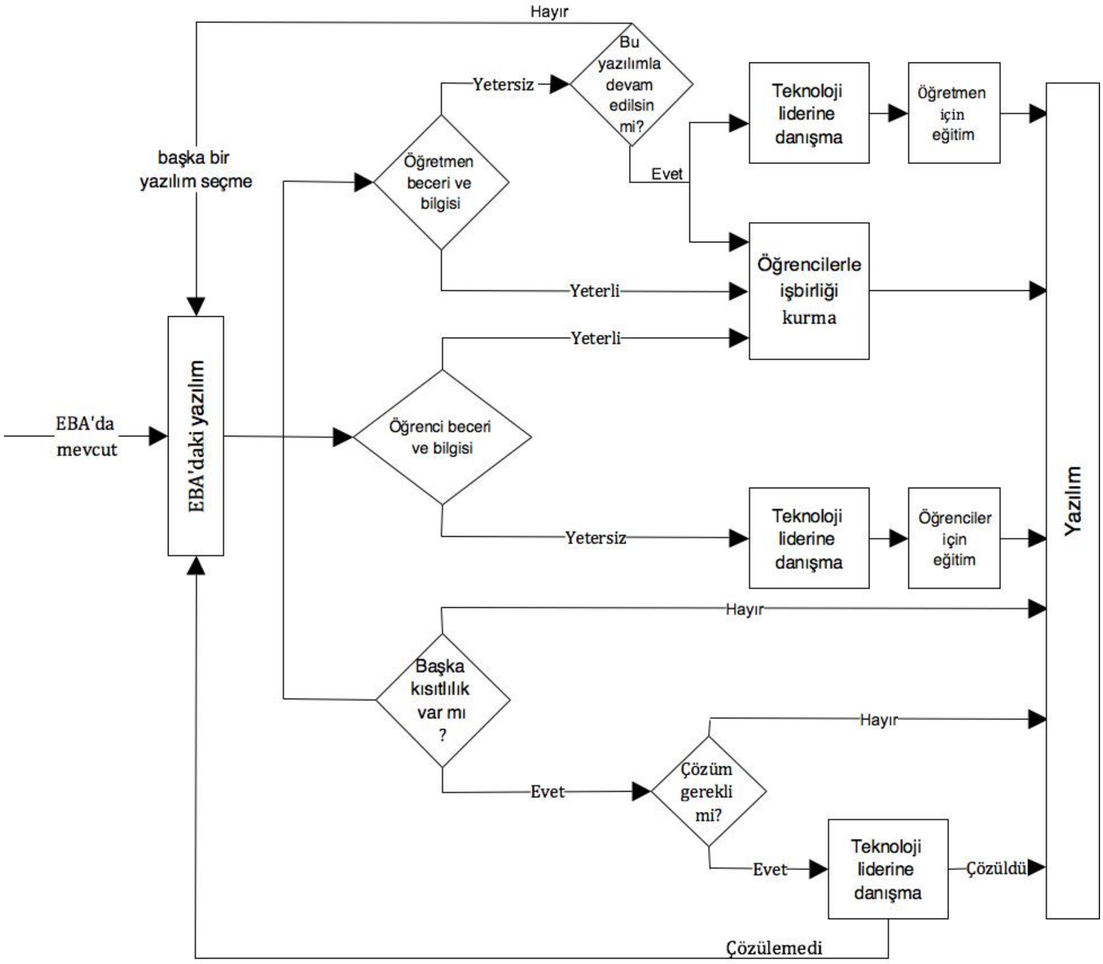
Şekil 2 Tabletin Eğitimde Kullanımı için Optimal Öğretim Tasarımı Modeli, 1. Bölüm



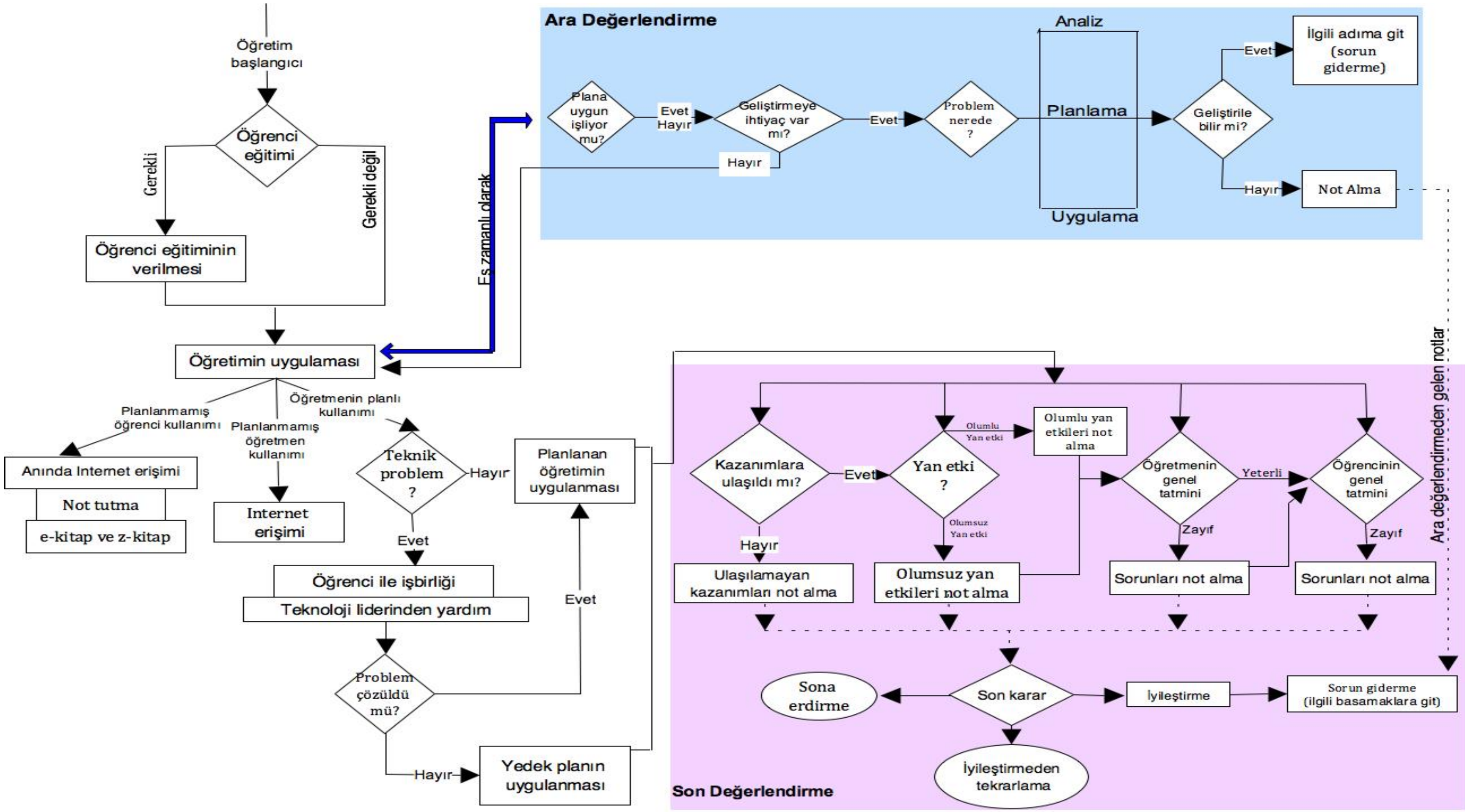
Şekil 2.1 Birinci Durum için Analiz Basamakları: Yazılım Mevcut Değil



Şekil 2.2 İkinci Durum için Analiz Basamakları: Yazılım Internet'te Mevcut



Şekil 2.3 Üçüncü Durum için Analiz Basamakları: Yazılım EBA'da Mevcut



Şekil 2 Tabletin Eğitimde Kullanımı için Optimal Öğretim Tasarımı Modeli, 2. Bölüm

6. Öneriler

Bu araştırma süresi sonucunda elde edilen veriler ışığında, FATIH projesinde çalışan yetkililere, program geliştirme uzmanlarına, yazılım geliştirme uzmanlarına, ve öğretmenlere önerilerde bulunulmuştur.

FATIH projesi kapsamında çalışıp tablet bilgisayar konusunda karar verme yetkisinde olan kişilere aşağıdaki öneriler sunulmuştur.

- Proje kapsamında daha sistematik bir planlama-uygulama-değerlendirme süreci tasarlamak ve elde edilen verilere göre hala pilot aşamada olan projenin aksayan kısımlarını saptayarak sistematik düzeltmeler yapmak gerekmektedir.
- Tablet bilgisayar kullanımına dair ilgili düzeltmelerin eğitim programlarına yansıtılması ve öğretmenlere yol gösterip örnek teşkil edebilecek etkili planlamaların yapılması gerekmektedir.
- Pek çok aksaklığa neden olan formatörlük sisteminden ziyade, program geliştirme ve teknolojide uzman teknoloji liderleri seçilerek okullarda sürekli istihdamı sağlanmalıdır.
- EBA marketin içerik açısından zenginleştirilerek öğretmenlerin hizmetine sunulması gerekmelidir.
- Hayat boyu öğrenmeyi kendisine hedef olarak belirleyen FATIH projesi, uzaktan eğitim merkezleri sadece öğretmenler için değil toplumun bütünü için ve özellikle öğrencileri destekleyecek şekilde yapılandırılmalıdır.

Program geliştirme alanında çalışıp Türk eğitim programını yapılandırılmasında çalışan uzmanların, programın amaç ve felsefesi üzerinde durmaları gerekmektedir. Eğitimin amaçsızlaştığı ve felsefesinin yok olduğu çalışmanın katılımcıları tarafından sıkça tekrarlanan önemli bir problemdir. Bu noktada tabletin öğretimde kullanımının nedenleri ve eğitimde teknolojinin yeri net bir şekilde ortaya koyulmalıdır. Ayrıca, bu kadar adım adım yapılandırılmış ve öğretmenleri fazlasıyla çerçevelendiren bir programdan ziyade kazanım ve amaç odaklı öğretmenlerin yaratıcılığına fırsat tanıyan ve öğretmenine güvenebilen bir programın olabilirliği değerlendirilmelidir.

Eğitim alanında yazılım ve uygulama geliştiren kişi ve kurumlar, MEB ile iletişime geçip gerekli alanları desteklemek için belki öğrenciler ve öğretmenlerle işbirliği kurarak yazılım geliştirmeleri gereklidir. Kaliteli ve öğrencilerin ilgisini çekebilecek yazılım ve uygulamalar geliştirmek için gerekli süreçler özel projeler ve yarışmalara öğrencilere tanıtılmalı ve öğrenci yardımı ile e-içerik havuzu olabildiğince genişletilmelidir.

Son olarak, bu süreçte teknoloji konusunda yetersizliğinin farkında olan öğretmenlerin bireysel çabalar ile teknoloji okur-yazarlık düzeylerini arttırmaları gerekmektedir. Internet ile öğrencinin her tür bilgiye ulaşmasının yarattığı bilgi kirliliğinde öğrenciyi doğru kaynaklara doğru sorular ile yönlendirmede öğretmenin rolünün önemli olduğu düşünüldüğü için öğretmenin hem alan uzmanı olarak hem de aktif Internet kullanıcısı olarak öğrencileri yönlendirmesi beklenmektedir. Öğrencinin bulduğu bilgiyi yargılayıp doğru veya yanlış diyebilecek yeterlilikte olabilmek için öğretmenlerin kendilerini sürekli olarak geliştirmeleri, naçizane, önerilmektedir.

APPENDIX G: CURRICULUM VITAE

PERSONAL INFORMATION

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EDUCATION

Degree	**Institution**	**Year of Graduation**
MS	METU Educational Sciences	2009
BS	METU Computer Education and Instructional Technologies	2007
High School	Kalaba Anadolu High School, Ankara	2002

WORK EXPERIENCE

Year	**Place**	**Enrollment**
2004- Present	Oluşum Drama Institute	Drama Educator
2011- Present	Education Volunteers Foundation of Turkey	Drama Mentor
2010-2011	Ankara University, Faculty of Health Sciences, Department of Child Development	Instructor for ÇGE112, Drama Application Course

FOREIGN LANGUAGES

English, Italian

PUBLICATIONS

Articles

1. Özbek, G. "Drama in Education: Key Conceptual Features", Journal of Contemporary Educational Studies, 65(1), 46-61 (2014)

2. Özbek, G. "A Proposal for the reorganization of Citizenship Education via the Implmentation of the Dramatic Method", Andragogic Perspective, 20(1), 87-94 (2014)

3. Özbek, G., Aslan, N., and Söken, A. "A Collaborative Study on Transforming the Society: Educational Volunteers Foundation of Turkey & Olusum Drama Institute", International Journal of Performance (2014, in press)

4. Baturay M. H., and Özbek, G. “Using Drama Method in Topics of Ethic and Heatlth in Computer Education”, Newsa Online Journal (2009)

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1. Özbek, G. “Drama Kuram ve Kuramcıları”, A. Köksal-Akyol (Ed.), Okul Öncesi Eğitimde Drama, Ankara, Hedef Cs Yayıncılık (2014, in press).

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2. Özbek, G., Aslan, N. and Söken, A. “A Collaborative Study on Transforming the Society: Educational Volunteers Foundation of Turkey & Olusum Drama Institute”, 8th Drama and Education IDEA World-Congress, Paris, France, 8-13 July 2013.

3. Özbek, G. “Drama In Education: A Meta-Analysis Of Process Product Studies,” Educational Reform in the 21st Century in Balkan Countries, 15th International Balkan Congress, Bucharest, Romania, 28-30 June 2012.

4. Özbek, G. “Bir Karşılaştırma: Ismayıl hakkı Baltacıoğlu ve Harriet Finlay-Johnson," (A Comparison: Ismayıl Hakkı Baltacıoğlu and Harriet Finlay-Johnson), Values Education and Drama, 14th Meeting of Drama Leaders and National Drama Seminars, Ankara, Turkey, June 22-24, 2012

5. Özbek, G. “Citizenship Education Through Drama Method,” Education for Active Ageing and Active Citizenship, 4th International Congress of Educational Research, İstanbul, 4-7 May, 2012.

5. Özbek, G. “Drama Öğretmenlerinin Öğretme-Öğrenme Sürecine İlişkin Algıları: Bosna Hersek ve Türkiye Örneği” (The Perception of Teachers on Teaching Learning Process: Examples from Bosnia Herzegovina and Turkey), 13rd Meeting of Drama Leaders and National Drama Seminars, İstanbul, Turkey, June 24-26, 2011.

6. Özbek, G. **“**Drama Öğretim Modeli: İngilizce Öğretmen Adayları ile Uygulama,” (Drama Instructional Design Model: Implementation with Pre-service English Language Teachers) İstanbul University, Faculty of Education, International Drama Congress, İstanbul, Turkey April 17-19, 2011.

7. Özbek, G. & Kiraz E. “Drama Öğretim Modeli: Tasarım ve Geliştirme” (Drama Instrutcional Design Model: Design and Development), National Congress of Curriculum and Instruction, Balıkesir, Turkey, May 13-15, 2010.

GIVEN WORKSHOPS

In-service Trainings

1. "Bireysel Gelişim için Drama," (Drama for Personal Development), In-service training for Personnel, Middle East Technical University, Ankara, Turkey, 2011-2013.

2. "Yabancı Dil Öğretmenleri için Eğitimde Drama," (Drama in Education for Language Teachers), In-service Training for Teachers, Private Kültür Schools, Bursa, Turkey, February 15-17, 2012.

3. "Drama Yöntemi," (The Method of Drama), Ministry of National Education, In-service Training of Scout Leaders, The Foundation of Beyşehir Youth and Scouting Education, Konya, Turkey, July 25-29, 2011.

4. "Eğitimde Drama," (Drama in Education), Ministry of National Education, In-service Training for Teachers, Ayhan Sümer Anadolu Lisesi, Ankara, Turkey, Dec 15, 2008- Jan 5, 2009.

5. "Yabancı Dil Eğitiminde Dramanın Kullanımı," (Using Drama in Foreign Language Teaching), In-service Training for Teachers in ARI College, Ankara, Turkey, December 17, 2008.

Workshops

1. "Brian Way ile Bireye Yolculuk," (A Journal with Brian Way), 16. Meeting of Drama Leaders and National Drama Seminars, Çorlu, Turkey, June 20-22, 2014.

2. "Drama Atölyesi," (Drama Workshops), Educational Funds for Elementary Schools, Middle East Technical University, Ankara, Turkey, 2011-2014.

3. "Şşşt! Sessizlik ve Drama," (Hush! Silence and Drama), Language and Drama, 15. Meeting of Drama Leaders and National Drama Seminars, Ankara, Turkey, June 21-23, 2013.

4. "İnsan Hakları Eğitimine Dramatik Bir Bakış," (A Dramatic Understanding in Human Rights Education), Values Education and Drama, 14th Meeting of Drama Leaders and National Drama Seminars, Ankara, Turkey, June 22-24, 2012

5. "Öğretmenler için Aktif Öğrenme Seminerleri," (Seminars of Active Learning for Teachers), Middle East Technical University (METU) College, Ankara, February 23, & March 2, 2011.

6. "Peter Slade and Child Play" & "Dorothy Heathcote and Drama in Education," Oluşum Drama Institute, Ankara, Turkey, May 2010.

7. "Who am I?" Eylem 1.1 Projesi, Osmangazi Belediyesi Yerel Gündem 21 (European Union Project) Bursa, Turkey, October 21-27, 2007.

8. "Oyun Atölyesi," (Play Workshops with children), TEGV, Educational Volunteers Foundation, Education of Educators, Ankara, Turkey, October 2004- May 2005.

SPEECHES

Panels
1. “Dil Eğitimi için Drama Oturumu Planlama," (Structuring Drama Plans for Language Education), Language and Drama, 15th Meeting of Drama Leaders and National Drama Seminars, Ankara, June 21-23, 2013.

2. "Eğitimde Öğrenen Merkezli Bir Yöntem: Drama," (Learner-centered method in Education: Drama), Ahi Evran University, Kırşehir, Turkey, September 29, 2011.

3. "Erken Çocukluk Eğitiminde Drama Kuramları," (Theories of Drama in Early Childhood Education), Early Childhood Education and Drama, 12th Meeting of Drama Leaders and National Drama Conference, Ankara University, Ankara, Turkey, June 18-20, 2010.

E-conference
“Yaratıcı Drama ve Kişisel Gelişim, (Creative Drama and Personal Development), Kariyer Adam E-conferences, Ankara, Turkey Mart, 2012.

Given Lectures
1. “Drama in Education: Key Concepts,” Ljubljana University/Slovenia, December 2013.

2. "ÇGE112- Drama Uygulamaları Dersi," (The Course of Drama Applications), Department of Child Development, Faculty of Health Sciences, Ankara University, 2010-2011.

OTHER RELEVANT INFORMATION

Certificates
Oluşum Drama Institute, Certificate of Drama Expertise Program, 2003-2004.
Museum of Anatolian Civilizations, Certificate of Museum Educator, March 2008.

Organization Committee Member
Meeting of Drama Leaders and National Drama Conferences, 2008-....

HOBBIES

Saxaphone and Flute, Short Movies, Theatre, Swimming

APPENDIX H: TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : Özbek
Adı : Gökçen
Bölümü : Eğitim Bilimleri Bölümü

TEZİN ADI (İngilizce) : The Development of a Model for Tablet PC Usage in Education: Expectations to Realities

TEZİN TÜRÜ : Yüksek Lisans [ ] Doktora [X]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: