AN INVESTIGATION OF 1:1 TECHNOLOGY INITIATIVE THROUGH THE LENS OF FULLAN'S EDUCATIONAL CHANGE MODEL: A THREE-YEAR STUDY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

TUĞBA BAHÇEKAPILI

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
COMPUTER EDUCATION AND INSTRUCTIONAL TECHNOLOGY

SEPTEMBER 2018

Approval of the thesis:

AN INVESTIGATION OF 1:1 TECHNOLOGY INITIATIVE THROUGH THE LENS OF FULLAN'S EDUCATIONAL CHANGE MODEL: A THREE-YEAR STUDY

submitted by **TUĞBA BAHÇEKAPILI** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy in Computer Education and Instructional Technology Department, Middle East Technical University** by,

Prof. Dr. Halil Kalıpçılar
Dean, Graduate School of **Natural and Applied Sciences** _____

Assoc. Prof. Dr. Ömer Delialioğlu
Head of Department, **Comp. Edu. and Inst. Tech.** _____

Prof. Dr. Kürşat Çağıltay
Supervisor, **Comp. Edu. and Inst. Tech., METU** _____

Examining Committee Members:

Assoc. Prof. Dr. Işıl Kabakçı Yurdakul
Comp. Edu. and Inst. Tech, Anadolu University _____

Prof. Dr. Kürşat Çağıltay
Comp. Edu. and Inst. Tech., METU _____

Prof. Dr. Soner Yıldırım
Comp. Edu. and Inst. Tech, METU _____

Assoc. Prof. Dr. Evrim Baran
School of Education, METU _____

Assoc. Prof. Dr. Ömer Delialioğlu
Comp. Edu. and Inst. Tech, METU _____

Date: 18.09.2018

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: Tuğba Bahçekapılı

Signature:

ABSTRACT

AN INVESTIGATION OF 1:1 TECHNOLOGY INITIATIVE THROUGH THE LENS OF FULLAN'S EDUCATIONAL CHANGE MODEL: A THREE-YEAR STUDY

Bahçekapılı, Tuğba
Doctor of Philosophy, Computer Education and Instructional Technology
Supervisor: Prof. Dr. Kürşat Çağıltay

September 2018, 176 pages

The purpose of the study is to examine the implementation process of 1:1 technology initiative through the experiences of key stakeholders by using Fullan's educational change model as a lens. For this purpose, the experiences of key stakeholders were investigated in terms of elements related to the initiation of the 1:1 initiative, perceptions, practices and provided support and monitoring regarding to implementation, and the elements to sustain the change. A qualitative research design was adopted, and a case study approach was chosen to examine the 1:1 technology initiative. The study was conducted in a private K-12 school which supports "smart education" concept in Turkey. The institution collaborated with a tech company and launched 1:1 technology initiative in which every student has a tablet PC in the classroom. The 1:1 technology initiative was monitored for three years. In this period the researcher visited the school many times to keep track of the initiative and gather data multiple times. Interviews and direct observations are the primary sources of data collection. Teachers from various disciplines, project coordinators, school managers, students, and parents were selected to be interviewed. Also, classroom observations were conducted. Content analysis approach was used to analyze the data. Findings were presented according to the categories of Fullan's model: initiation,

implementation, and continuation. Through the three years, the initiative progress as a developmental cycle which affected the implementation in a positive way, but constantly changing school structure and management was found as a negative factor.

Keywords: Technology Integration, Educational Change, 1:1 learning, Tablets for Learning, Case Study

ÖZ

FULLANIN EĞİTİMSEL DEĞİŞİM MODELİ ÇERÇEVESİNDE BİRE BİR TEKNOLOJİ GİRİŞİMİNİN İNCELENMESİ: ÜÇ YILLIK BİR ARAŞTIRMA

Bahçekapılı, Tuğba
Doktora, Bilgisayar ve Öğretim Teknolojileri Eğitimi
Tez Danışmanı: Prof. Dr. Kürşat Çağıltay

Eylül 2018, 176 sayfa

Bu çalışmanın amacı, Fullan'ın eğitimsel değişim modelini çerçeve olarak ele alarak birincil paydaşların deneyimleri doğrultusunda birebir teknoloji girişiminin uygulanma sürecinin değerlendirilmesidir. Bu amaçla, 1:1 teknoloji girişiminin başlatılması, algılar, pratikler, uygulamaya yönelik destek ve izleme ve değişimin sürdürülmesi ile ilgili unsurlara yönelik birincil paydaşların deneyimleri incelenmiştir. Çalışma nitel araştırma yaklaşımıyla yürütülmüş ve bire bir teknoloji girişimini incelemek için durum çalışması deseni kullanılmıştır. Çalışma "akıllı eğitim" kavramını destekleyen ilkokul ve ortaokul düzeyinde özel bir okulda Türkiye'de gerçekleştirilmiştir. İlgili okul bir teknoloji şirketiyle işbirliği yaparak her öğrencinin sınıfta tablet PC'ye sahip olduğu bire bir teknoloji girişimini başlatmıştır. Bire bir teknoloji girişimi üç yıl boyunca izlenmiştir. Bu süreçte araştırmacı, uygulamayı takip etmek ve veri toplamak için bir çok kez okulu ziyaret etmiştir. Mülakatlar ve doğrudan gözlemler ana veri toplama kaynaklarını oluşturmaktadır. Farklı disiplinlerden öğretmenler, proje koordinatörleri, okul yöneticileri, öğrenciler ve veliler çalışmanın katılımcıları arasındadır. Ayrıca, sınıf gözlemleri yapılmıştır. Verilerin analizinde içerik analizi yaklaşımı kullanılmıştır. Bulgular Fullan'ın modeline göre: başlatma, uygulama ve sürdürme başlıklarında sunulmuştur. Üç yıl boyunca, uygulamanın

gelişimsel döngü içerisinde ilerlemesi olumlu bir etki yaratırken, sürekli değişen okul yapısı ve yönetimi olumsuz bir etki yaratmıştır.

Anahtar Kelimeler: Teknoloji Entegrasyonu, Eğitimsel Değişim, 1:1 Öğrenme, Eğitimde Tablet Kullanımı, Durum Çalışması

To My cousin Serkan Bahçekapılı who passed away and

To My nephew Sare Gündoğdu who was born

ACKNOWLEDGMENTS

This Ph.D. study, which investigated a journey of one school, was also one of the most fantastic journeys of my life. I would like to express my gratitude to the people for their guidance and patience through my Ph.D. journey. First and foremost, I would like to express my deep gratitude to my advisor Prof. Dr. Kürşat Çağıltay for his continuous support, encouragement, and trust in me. As a mentor, he has always provided his valuable suggestions and insights. I would like to thank him for sharing his experiences and great depth of knowledge.

I am also so grateful to my thesis monitoring committee member Prof. Dr. Soner Yıldırım for his wisdom and feedbacks; Assist. Prof. Dr. Evrim Baran Jovanovic for her ongoing support and practical advice, I have learned a lot from her. I would like to thank the examining committee members Assoc. Prof. Dr. Işıl Kabakçı Yurdakul and Assoc. Prof. Dr. Ömer Delialioğlu for their contribution.

I need to express my gratitude to Informatics Association of Turkey (TBD) and Turkcell Academy for supporting me as a part of the Technology Leaders Scholarship. Also, I am grateful to Mektebim schools for opening their doors for me, especially to Şule Yurcu and Nuray Özmen. This study would not have been possible without the help of them. I am also grateful to the Scientific and Technological Research Council of Turkey (TÜBİTAK) for their support under the 2224-A and I would like to thank Dr. Vanessa Paz Dennen on behalf of Florida State University.

I am grateful to the people who contribute to my growth with their existence, wisdom, and knowledge. I would like to thank friends and colleagues for their support. I am grateful to my colleague and close friend Tuğba Altan for her endless support and sharing my Ph.D. journey. I would like to express my thanks to Nazihan and Omer Faruk Ursavas family for their support. I am thankful to Ayca Cebi, Canan Colak, Eda Bakir and Ilknur Reisoglu for giving me strength on my way and motivating me. I am also thankful to Yasin Yalcin for his support and friendship. I would like to extend thanks to Esra Gundogdu, Melek Atabay, Merve and Muharrem Aydin, Ayşe Aytar,

I. Nihan Demirel, and Nihal Akoğuz Yazıcı for standing beside me and believing in me. My special thanks also go to Cigdem Hekimoglu Kilic, Ozge Yayli Atay, Serap Ozer, and Zeynep Yilmaz for their support in every aspect of my life and Ilker Ozdemir for his strength regardless of the distance. I also would like to thank my cousin Ayse Begum Bahçekapılı who always spread positive vibes and be my study companion.

Last but not least I would like to thank my family members for their support and encouragement. They always believe in me, none of this would be possible without the support of them.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

1.1. Background of the Study

One of the prominent elements of the 21st century can be pointed as digital transformations that take place almost every aspect of our lives. In terms of educational systems, 21st-century schools were stated to have identity confusion because of introducing many digital tools and applications into the school. Thus, in order to keep up with the digital age and integrate new technologies into learning environments, there is a need to plan for the restructuring and transformation of the elements of the educational systems (Erişti, 2010). On the other hand, the need for rethinking the role of technology in education emerged due to the changes in society and learner needs (Aslan, 2012; Blair, 2012). Also, Blair (2012) underlined that learners in the digital age have instant access to information and it is not enough to demonstrate simple videos or pictures in classrooms or make students play digital games on the internet related with the course topic. Accordingly, governments are allocating large investments in technology and worldwide technology initiatives have been disseminated into schools to provide digital transformations in education and support learner needs in the information age. Governments put increased attention on using technologies to provide access to information and rich learning environments, as well as improving students' learning outcomes and equip students with necessary skills (Pouezevara, Dinçer, Kipp, & Sarışık, 2013). In the last decade, projects have been shifted from providing one laptop per learner to using tablets as primary computing devices and the trend of using technologies in classrooms that might reform education continued with the developing technologies (Trucano, 2010). In this scope, driving forces of tablet use in education are considered as follows: the need of 21st century skills, providing independent learning experiences for students regardless of their places or time, supporting instructional practices, communication and

collaboration opportunities through tablets, and availability or purchasing options of tablet devices (Kocak, 2015). In this educational landscape, teachers are expected to develop new forms of professional knowledge to benefit from digital environments for instructional purposes such as content delivery, learner support, and assessment (Freeman, Adams Becker, Cummins, Davis, & Hall Giesinger, 2017). Hence, today's schools are equipped with the latest technologies and teachers were expected to guide the integration of these technologies into the learning environments. Although teachers have better technology skills and schools have access to various technologies than before, the integration of technology into the learning process is considered difficult to be actualized in the same way (Lai, Pratt, & Trewern, 2002). Integration of technology into the learning process requires more than equipping classrooms with various technologies and devices (Çağıltay, Çakıroğlu, Çağıltay, & Çakıroğlu, 2001; Maddin, 2002). Thus, integration of technology into the learning process is considered as a complex process (Harris & Hofer, 2009; Mishra & Koehler, 2008). Given the importance of examining the technology integration practices, there are lessons to be learned from insights of stakeholders who play an important role in this integration process. Understanding the stakeholders' perspectives and attitudes contributes to the research and practices of educational technologies as well as identifying successful and unsuccessful attempts in integrating technology in learning environments. In addition, it provides empirical evidence for practitioners and policy makers to rethink the related technology initiative under the study (Trucano, 2010).

When computer technologies have received widespread attention from the policymakers and stakeholders in the last few decades, they often have failed to be fully implemented in schools and other learning environments. For example, film, radio, educational television, and many various computer initiatives have challenges to reach the potential that have envisioned for them (Cuban, 2001). As technology initiatives aim to transform the technology use in education and to prepare students for the future, the need for the pedagogical approaches come into prominence to integrate new technologies into the learning. Even investments in technology in schools have contributed to students' technological qualifications and access to

technology, its positive effect on students' academic performances are limited. Also, the fact that the technology projects are hardware-oriented inhibited the transformation in education (Cristia, Ibarrarán, Cueto, Santiago, & Severín, 2012; Balanskat, A. & Garoia, 2010). In Turkey, the Ministry of National Education (MoNE) has launched projects in order to equip schools with technology and allocated large budgets. These efforts have been started from1997/98 school year within the Basic Education Program first and second. Schools were equipped with technology, computer labs were opened, and teachers were trained in computer use. The MoNE, however, has missed an important point when that program was implemented. According to Uluyol (2013), successful technology integration requires providing pedagogical use of technology, technical and pedagogical support, and high-quality teacher training. In the last decade, "Movement of Enhancing Opportunities and Improving Technology" (FATIH) is considered the most significant educational technology investment in Turkey. The FATIH project aims to provide equal opportunities for all students and to integrate of technology into learning processes. When the evaluation studies were examined related with the FATIH project, the findings indicated that students' and teachers' use of tablet computers was limited in the classrooms; while the stakeholders used the interactive boards most often and have positive attitudes towards the availability of the interactive boards in the classes. Besides the technical problems, the lack of appropriate content and the pedagogical support for using the related technologies in the learning process are among the outstanding problems (Keleş, Dündar-Öksüz & Bahçekapılı, 2013).

On the other hand, increasing need to access to information anywhere, the popularity of mobile users and the developments in mobile technology at an incredible pace has brought about to use mobile devices in educational settings. Many educational institutions such as K-12 schools create their own web pages, design online educational materials, and resources, and provide online content for their use of mobile devices. Relatedly, learning through mobile devices are redefined and the importance of mobile applications are emphasized. As a result of the popularity of the use of mobile technologies in education, schools have implemented their own 1:1

technology project to provide their students with an equal opportunity to access to technology. It is well established that technology use in education support learners to become more productive and efficient in the learning process and support learning outside of the classroom (Sharples, Taylor, & Vavoula, 2007). With the integration of mobile technologies in schools, implementation of 1:1 technology or BYOD (Bring Your Own Device) programs to provide technology access for every student became more widespread. Among available mobile technologies, tablets are one of the popular ones for both children and adults (Neumann, 2014). Also, cost-effective laptop computers or other portable devices (tablets) are preferred in terms of cost reduction and ease of use. However, the efficacy of integrating mobile devices into learning environments has been a problematic issue. In this point, there is a need to consider the strategies, models, and techniques in order to use mobile devices effectively in education to add value to the learning process. Similarly, it was stated that technology could make a difference in education when capabilities of technology are examined, training for teachers to integrate technology into their discipline area is provided, and when learning environments were designed to support students' complex problem-solving, creative thinking, and life-long learning (Cottrell, 2007). Also, even the focus is integrating technological devices into education the management of the change is pointed as a critical factor (Twining et al., 2006). Taken all together, this research was aimed to investigate a 1:1 technology initiative in a private school in Turkey by using the Fullan's change model and explore the possible factors throughout the change process.

1.2. Purpose

The purpose of this study is to investigate a 1:1 technology initiative through the experiences of key stakeholders within a private school by using Fullan's educational change model. In order to do so, the experiences of key stakeholders (such as administrators, project coordinators, teachers, students and parents) were investigated in three stages: (1) the elements related to the initiation of the 1:1 initiate were investigated; (2) perceptions, practices and provided support and monitoring regarding

to implementation of the 1:1 initiative was investigated, and (3) the elements to sustain the change were revealed out from the stakeholders' perspectives.

1.3. Research Questions

The following questions have guided the study to examine the change process within the 1:1 technology initiative.

Research Question-1: What are the elements related to adopting the 1:1 technology initiative?

1. What are the motivators to adopt 1:1 technology initiative?
2. How does the school plan and provide support for the adoption of 1:1 technology initiative?

Research Question-2: How are the stakeholders` experiences regarding 1:1 technology initiative implementation process?

1. How do stakeholders perceive the implementation of 1:1 technology initiative?
2. What are the stakeholders' practices throughout the implementation of 1:1 technology initiative and how they use the system?
3. How do project coordinators and administrators support and monitor the implementation of 1:1 technology initiative?

Research Question-3: Based on the experiences of the current 1:1 technology initiative what are needed to implement 1:1 technology initiative successfully?

1.4. Significance of the Study

It is well established that stakeholders around the world are investing in technology programs to improve the students' learning outcomes and prepare them for the future. Turkey is one of the countries that created a nationwide educational technology project (Movement of Enhancing Opportunities and Improving Technology, known as the Fatih Project) which aimed to integrate the latest technologies in public school classrooms and provided each student a tablet device. Regarding evaluation studies of the Fatih Project, many challenges were listed in terms of infrastructure, teacher

readiness and training, and learning materials. On the other hand, even stakeholders lean towards to implement the project the adoption of the proposed technologies to contribute learning and student development is not fully actualized (Kizilet & Özmen, 2017). Furthermore, there were attempts in private schools to implement their own technology initiative. Thus, this study aimed to investigate a specific 1:1 technology initiative from the initiation phase in a school by using a holistic view. The study influenced by the Fullan's educational change model and technology integration frameworks. In this investigation, the researcher went into the classrooms to track the adoption of 1:1 technology into the school and identified the factors affecting the adoption by analyzing how the initiative was put into the practice what worked well and what did not, and what is needed to implement 1:1 technology initiative successfully. The researcher also established prolonged engagement with the school and track the initiative for three years that provided a convenient environment for data collection. Likewise, multiyear studies were regarded as important in terms of providing opportunities to investigate the change process in a longitudinal way (Hughes, Boklage, & Ok, 2016). On the other hand, participants in the study have an opportunity to interact with the researcher and learn about the preliminary investigation notes from the researcher at first hand. Also, different kinds of stakeholders who have a diverse role in the integration of technologies into the learning environments were included in the study such as administrators, coordinators, students, parents, and technology partners. As a result of the study, a prescription will be made based on the stakeholders' experiences to implement 1:1 project successfully. The results will widen the current perspectives of using 1:1 technology in learning environments and will present a guide for national and local technology initiatives.

1.5. Definition of terms

1:1 Technology Initiative: In this study, it is described as making use of technology at a 1:1 ratio in learning environments or providing a device (i.e., computer, tablet.) for each learner.

Tablet Computer (Tablet PC or Tablet): A Tablet PC is a lightweight computer, similar to a notebook, which allows the user to interact with software using a stylus (digitizer pen) as if writing on a slate (Twining et al., 2005, p.1)

Smart Education Platform: A specific software which is designed for the 1:1 initiative that allows teachers to operate the school's curriculum on the smart board and aids them to establish a connection between the smart board and student devices for interactive quizzes and exams.

CHAPTER 2

LITERATURE REVIEW

2.1. Technology and School Change

A transition from the industrial age to the information age has changed the society globally. In this transition process, a need to meet the requirements of information age was appeared (Reigeluth, 1995). 21st century entitled as information age proposed some skills, knowledge, and expertise that people must master to succeed in work and life. In this perspective, the essential skills for success in today's world expressed as critical thinking, problem-solving, communication, and collaboration called as 21st-century skills. Also, digital transformations nearly in every area of life can be considered as the most important element in the 21st century (Partnership for 21st Century Skills, 2009). In this context, technology was regarded as a potential transformation tool for the transition to a new educational paradigm to meet 21st-century learning needs. The effective use of technology in the process of transition was associated with teachers' ability to integrate technology proper with the pedagogy and teacher qualifications to use technology to provide a learner-centered interactive learning environment (Inan & Lowther, 2010; Topper & Lancaster, 2013). Also, the digital transformation in schools draws attention to the change in teaching practices of teachers and learning styles of students. It was stated that effective use of technology by teachers will contribute to students' learning, and an emphasis is placed on teachers who can use technology effectively in the digital transformation process (Jonathan, 2010). Regarding students as 21st Century learners, showing simple videos or pictures in the classrooms, and providing educational games for any subject on the internet will not be enough. Even from the beginning of the 21st century to the present, the profiles of the learners have changed. The world is now at the fingertips of the learners and they are accessing information instantly. Therefore, it is necessary for administrators and teachers to re-think the role in technology in learning environments in order to meet the needs of learners (Blair, 2012). Technology is regarded as a tool to provide

the required skills needed for the 21st century and policies are developed in this direction (Lambert & Cuper, 2008). Thus, especially for preparing students for their future education or life after school; technology, effective learning practices, and 21st-century skills are considered together to design learning environments (Lois, 2012). As a matter of fact, technology is regarded as mindtools that can be used to solve complex problems. In this respect, mindtools are described as computer-based tools or learning environments supported and modeled by computer technologies and adopts high-level critical thinking (Jonassen, 2008).

As digital transformations that take place almost every aspect of our lives, change and reform in schools have been a challenge for policymakers, educators, and researchers. In this scope, technologies were introduced into the schools as an innovation as it has been in different formats for decades to make school more efficient and productive, transform teaching and learning, and prepare students for the future (Cuban, 2001). On the other hand, even there are many potentials of digital transformations; ill-preparation of individuals to take the advantages of the digital world was stated as a risk factor (Hooft Graafland, 2018). Historically Cuban (1986) reported that even technologies promised to transform learning and teaching, from film to radio and to instructional television, reforms have resulted in limited classroom use. However, the trend of using technologies in classrooms that might reform education continued with the developing technologies. But identity confusion was indicated for the 21st-century schools by the results of adding many digital tools to components of learning environments and restructuring learning environments different from traditional settings. So, there is a need to restructure and identify the components of educational systems (Erişti, 2010). Also, educational systems reported for failing to meet the needs of an information age (Duffy, Rogerson & Blick, 2000; Duffy, 2009). One of the underlying factors of this situation was described as putting emphasis on inclusion of technology into learning environments and ignoring its relation and impact on other aspects of schooling (Butler, et. al, 2018). In this direction, Kozma (2003) underlined three levels that effect and mediate the change while integration of technology into the learning environments;

- Micro-level is about factors related to teachers, classroom and students. For example, teacher background and experience with technology; classroom size and technological facilities; socioeconomic status of student and student experience with technology.

- Meso level is about the school factors such as school type, culture, staff development or IT infrastructure, principles/ leaders, school board and parents were the actors in this level.

- Macro-level deals with cultural norms, social context, educational policies, and curriculum standards, etc. and policymakers, leaders, and organizations were taking part in this process.

Similarly; Zhao, Pugh, Sheldon, and Byers (2002) studied the conditions for classrooms technology innovations to understand the factors to successfully implement technology integration projects. In their research, they investigate the conditions under three interactive domains; the innovator (teacher), the innovation (project), and the context (school). In addition, they underlined to considering the interactions between these domains and the interactions among some factors within and across the domains. For instance, it was stated that teachers should have technology knowledge and knowledge about teaching with technology. Besides that, it is better for teachers to have social awareness related to school culture in order to take support from the other employees such as technology coordinator in the school to implement the innovation.

On the other hand, putting technologies in schools not guarantee to provide effective learning and improve learning outcomes (Koc, 2005; Cuban, 2001). Governments and stakeholder missed the point related to successful technology integration such as pedagogical use of technology, technical and pedagogical support, and teacher training (Uluyol, 2013). There are so many studies in the literature that explains factors related to use of technology by teachers. Cuban, Kirkpatrick, and Peck (2001) examine

two high schools which have outstanding access to technology in order to explain the limited use of technology in these schools and the reasons behind the use of technology to sustain common teaching practices by teachers. As a result of their study, the reasons listed as teachers do not have the time to find and evaluate software and unsuitable timeline of training offered to teachers and irrelevant of its content is to teachers' specific needs. Also, the structure of the schools, timetables and ill-structured nature of technology make teachers use technology to sustain their current teaching practices. Similarly, Bauer and Kenton (2005) studied with tech-savvy teachers to find out obstacles to technology integration. Even these teachers were skillful in terms of technology, the integration occurred inefficiently because of hardware which was old, slow, lack of appropriate software proper networking, amount of time to for teacher preparation, students' computer skill level and lack of appropriate software. But according to Ertmer (1999), even if barriers such as access, time, and technical support as mentioned above were removed the integration process could not have actualized because there are some factors related with inherent to individuals such as beliefs and attitudes. In sum, schools are equipped with the latest technologies and teachers were expected to guide the integration of these technologies into the learning environments. Although technology access in school increased and teachers had better technology skills, the integration of technology into the learning process couldn't be actualized in the same way (Lai, Pratt, & Trewern, 2002). This is because of the integration of technology into the learning process requires more than equipping classrooms with technology (Çağıltay et al., 2001; Maddin, 2002). Thus, integration of technology into the learning process was pointed as a complex process (Harris & Hofer, 2009; Mishra & Koehler, 2008). On the other hand, Cuban (2013) assumed schools as complex systems rather than complicated and emphasized the uncertainties and nonlinearity regarding why reforms were not happening. So, by taking into consideration of schools as a complex system it is important to examine the technology integration practices and there were lessons to be learned from insights of stakeholders who play an important role in this process.

On the other hand, some researchers focused on the adaption process of technologies as innovations (Robinson, 2005). According to the Rogers (1995) diffusion of innovations is a process by which an innovation is communicated through certain channels over time in a social system. Furthermore, even the focus is integrating new technological devices into education the management of the change is pointed as a critical factor. Theories on educational change provide a base to study innovations that put into practice by referring to the effective factors regarding initiation and implementation. But rather than considering the change as a set of factors it was important to regard the change as a dynamic process and consider the relationship among the factors which were effective in each phase of implementation (ten Brummelhuis, 1995). This research was informed by Fullan's educational change model and 1:1 computing.

2.1.1. Fullan's educational change model

Fullan (2007) suggest two mutually exclusive approaches to study educational change. One of them is an innovation-focused approach which "examine and trace specific innovations to see how they fare, and to determine which factors are associated with success" and the other one is capacity-building focus which asks "how we develop the innovative capacity of organizations and systems to engage in continuous improvement (Fullan, 2007, p. 65)

Regarding the innovation-focused approach Fullan (2007) investigates the educational change in three broad categories as shown in Figure 2.1. The first phase is initiation which considered the adoption of the change and includes the decision to proceed with the change. The second phase is the implementation which refers to putting the change in action. The third phase is institutionalization or continuation that is the decision

related with remaining or discontinuing of the implementation of the proposed change.

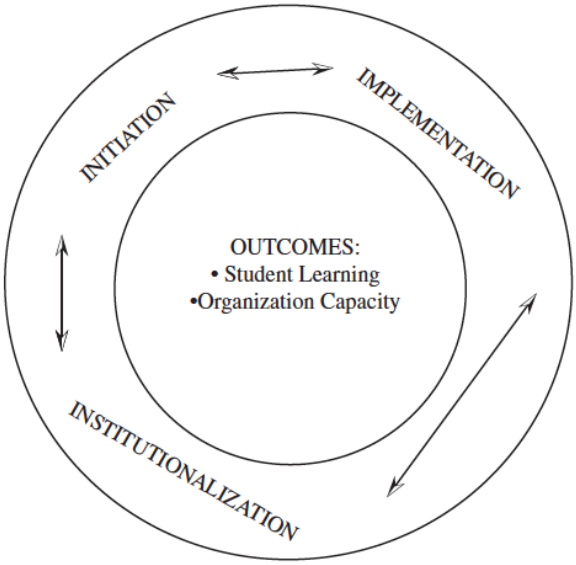


Figure 2.1. Overview of the Change Process (Fullan; 2007, p. 66

Fullan (2007) provided factors associated with initiation decisions to proceed with the change as; existence and quality of innovations, access to innovation, teacher and administrator advocacy, problem-solving and bureaucratic orientations, new policy and funds, community pressure/ support/ apathy, and external change agents. Regarding factors affecting the implementation three main categories were identified by Fullan (2007). Clarity (goals and means), quality, complexity (difficulty and extent of change) of the given change, and the perceived need to implementation were stated to affect implementation under the factor of characteristics of the proposed innovation or change. The other factor related with the implementation of change is local characteristics which deals with the issues about the school environment that the innovation was put into practice. The local characteristics affecting the implementation were stated as a school district, the community including parents and school board, principal and teacher. As external factors, Fullan (2007) pointed out the role of government and other agencies affecting the implementation. Finally, the institutionalization of the innovations dependent on whether the innovation gets embedded into the organizational structure, whether there were skillful teachers and

administrators, and whether procedures were established for continuing assistance. Fullan (2007) also stated that the change process as simply described by initiation, implementation, and continuation is not a linear process and mentioned that these three phases were progress in an interactive way.

2.2. 1:1 Computing

The recent advances in technology and low costs of technological devices facilitated easy access to a computer and other technologies for adults and children's regular use (Spatariu, Peach & Bell, 2012). In terms of educational systems, governments are making investments in technology to provide digital transformations in education and support learner needs in the information age. In this point, new technologies were expected to enrich the curriculum and provide tools to support learning. In addition, the affordances of new technologies which supported the interaction between the learners and the teacher were considered as an opportunity for students to receive immediate feedback about their learning progress and participate in the learning process (Kozma, 2003). Thus, developments in technology change the way of implementing technology in schools. 1:1 computing initiative is one of the ways of implementing technology in schools which aim to provide a device and internet access for learners in the learning environments and at home. But the implementation of 1:1 initiative can be varied from school to school and is defined by the initiating institutions such as determining issues regarding home usage of devices or methods of supplying tablets for students (Penuel, 2006).

On the other hand, there are many definitions regarding to 1:1 computing, but generally 1:1 computing is characterized by references to the; degree of access to technology (i.e., anytime, anywhere); groups who have access (e. g., students, teachers, school staff); types of technologies involved (e.g., wireless laptops, tablet PCs, handhelds, etc.) as well as their connectivity to the Internet; types of software (e.g., word processing) and/or multimedia learning resources used, and/or the collaborative and authentic nature of the learning environment (Alberta Education, 2006, p.11).

Also, different terms were used to identify 1:1 computing such as one-to-one mobile computing, 1:1 wireless computing, 1:1 laptop computing, or ubiquitous computing.

Undoubtedly, it is important that the results are monitored, and lessons learned in order to take advantage of the technology investments. Also, it is important to realize how technology can be used to serve these learner needs within the information age paradigm. Aslan and Reigeluth (2011) characterized three periods in the evolution of educational computing: Mainframe Period, Microcomputer Period, and Internet Period and a possible future period based on societal needs: Personalized Computing Period or Internet period. In the Personalized Computing Period educational technology should be available mostly for free, have an online infrastructure for ease of access, support attainment based student progress, provide an open-source environment that is customizable, have built-in personalization tools such as Web applications, and offer a number of different functionalities in order to meet the needs of students and teachers in the information age paradigm of education (Aslan & Reigeluth, 2011, p. 13). On the other hand, there is an increase on one-to-one computing initiatives that provided a computing device for each student with internet access because of decreasing costs, ease of use and wireless connection opportunities (Penuel, 2006). One of the technology projects around the world is "one laptop per child" developed for providing technology access and quality education for children in developing countries. According to the Peru experience which was one of the countries where the project is implemented, the reports showed that even students' access to technology has increased results failed to record positive progress on academic achievement. On the other hand, it was stated that computer usage skills and cognitive skills were affected positively in this process. As a result, the need for how to integrate technologies into education with a pedagogical approach has come to the forefront (Cristia, Ibarrarán, Cueto, Santiago, & Severín, 2012). The hardware-oriented projects carried out in this direction was stated as a barrier to the transformation of education with technology. Similarly, the same situation can be realized in the Magellan project in Portugal, where laptops were distributed to students (Balanskat, A. & Garoia, 2010). Another project was "Smart Education" Project in

Korea in which textbooks and other teaching materials were transferred into a virtual environment. By the way, students will be able to access the course material online through the digital tools such as computers, mobile phones or tablets, and they will be able to take courses through these technologies (Seo, 2012).

Especially in recent years, there is a tendency on technology programs aimed at achieving equal access to technology. In this respect, one of the projects being carried out in Turkey is "Movement of Enhancing Opportunities and Improving Technology", abbreviated as FATIH, which is said to be the most significant educational investments in our Turkey (Ministry of National Education (MoNE), 2013). With this project, schools and classes equipped with the latest Information Technologies and turned into computerized education classes (Smart Class). The project aims to provide equal opportunity in education and integrate technology into learning processes. When the evaluation studies for the project are examined, low use of tablet devices was reported, while there were positive attitudes and high usage regarding the interactive boards. Moreover, pedagogical support for using related technologies in the learning process and the lack of proper content were among the outstanding problems besides the technical problems (Keles, Dündar-Öksüz & Bahçekapılı, 2013). In this point a report was prepared by collaboration with Education Reform Initiative (ERI), a think-and-do tank in Turkey and Research Triangle Institute (RTI International), which summarize lessons learned from previous and ongoing international experiences, proposed some critical points to succeed when introducing new technologies into the classrooms (Pouezevara, Dinçer, Kipp & Sarışık, 2013). One of them was adopting a phased strategy. Therefore, depending on the established readiness criteria or on the requirements of the schools, the schools that implement the initiative first will increase the chance of developing exemplary practices for the other schools. Another point was the designing the professional development of teachers. It was stated that professional development should be supported by practices such as peer support, action research, sharing of best examples, and encouraging innovative approaches. At this point, it is important for managers to provide support for teachers and to use strategies that encourage the use of technology. Communicating with teachers or providing

communication among teachers through tablets and sharing resources; providing classroom scenarios and instructional methods for different courses are among the recommended strategies. Another point is defining clear objectives and establish a monitoring and evaluation framework. Therefore, the importance of introducing the logical framework to be followed and the model of technology integration to be used is put forward. With these efforts, the sustainability of the technology integration into the education will be provided; and the technological and pedagogical implications of the technology will be evaluated. The last point is to improve institutional leadership and communication with stakeholders. At this point, the participation of parents and school is especially important.

Especially in recent years, it has been observed that the tendency of every student towards individual technology programs to provide equal access to technology has led to the fact that the schools have started to implement their own individual learning programs. Many learning institutions are striving to create their own web pages, educational materials, presenting their sources online, and adapting them to mobile devices. Especially mobile learning is redefined with devices such as mobile phones and tablets, and the importance of mobile applications (apps) is emphasized in this process. Especially with the integration of mobile technologies in schools, implementation of 1:1 technology or BYOD (Bring Your Own Device) programs to provide technology access for every student becomes more widespread (Penuel, 2006: Traxler, 2016). Penuel (2006) reported that students improve their technological skills by interacting with the tools within their devices through the opportunities provided by 1:1 implementation.

2.3. Summary of the Literature

There are many theoretical and applied studies in the literature which emphasized the potential of technology in education. Many of these studies were focused on the evaluation of the proposed technologies or its effectiveness regarding learning performance. Even there were numerous studies which focused on the implementation factors, these studies deal with the certain aspects such as teacher voices, teacher

background or administrator perspectives there is a need to focus the elements of the school system as a whole, and interactions among them. Similarly, the voices of students and their experiences were sometimes ignored. Even further, there is a need to research technology in education by accepting the complexities of the school system and apply a holistic view to technology integration research. In addition, there is a need to examine the implementation process of technologies in schools in order to deduce examples of how to best integrate new technologies in schools.

With the rapid growth of technology, the forms of technology usage in education have changed. Thus, it is also important to examine the affordances and limitations of the proposed technologies to be able to provide the best implementation examples. Also, when considered a tablet as one of the popular tools in education or among new generations, it is important to consider that how tablets contribute the learning process different from the other technologies.

CHAPTER 3

METHODOLOGY

The methodological aspects of this research are presented in this chapter. The chapter includes information about the research design and detailed descriptions of the research context, participants, data collection, data analysis, trustworthiness and the researchers' role in the study.

3.1. Research Design

According to Creswell (2007), qualitative designs are used when there is a need to explore a problem or an issue, to understand a complex matter in greater depth, to identify the context and setting of the problem or issue that is under study, to empower individuals to share their stories and to bring their voices into the process. Because the purpose of this research is to investigate the implementation process of a 1:1 technology initiative through the experiences of key stakeholders within a school, a qualitative research design was adopted. By that way, the implementation process of a 1:1 technology initiative in its unique context is described and explored.

Among qualitative research designs, the case study approach was chosen. A case study is defined as an "empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident" (Yin, 2003, p. 13). In this research, which focuses on the how and why, we question whether a true picture of the 1:1 technology implementation process is provided by considering contextual conditions that are significant to the phenomenon under study (Yin, 2003). As one of the characteristics of qualitative studies, this case study had an emergent flexible design (Patton, 2002). As a result, the researcher modified the design as she entered the field.

Regarding research design, a single case study design was used for the purposes of this study. The single case study methodology was chosen because the focus of the research was one school that implemented a specific 1:1 technology initiative as a unique case. From this perspective, 1:1 technology initiative program that put into action in the school was chosen as a unit of analysis. Figure 3.1 shows the outline of the design map of the research summary (Adapted from Maxwell 2014, p.5).

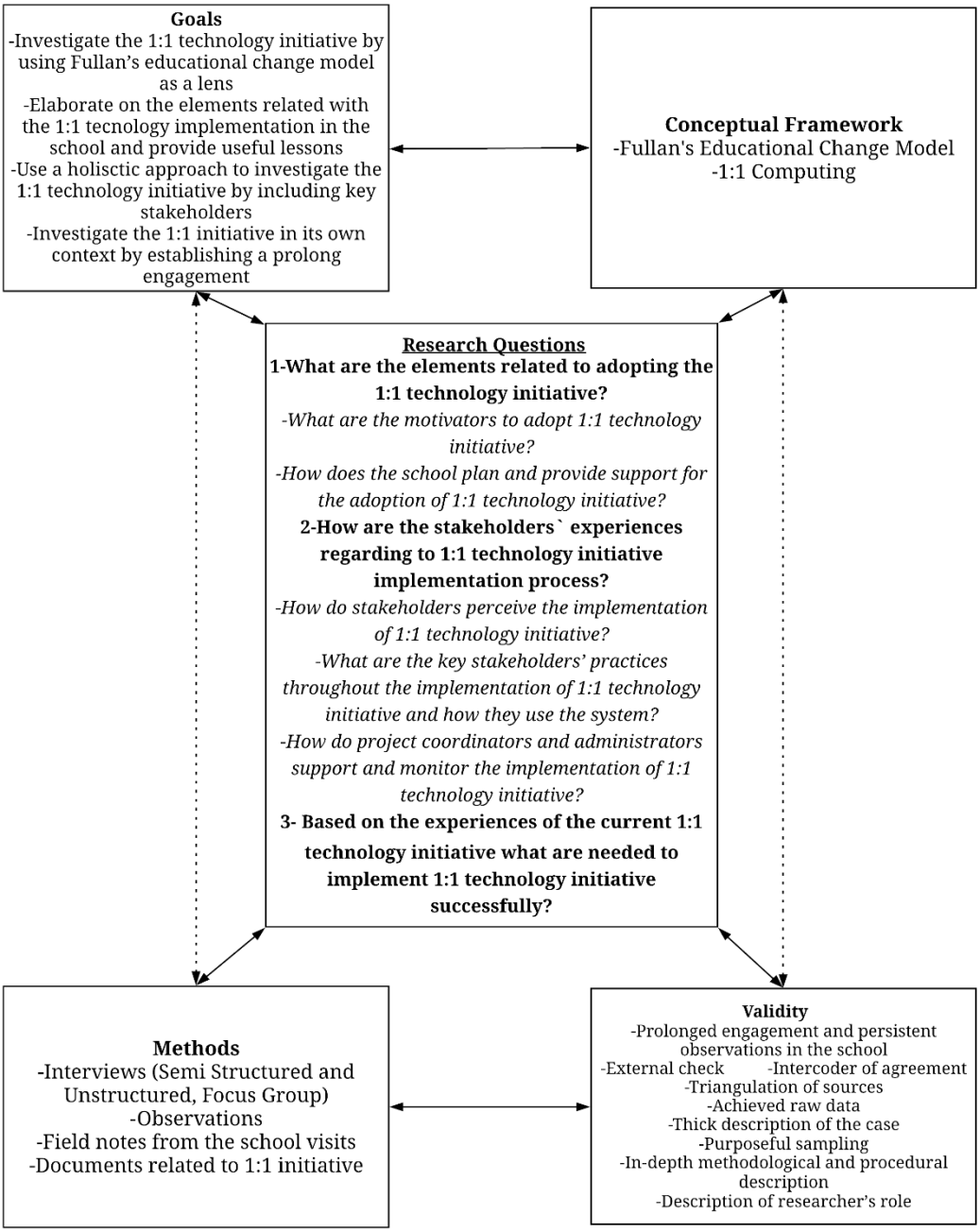


Figure 3.1. Design map for the research

3.2. Research Context

This study was conducted on one of the educational campuses of a private K-12 school in Istanbul, Turkey. This private institution, which was founded in 2011-2012, is comprised of many educational campuses under the general directorate, and each campus has a school administrator. The general directorate has different

departments, such as human resources, educational coordinatorships, and information technology. This private institution advertises itself as having a strong infrastructure to apply campus technologies, physical environments to support meaningful learning, foreign language educational offerings, and coursework designed to prepare students for the future with distinctive learning methods. The educational campuses are equipped with classrooms that include interactive boards, tablet computers and fiber optic infrastructure to establish high-speed Internet connections, 3-D high-tech classrooms, and laboratories. The institution also supports the "smart education" concept. Related to smart education, the institution collaborated with a technology company to launch a 1:1 technology initiative enabling every student to have a tablet pc in the educational setting. By means of this collaboration, the school contracted with the technology company to be able to use the "Smart Education Platform" within their devices. The platform allows teachers to operate the school's curriculum on the smart board and aids in the presentation of interactive quizzes and exams by establishing a connection between the smart board and student devices. The Smart Education Platform also supports file transfers between devices connected to the network.

Related to the "smart education" concept, the institution is structured to implement a 1:1 technology initiative, as shown in Figure 3.2.

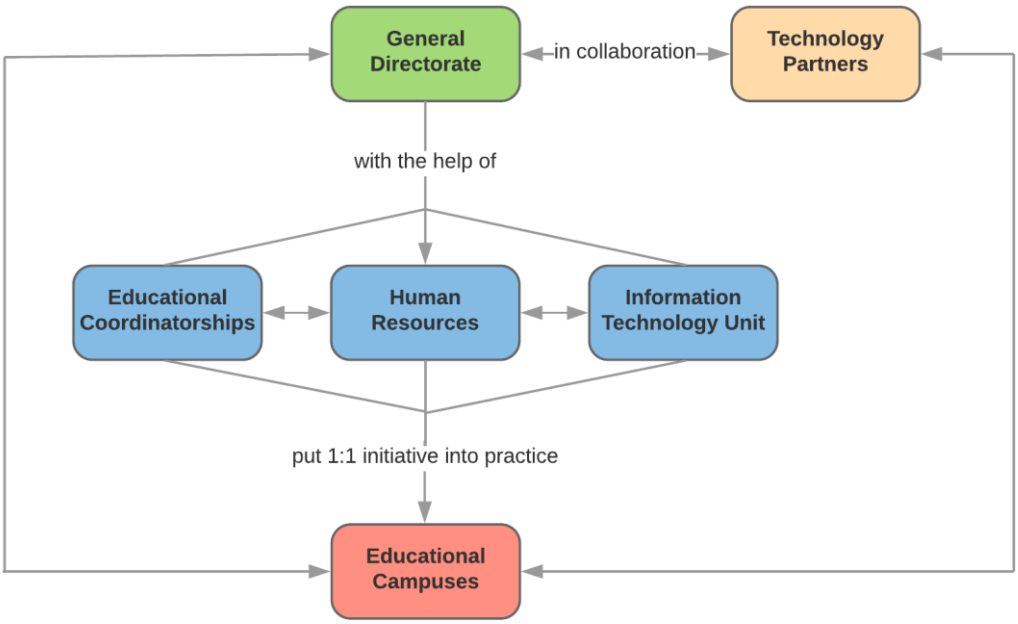


Figure 3.2. Structure of the institution to implement the project

According to Figure 3.2, the institution collaborated with a tech company and with the help of the units in the general directorate the 1:1 initiative was put into practice in their educational campuses.

3.2.1. The Research Site

The campus on which this research was conducted became operational in the Fall of 2013. At the same time, the implementation of the 1:1 technology initiative was launched. This campus was selected because it was the first among all the institution's campuses to implement the 1:1 technology project.

The number of students in a class ranges from 15 to 25 at the school. There are different types of classroom layouts, including classical rows, cooperative clusters, and u-shaped configurations.

The organizational structure of the school at the very beginning of the 1:1 technology initiative is shown in Figure 3.3.

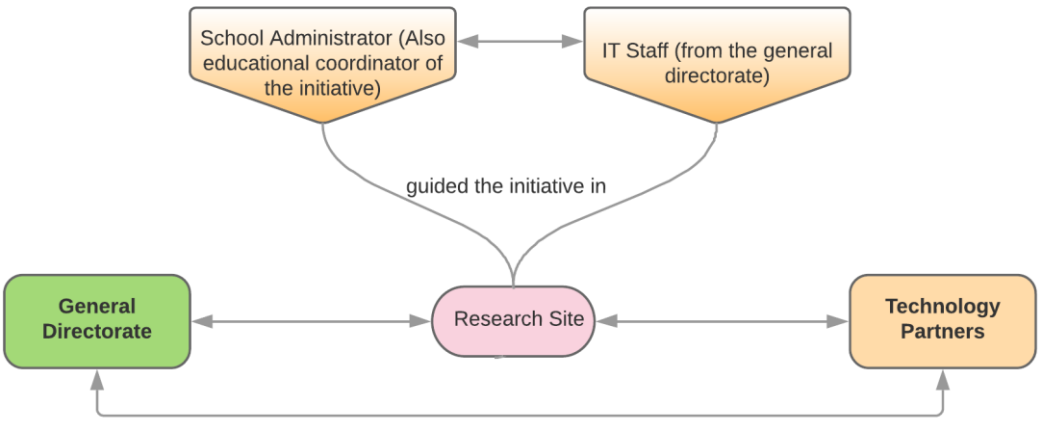


Figure 3.3. Structure within 1:1 technology initiative research site

As shown in Figure 3.3, school administrator and IT staff from the general directorate guided the initiative in the campus, which was stated as a research site, in collaboration with the technology partners.

At the beginning of the initiative, the school administrator (administrator 1) was assigned to manage the implementation of 1:1 technology with other stakeholders in the school. Primarily, administrator 1 agreed to work with the private educational institution as an educational coordinator, but for other institutional reasons, she was also assigned as an administrator. With the 1:1 technology implementation, she also became the educational coordinator of the project (project coordinator A). During the first year of the 1:1 technology implementation, administrator 2 was assigned to the school. As a result, administrator 1 left the school management to administrator 2, and she was exclusively tasked with the educational coordination of the 1:1 technology implementation as project coordinator A. Figure 3.4 shows the revised organizational structure of the school in implementing the 1:1 technology initiative.

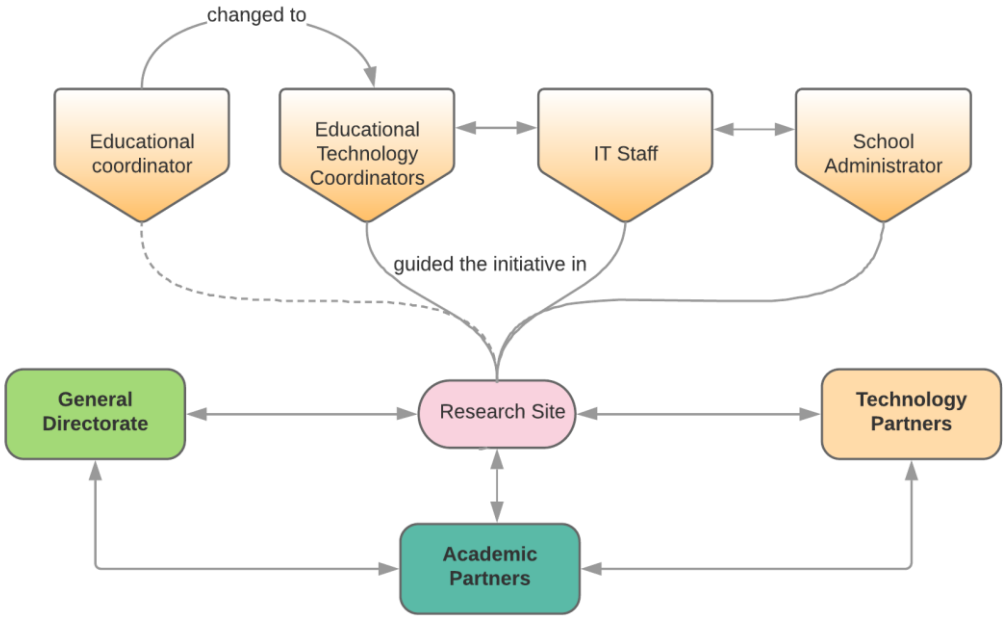


Figure 3.4. Revised structure within 1:1 technology initiative

In the revised structure, there is an educational coordinator in addition to the school administrator. As shown by the dotted lines in Figure 3.4, throughout the project, the educational coordinator's role changed to educational technology coordinator. Additionally, an outstanding teacher in technology use in education was assigned as an assistant (project coordinator B) to the educational technology coordinator, and they guided the project collaboratively. Additionally, technical support, which was provided by the general directorate, in the beginning, was later provided by the information technology unit established at the school. As shown in Figure 3.5, the implementation of the 1:1 initiative was monitored by the independent research group as academic partners from the university to examine the process from an academic perspective and prepare reports regarding the initiative. Collaboration between the university and the school was initiated at the request of the tech company because the tech company wanted to know more about the impact of its educational solutions on educational settings. The research group from the university shared the findings from school visits with the school and the tech company in the form of academic reports. The researcher who carried out this study is one of the members of this research group.

The interactions of the researcher within the research site were explained in the researcher's role section.

The implementation process was monitored throughout the three-year period. In this time period, the researcher visited the school many times to keep track of the project and gather information. Figure 3.5 shows the timeline of the research and the procedures within the research site throughout the three years of implementation.

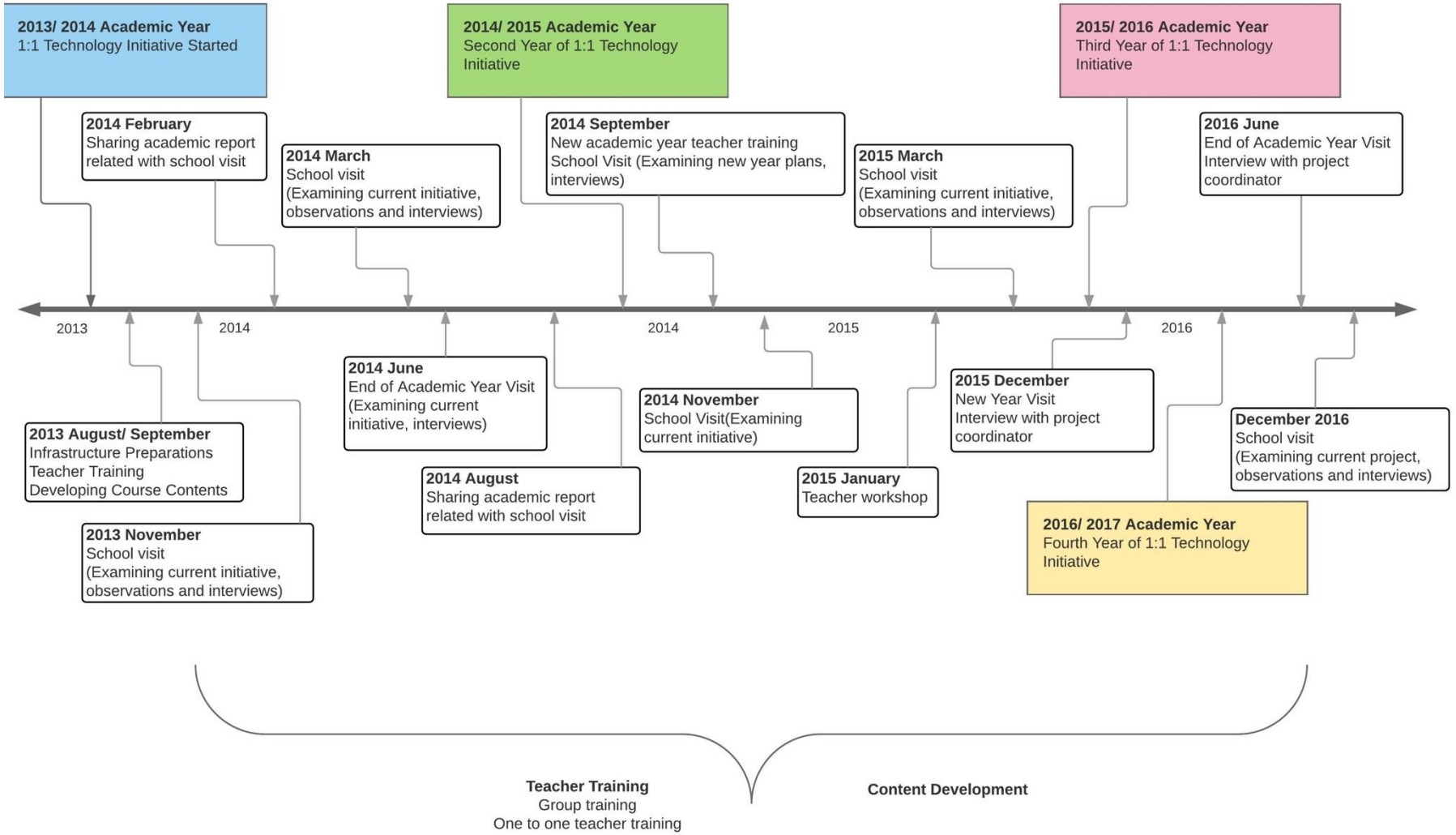


Figure 3.5. Three years of implementation

3.2.2. 1:1 Technology Initiative

The primary aim of the 1:1 technology initiative is to provide 21st-century skills to students, enhance the learning process and improve learning outcomes. The classrooms of the campuses were equipped with smart boards, and students were guided in the use of their own tablet PC for the implementation of the 1:1 technology initiative. Information regarding the 1:1 technology initiative was provided to parents who were willing to enroll their children in one of the schools of the institution. In addition to the annual school fee, parents paid a fee for the smart education platform and the students purchased of their own tablet PCs.

Information related to the 1:1 technology initiative was provided to teachers who applied to the school. At the beginning of the initiative, group training was provided for teachers by the educational coordinator of the tech company about using the smart education platform, and user guides were distributed. Throughout the educational year, various training sessions were provided to teachers. In addition, some sessions were provided to inform parents about the project. In terms of students, technology volunteers were selected. Digital citizenship contracts were prepared through discussions with students. These contracts were displayed in classrooms throughout the school. In the first year of the initiative, technology partners guided the school in obtaining the tablet PCs. In the first year, students were told to obtain a tablet PC with an Android operating system, and in the second year, there was no restriction related to the operating system.

Related to the 1:1 technology implementation, software developed by the tech company called “Smart Education Platform” was installed on smart boards and student tablets as a learning management system. Components of the learning process can be reached in one unit by means of the smart education platform. Smart Education is a platform for teachers and students to experience technology-enhanced learning. Teachers use their personal passwords to log in to the Smart Education system on the smart board in the classroom. To start the lesson, teachers select the grade level and course hours and then click on the course in the system. Students can also log in to

this system by launching the smart education application on their tablet PCs. Teachers can also take attendance using the smart education system.

When teachers log in to the smart education platform, they select the course content within the educational materials stored in the cloud system according to grade level and course objectives. The course content that is used in the smart education platform was developed by teachers in guidance with project coordinators and administrators. Additionally, a file sharing system was established within the school to share course content.

A connection between smart boards and student tablets was provided so that interactions and data exchange using these devices can occur between teachers and students. By means of the smart education platform, teachers can share data with the students through their tablets during the course by selecting from the content on the smart board. Accordingly, students can share data with the smart board if needed. Students can also use tablets to take class notes and collect educational materials that teachers send to their tablets via the smart education platform.

Furthermore, teachers can benefit from the functions of the smart education platform, such as the ability to record the course and access to timetables and reminders. Teachers can send information to administrators or parents related to the successes of students, absences and other matters. In addition, teachers can benefit from the platform's quiz function. Teachers can administer a quiz that was previously developed or create a quiz based upon a specific lesson plan and administer it to students. Students can then access the quiz on their tablets and submit their answers. Teachers can review the responses on the smart board and assess the progress of the class base on the quiz results. Students can also use this system by launching the smart education platform on their tablet PCs and reach course content and educational materials wherever and whenever they want. Students can benefit from the Internet connection within the school. They also have a limited 3G Internet connection within their tablets.

3.3. Participants

The participants in this study included the school chair, school administrators, school counselor, project coordinators, 13 teachers from various disciplines, the school IT Specialist, four parents whose children were enrolled in various grade levels, 16 students enrolled in various grade levels, and the educational coordinator from the technology company. Different stakeholders were included in the study because they have a diverse role in the implementation process. Also, teachers were selected from different areas to gather different perspectives. Thirteen teachers participated in the study, and information on teacher participants is provided below.

Table 3.1. *Teacher participants*

Pseudonym	Area	Years of teaching
Teacher 1 (T1)	Classroom Teaching	3 years
Teacher 2 (T2)	Social Sciences	12 years
Teacher 3 (T3)	Mathematics	11 years
Teacher 4 (T4)	Classroom Teaching	34 years
Teacher 5 (T5)	English Language	17 years
Teacher 6 (T6)	Mathematics	15 years
Teacher 7 (T7)	Science	3 years
Teacher 8 (T8)	Turkish Language	4 years
Teacher 9 (T9)	Science	2 years
Teacher 10 (T10)	Social Sciences	9 years
Teacher 11 (T11)	Mathematics	5 years
Teacher 12 (T12)	English Language	1 year
Teacher 13 (T12)	Turkish Language	3 years

The chair of the school has nine years of experience in administration in different educational settings, and he has been the chairman of the school board under study since 2011. Three administrators participated in the study during the three-year period. They were identified as administrator 1, administrator 2 and administrator 3. Administrator 1 is experienced in pedagogy and math education. She has taught for the public schools for 21 years and has 19 years of experience in private schools as an administrator. During the study, administrator 1 left school management to administrator 2, and she was tasked exclusively with the educational coordination of

the 1:1 technology implementation. Administrator 2 is experienced in social sciences and she has 15 years of experience. From that point forward, administrator 1 assumed the role of a project coordinator in the study (project coordinator A). In the third year of implementation, one of the teachers who has 13 years of teaching experience was appointed as an administrator to the school, and this teacher was identified as administrator 3 in the thesis.

During the implementation of the 1:1 technology, one of the science teachers from the school who has an interest in using technology in education was also tasked with coordination of the project (project coordinator B) and worked collaboratively with the educational coordinator of the project (project coordinator A). She had also served as a lead technology teacher in the school where she was previously employed, and she has experience in providing guidance to educational material companies and delivering seminars to teachers about the use of technology in their classrooms. Both educational coordinators for the project, who were previously identified as educational technology coordinators, are identified as project coordinators in the thesis.

IT specialist of the school has four years of experience in an IT department of a private university before joining the 1:1 initiative. He got his degree from the department of computer technology and programming and department of business administration. He started to work in the school from the beginning of the 1:1 initiative. The educational coordinator of the tech company was working with the company since 2003. She got her degree from computer engineering. She worked at the company as a Corporate Marketing Manager and Business Development and Product Manager responsible for the education sector and cloud computing. Her working area includes the dissemination of the use of technology in education and improvement of educational processes.

3.4. Data Collection Methods

In this study, multiple sources of data were used to gather stakeholders' experiences through the 1:1 technology implementation process. Yin (2003) proposed six common data collection methods for case studies: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts. In this study, documents, interviews and direct observation were employed as sources of evidence. Interviews and direct observations are the primary sources of data. Additionally, field notes, lesson plans, user guides for teachers, students and administrators, video recordings from teachers' educational sessions, reports on the implementation process, and photos from the school were collected as data for the case study documents. The data collection process took place throughout the three years of the 1:1 technology implementation. The researcher visited the school to observe the implementation process and collect data on multiple occasions. In order to analyze the implementation process, stakeholders were invited to be interviewed multiple times throughout the three-year time frame, and different participants were active in different data collection periods, which are explained in Table 3.2 below.

Table 3.2. *Participants in each data collection period*

Period	Stakeholders	Activities/ Data Sources
November 2013	Administrator-1 (A1) Teacher 1 Teacher 2 Teacher 3 School counselor (SC) Educational coordinator of tech company (EDTECH)	Getting into the field Documents related to 1:1 initiative (user guides for teachers, students, and administrators; video recordings from teacher educational sessions) Field notes from the school visit
March 2014	Administrator-2 (A2) Project Coordinator-A (PCA) Teacher 2 Teacher 4 Teacher 5 Teacher 6 Students (3rd to 7th grade)	Semi-structured Interview Semi-structured Interview Semi-structured Interview, observation Semi-structured Interview, observations Semi-structured Interview, observations Semi-structured Interview, observations Group interviews, observations Documents (lesson plans, an evaluation report of site visit), Field notes from a school visit
June 2014	Project Coordinator-A (PCA) Teacher 2 Teacher 4 Teacher 6 School counselor Students (5th to 7th grade)	Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Group Interview Field notes from the school visit
September 2014	Project Coordinator-A Teacher 1 Teacher 2 Teacher 5 School IT specialist	Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Field notes from the school visit
March 2015	Chair of the school Project Coordinator-A Project Coordinator-B (PCB) School IT specialist (TECH) Teacher 1 Teacher 2 Teacher 5 Teacher 6 Teacher 7 Teacher 8 Students (5th to 8th grade) Parents	Semi-structured Interview Semi-structured Interview Semi-structured Interview Semi-structured Interview Semi-structured Interview, observations Semi-structured Interview, observations Semi-structured Interview, observations Semi-structured Interview, observations Semi-structured Interview, observations Semi-structured Interview, observations Focus group interview, observations Focus group interview Field notes from the school visit
December 2015	Project Coordinator-B	Informal conversational interview
June 2016	Project Coordinator-B	Informal conversational interview
December 2016	Administrator-3 (A3) Teacher 9 Teacher 10 Teacher 11 Teacher 12 Teacher 13 Educational coordinator of tech company	Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Informal conversational interview Field notes from the school visit

As seen in Table 3.2, data collection took place from November 2013 to December 2016. Below, the data collection method used in each period is explained.

3.4.1. Interviews

Four types of interview techniques were used for the study: (1) semi-structured interviews, (2) informal conversational interviews (unstructured interviews), (3) group interviews, and (4) focus group interviews.

Interview guides were organized for each type of participant to examine their perceptions and experiences related to the basics of the implementation process such as how the tablets were used for learning or what kind of support was provided for the implementation (as seen in Appendix C, D, E, F). First, drafts of the interview guides were prepared and reviewed according to the research questions. The guides were then checked by the researchers in the area of instructional technology. In the end, necessary changes were implemented to form the final interview guides. In addition to expert opinions, interview guides for teachers were pilot-tested with the teachers who did not participate in the study.

Throughout the three-year period, participants were interviewed multiple times, and interview guides were updated during the study. Also, informal conversational interviews were used to revise and deepen the previous experiences of the participants during the school visits (Patton, 2002). In conversational interviews, experiences of participants such as their progression within 1:1 initiative were investigated.

Apart from one-on-one interview approaches focus group interviews and group interviews were used. Focus group interviews were conducted with parents and students midway through the implementation process. Focus group interviews were used to encourage conversation and to gather parents' and students' views related to the implementation process in an interactive group setting to enhance the quality of the data. In addition, group interviews were conducted with students during the school

visits. Group interviews were not structured as focus group interviews from planning to implementation (Patton, 2002).

3.4.2. Direct observations

During the first and second year of the implementation, semi-structured classroom observations were conducted to provide more details on the implementation process in the classrooms. Researcher scheduled observation sessions for different disciplines areas by communicating with teachers. The researchers introduced herself to teachers and students that she is independent of the tech company and investigating the 1:1 initiative in the school from an academic perspective.

3.4.3. Documents

Fields notes taken by the researcher, user guides for teachers, students and administrators, video recordings from teachers' educational sessions, and evaluation reports from the site visit were stored as supplementary materials to better understand the implementation process in depth.

3.5. Data Analysis

In analyzing qualitative data, a reliance on theoretical propositions was applied as an analytic strategy, as projected by Yin (2003). As a theoretical proposition, Fullan's educational change theory guided the analysis to examine the 1:1 technology implementation process. A content analysis approach was used to analyze various types of data related to the implementation process. Content analysis is used to refer to any qualitative data reduction and sense-making efforts that take a volume of qualitative material and attempt to identify core consistencies and meanings (Patton, 2002, p. 453). One unique characteristic of qualitative content analysis was considered a flexibility method that uses inductive or deductive approaches or a combination of both approaches in the analysis (Patton, 2002; Cho & Lee, 2014; Miles & Huberman, 1994). In the qualitative content analysis process of this study, theory-driven (deductive) and data-driven (inductive) methods were jointly applied. For this reason,

while using theory-driven methods, the researcher established a set of initial categories to tie the data with Fullan's educational change model as a theoretical framework and accompanying research questions. Open coding was also used to analyze the data inductively for emerging codes and categories (Miles & Huberman, 1994). The qualitative data analysis process was guided by the steps offered by Creswell (2009) as described below.

Step l. Organize and prepare the data for analysis. In this step, the interview data were sent out for transcription. To become familiar with the data and validate the recordings, the researcher also checked the transcripts line by line by listening to the recordings. Various types of data were collected through the study. The different types of data (field notes, observations, lesson plans, photos from the school, videos from teacher training) were organized in a digital format for the data analysis process.

Step 2. Read through all the data. First, to obtain a general sense of the data, each of the interview recordings was studied by the researcher. After listening to all the recorded data, the researcher began to read all the transcribed data and take notes to reflect about and record general thoughts.

Step 3. Begin detailed analysis with a coding process. For the coding of data, predetermined and emerging codes were used. For the predetermined codes, an initial code list was prepared according to Fullan's educational change theory (Fullan, 2007) and a previous study (Gerger, 2014). Data were coded by using the initial code list, and codes emerged from the data. QSR Nvivo 10 qualitative computer software program was also used to code and organize the data. A peer reviewer coded the transcripts to verify the analysis.

Step 4. Use the coding process to generate a description of the setting or people as well as categories or themes for analysis. In this step, categorical aggregations were used to build themes.

Step 5. Advance how the description and themes will be represented in the qualitative narrative. To provide a clear picture of the case narrative, detailed descriptions were used, and themes were presented in tables and figures in this step.

Step 6. Derive an interpretation or meaning from the data. In this step, a summary of the major findings was provided, and the researcher examined the data from her personal experience, using previous studies and Fullan's Educational Change Model as an analytic lens to describe and discuss the current situation.

3.6. Trustworthiness

Criteria for the evaluation of the research are shaped by the ontological and epistemological positions of the researcher. Thus, different approaches have been developed to address the quality and accuracy of the research from the researchers' standpoint (Creswell, 2007; Twining, Heller, Nussbaum & Tsai, (2016). In terms of a qualitative research paradigm, there are various perspectives in terms of evaluating quality. Trustworthiness of the data and research is indicated as one of the perspectives indicative of quality, and it refers to "How can an inquirer persuade his or her audience (including self) that the findings of an inquiry are worth paying attention to, worth takıng account of?" (Lincoln & Guba, 1985, p. 290). To establish trustworthiness, Lincoln and Guba (1985) proposed four criteria: credibility, transferability, dependability, and confirmability.

In this research, some strategies have been used to address these criteria, and these are explained below in Table 3.3. An inter-coder agreement was also used to check consistency between coders to establish the trustworthiness of the study (Creswell. 2007). For the intercoder agreement, a research assistant in the Department of Computer Education and Instructional Technology who was experienced in qualitative research also took part as a second coder. Before the coding process, the researcher informed the second coder about the objectives of the study and explained the framework used in the study. Then a selected document was coded separately by each coder. After that, the codes were cross-checked, and a coding table was prepared

upon a discussion of two coders. When 80% similarity between two coders ensured the researcher started coding the rest of the documents lonely. Also, final codes were checked by an external researcher.

Table 3.3. *Trustworthiness of the study*

Criteria (Lincoln & Guba, 1985)	Strategies
Credibility (the truth of the findings)	Prolonged engagement and persistent observations in the school Member check: Selected participants reviewed the interpretations Peers debriefing: External check Triangulation of data, informants, and investigators Referential adequacy: Achieved raw data
Transferability (applicability of findings in other contexts)	A thick description of the case Purposeful sampling
Dependability (findings are consistent and could be repeated)	In-depth methodological and procedural description
Confirmability (a degree of neutrality)	Triangulation of data, informants, and investigators Description of the researcher's role

3.7. Researchers' role

This study investigates the implementation process of 1:1 technology in a school setting. Toward this aim, my colleagues and I participated in the implementation of the process as external observers. At the beginning of the study, we visited the school and introduced ourselves to school personnel by underscoring our role as observers. During the implementation process, I worked in the evaluation of the current project and shared findings as evaluation reports with the school administration. I have completed my bachelor's and master's degrees in the area of computer education and instructional technology. Before this study, I conducted various research projects regarding technology integration. Thus, I have previous knowledge of and beliefs about technology integration. However, during my involvement with this research, I have broadened my knowledge as a result of a comprehensive examination of

technology integration practices within the school. Throughout this process, I have established strong ties with school personnel by regularly visiting the school, spending time at the school, and demonstrating my willingness to discover those factors related to the 1:1 implementation.

CHAPTER 4

RESULTS

The purpose of this study was to investigate the implementation process of the 1:1 technology initiative through the experiences of key stakeholders within a school by using Fullan's educational change framework as a lens. The findings of the study were presented in this chapter according to Fullan's model in line with the research questions.

4.1. Elements related to the initiation of the 1:1 technology initiative

Research questions of the study were categorized according to Fullan's educational change framework categories. The first question was about the elements related to the initiation of the 1:1 technology initiative. In this regard, elements related to adopting the 1:1 technology initiative were investigated. As a result of the interview data and field notes from the school visits, two main themes occurred related to the initiation of the 1:1 technology initiative as motivations and action plan shown in Figure 4.1.

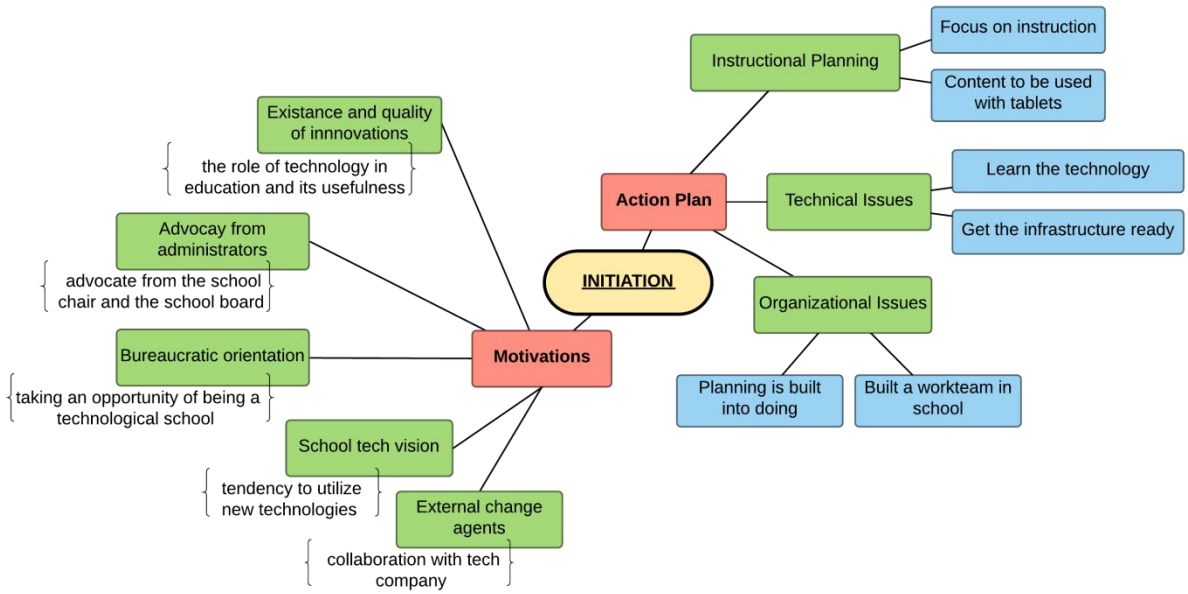


Figure 4.1. Elements related to the initiation of the 1:1 technology initiative

4.1.1. Motivations

Under the motivations theme, driving forces that lead up to initiation of the 1:1 technology in the school were considered. As a result, five codes emerged: advocacy from the administration, bureaucratic orientations, school tech vision, existence quality of innovations, and external change agents, which were explained below.

4.1.1.1. Advocacy from administration

The initiation of change occurs with an advocate from the school chair. The interest and support from the innovative school chair who received the school board's support played an import role in the initiation of the 1:1 technology in the school. The school chair expressed his interest in relation to educational technology and mobilized the people in the school toward the initiation of the 1:1 technology. In other words, the chair provided internal authority and support. The chair of the school indicated that he stands behind the project and supports the initiation and placed the 1:1 technology initiative at the top within the school. Similarly, both project coordinators PCA and PCB underlined the school chairs' advocacy regarding the initiation. In line with that,

PCB indicated that "*Decisions had already been made by the time I joined this project… We started to work on how to use these technological devices effectively and productively".*

4.1.1.2. Bureaucratic Orientations

One of the adoption decisions was related to taking the opportunity of being a technological school. In other words, being a pioneer in the field and name recognition for the school was stated as an important factor by the school chair. The school chair underlined the idea of coming to the fore by using the smart education platform within the 1:1 technology initiative and taking the advantage of being the first. In this direction the views of the chair were:

> *As the decision was made, there were about four or five alternatives to smart education-related software for us. As I mentioned earlier, one of the biggest advantages of smart education is that our school was going to be the first to use it. Although there are disadvantages of being the first to try something new, the advantages that could be in our favor could be more. We are trying to do something a little more specific to our school. The number of private schools is increasing every day in Turkey and so is the competition. In such cases, you have to take some initiative to be one step further and, in a sense, avoid the 'standard' way.*

4.1.1.3. School tech vision

The school chair interview data showed that the vision of the school, especially the school chair's tendency to utilize new technologies in education, was an important factor to initiate the 1:1 initiative. The chair indicated that the vision of the school to use technology in education was determined first and then they proceed with 1:1 technology initiative. At first, the chair of the school communicated the idea with the school board and the first steps were taken. Also, the school chair characterized the school for being an up-to-date institution in terms of providing rich learning environments.

4.1.1.4. Existence and quality of innovations

Another element regarding the initiation was the existence and quality of innovations. In terms of innovations, the "role of technology in education" and "usefulness of technologies on student learning" were covered. In this perspective, the chair expressed his opinions as follows:

> *An updated school needs to catch the era. And the era we are talking about the era of technology, educational technology brings the technology practices with education needs. So that, we use educational technologies in our schools. In terms of smart education, providing an excellent perspective on the interaction between the tablets and the smart board gave us confidence.*

Benefits of technological innovations on students learning were driving forces for the school chair to initiate the change.

4.1.1.5. External change agents

The last factor of the initiation decision was external change agents. As mentioned earlier, the school launched the 1:1 technology initiative with the collaboration of one of the known telecommunication companies. The company, acting as an external change agent in this process, helped for the initialization of the 1:1 technology initiative. PCA indicated that the chair of the school met the representatives of the tech company in a conference and decided to use the company's smart education system in the school and communicate this idea with the school board. In this regard, the school chair stated that:

> *…as one of the world's leading brands, the tech company gave us confidence. So, we decided to use their system in our schools. We rely on the tech company. We rely on its brand because we know that even if there is a problem in the first year, they can fix it immediately…*

4.1.2. Action Plan

In the action plan theme, first steps related to the implementing the 1:1 initiative are presented. It was the first year of the school and the school administrator (A2) indicated her concerns about the short distance between planning and action as below:

> *It's a very difficult process now. First of all, I speak on behalf of our school, because the whole team said "hello" in the first year of our school. With the children, everyone said "hello" to each other in this school. During the establishment of our school, we also had a considerable amount of work done on tablets. Am I totally OK with the results? No. There are and will be times when things won't go well during the process-regarding teachers and the whole process- but these are definitely things that could be overcome in time and with effort.*

On the other hand; instructional planning, organizational planning, and technical issues were pointed as the first steps to get ready for the 1:1 technology implementation.

4.1.2.1. Instructional planning

Instructional planning refers to the acts to be able to use the proposed technologies for educational purposes under the leadership of the project coordinators. Within the instructional planning theme, two codes emerged, one of which is related to providing content and the other is pedagogical use of the proposed technologies.

Content to be used with tablets

The contents to be used with tablets were stated as an important issue by the school administration. Also, during the first school visit, the teachers indicated their concerns about the lack of digital content. In this stage, administrator A1 refused to use ready-made content and communicated the idea of preparing information and worksheets to be used with tablets. Then she worked collaboratively with the school counselor and volunteer teachers to form the templates for the information and worksheets. In this regard, administrator A1 indicated her view as:

> *The first reason for me to be in this project is how we can design content with teachers. What kind of content can be sent from smartboard to student tablets? We need to hurry because teacher training was not provided due to the fact that the school was in its first year…*

Focus on instruction

Along with the content development efforts, PCA formerly the administrator of the school guided the process by focusing on the instructional use of the technology within the 1:1 initiative. She proposed to use Bloom taxonomy to prepare the learning content which was intended to be in the form of information and worksheets and focused on the pedagogical use of tablets and said "*A software was purchased for the tablet and smartboard interaction. I both tried to understand the software and provide a guide to prepare teacher contents proper with the pedagogy".*

Information and worksheets were prepared in portable document format (pdf) which contain learning activities during a course. This pdf document can include links to video or other multimedia elements. A1 guided the preparation of these material and proposed an instructional template for teachers to develop their own content. This template includes an introduction section where it was expected from teachers to offer students a joyful introduction to the subject and to measure students' readiness. A1 explained that "*There can be a video here which the child can follow to make a mental map. Discussions can be opened among them... like that".* Then, there is a part including concepts related to the objectives of the course and discussion upon the subject related concepts. In this point, it was expected from students to share their understanding upon writing on their tablets and share with the teacher. Similarly, teachers can provide explanations for students so that students have a chance to check their understandings.

In the practice section of the template, it was expected for teachers to present their examples related to the course objectives and provide an opportunity for students to make practice. In addition, there is a section in which interdisciplinary connections with other courses were made.

Related to the content developments A1 stated that teachers can benefit from various kind of media and sources to create the contents of the templates to be used as information and worksheets. A1 also underlined that there are no constraints for teachers to generate their course content.

4.1.2.2. Organizational planning

In relation to organizational planning, two themes were derived as "planning is built into doing" and "built a work team in school" Each code is explained below.

Planning is built into the doing

There was a limited time for the preparation. Even there were some implementation strategies determined, most of them were set during the implementation. In this regard, the chair of the school indicated that there was no educational technology unit in their structure but after initiation of the 1:1 technology, the educational technology unit was settled. PCA expressed that the contract related with the 1:1 tablet initiative was signed before they started to work in the school. As a project coordinator, she started to elaborate on what to do after being involved in the initiative. At the beginning of the term, teacher training was provided by the tech company about using the smart education platform. And professional development training sessions organized by the school were planned after the project was put into the practice. Similarly, PCA indicated her thoughts as:

> *We noticed that every school should have a technology leader teacher and more importance should be given to digital citizenship issues. This was due to the lack of digital literacy of students, especially Internet use. In fact, these were the issues open to improvement. In fact, these were the issues open to be improved.*

Also, PCA remarked that they did not have an exact plan at the initiation stage. But while proceeding with the change they thought that they should have a plan. Accordingly, they set a plan for the entire implementation process. On that issue, PCB indicated how they settled the plan by saying:

> *After having attended the Certificate Training on Expertise in Education Technologies, I met colleagues who already made use of this work and who could be of help as a guide on how to apply it. They provided us with sample practices and we worked on what kind of a program would work for our school and how we could develop a certain path. We issued the smart education booklet and created a flowchart in line with these guidelines and started to apply them.*

Built a work team in school

Interview data and field notes from the school visits revealed that an organizational structure was built to proceed with the initiation of the 1:1 technology initiative and new roles were assigned to people. The chair of the school indicated that they settled an IT coordinatorship within the general directorate. The chair assigned one of the administrators as project coordinator to guide and monitor the 1:1 initiative. During the first school visit, the counselor of the school characterized the PCA as a mold breaker and indicated that she is a qualified leader who has awareness of solution. But she indicated that the organizational structure was not enough to put the initiative into practice. The school counselor also expressed that she also needs to have a voice in the process. Afterward, PCB who was a teacher in the school was assigned to coordination of the project as an assistant of PCA owing to her willingness to use technology in education and her technology-related works. PCA concluded that none of them were educational technology specialists but they have a background in education and attended some courses related to educational technology. Firstly, PCA started to work on the configuration of the infrastructure, collaborated with the IT specialists from the general directory in this process, and included them in the initiative. She said:

> *One of our IT managers has been mostly involved in purchasing equipment, repairing and maintenance, and electrical issues. As for another manager, he played a bigger role in the establishment of the system and adaptation of the software to our systems.*

Afterward, in the second year of the implementation, an IT unit was settled within the school and a new IT staff named as TECH was appointed to the school.

On the other hand, PCB expressed how they built a work team in the school as "*First, we determined the responsibilities of each teammate who will take a role in the process and declared their responsibilities"*. In addition, the people worked collaboratively to solve the problems encountered in the process. For example, volunteer teachers collaborated with the administration in content development and volunteer students were selected to communicate the initiative to the rest of the students effectively.

4.1.2.3. Technical issues

The last element was related to the technical issues to start the implementation.

Get the infrastructure ready

Another point regarding the action plan was about getting the infrastructure ready. Both coordinators and tech specialist indicated that they work collaboratively to maintain a ready system. The reason is that some of the tools were not working within the smart education platform and the infrastructure of the school such as network connections and server capabilities were not enough. Also, school visits showed that it took nearly one semester to get the infrastructure ready to launch the initiative completely. PCA indicated that although the tech company looked like proficient to satisfy the requirements related to the technical issues, even their software was not satisfactory. So, they realized that the tech company provided the software and they need to work on the infrastructure. PCA explained that:

> *Infrastructure was our priority here. For this reason, we worked together with a colleague IT manager in our school. I asked him if a prior infrastructure is needed for this and whether or not the Internet is needed. After having made the necessary negotiations, he told the founder of our school that the company is not going to build an infrastructure, but it only provides the required software. However, they pointed out that they will*

> *help to distribute it through a network. As a result, a system with cache servers was installed in schools. And it was told that signal distributors were needed for distribution of this program to boards and tablets. This is how the building of the infrastructure started...*

At this point, PCA collaborated with the IT specialist and the network infrastructure was settled under their leadership. Similarly, PCB indicated the importance of infrastructure as "*First of all, it was important that the tools in our program worked well. We worked on that issue for a while as some features didn't work properly or not very efficiently. So, we worked on the development of these tools...*"

Learn the technology

Lastly, PCA indicated that she first tried to understand how to operate and use the software within the 1:1 technology initiative. Because a specific software called smart education platform was installed in smartboards and students' tablets. Thus, to guide teachers, students and parents the coordinators thought that they should have control over the smart education platform. As a technological tool, they want to learn about affordances and benefits of the smart education platform to provide both instructional and technical guidance.

4.2. Elements related to the implementation

The second research question of the study examined the key stakeholders` perceptions and experiences regarding the implementation of the 1:1 technology initiative. The stakeholders' perceptions regarding the implementation of the 1:1 initiative and their practices were presented accordingly. As a result of the interview, observation data and field notes from the school visits; three themes occurred related to the implementation process; perceptions about characteristics of the 1:1 technology initiative, 1:1 practice, and support and monitoring.

4.3. Perceptions about characteristics of the 1: 1 technology initiative

Under this theme, findings related to clarity, complexity, need, and the quality of the 1:1 initiative were presented as shown in Figure 4.2.

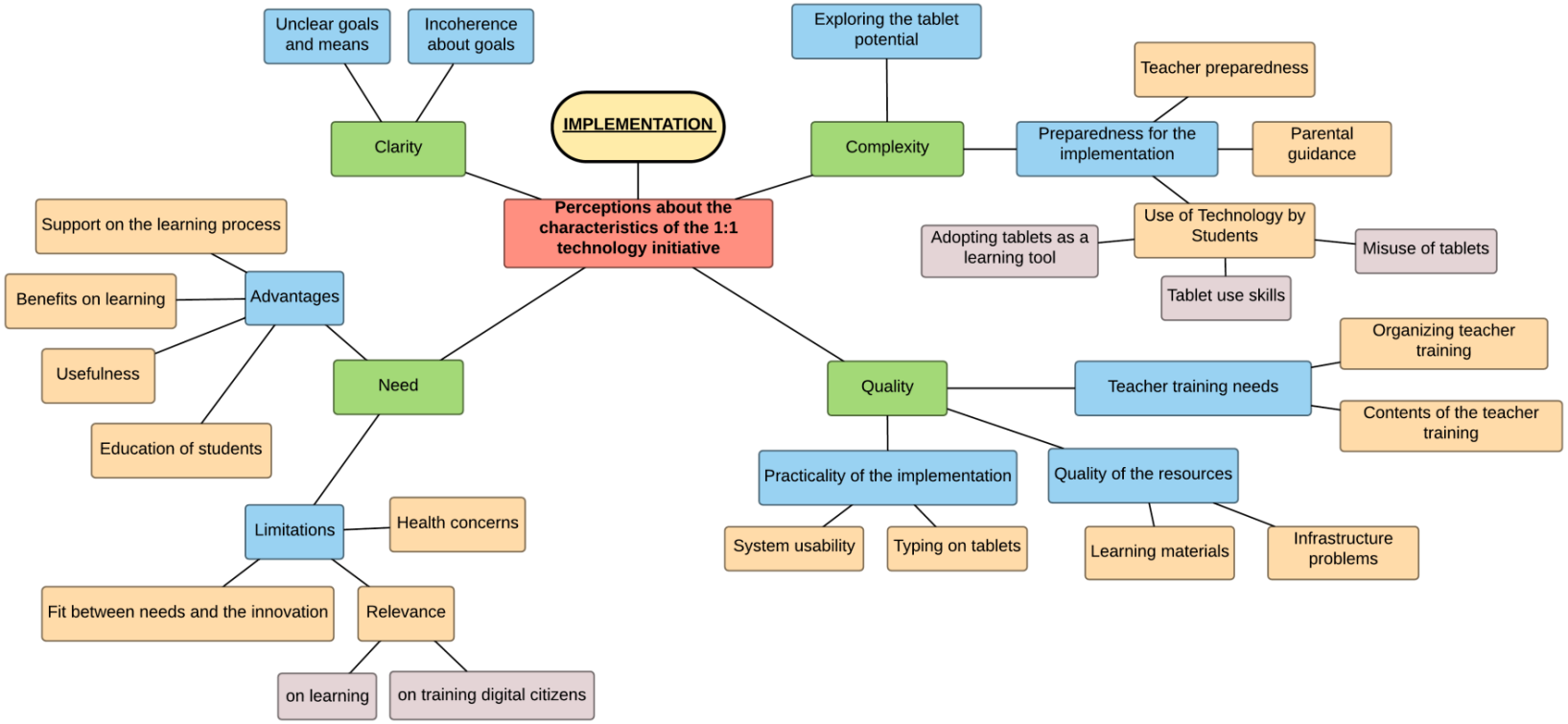


Figure 4.2. Perspectives on the characteristics of the 1:1 technology initiative

4.2.1.1. Clarity of the 1:1 technology initiative

The implementation process was examined to find out participants' understandings regarding the 1:1 technology initiative. Two codes emerged upon the participants' views and field notes; unclear goals and means and incoherence about goals.

Unclear goals and means

In the initial stage of the implementation, in the first school visit, it was noted that administrator A1 were concerned about the vagueness of the implementation in terms of management, the inclusion of parents, or what teachers should do in the process. Also, related to the vagueness school counselor also indicate her view as "*The project is abandoned in a sense. Up to now, there is no answer to the question of whether a parent and a student can communicate on the Internet using a tablet. And the responsibility has not been given to a certain party".*

One of the teachers interviewed in the first stage of implementation (T4) expressed her curiosity about how other schools use this kind of systems and how long it takes for schools to benefit from the 1:1 initiative. On the other hand, another teacher (T5) was not clear about how to use the system beyond uploading materials into the smart education platform as shown while introducing the new system. Similarly, when the idea of 1:1 initiative was communicated, T1 expressed her view as:

> *...I thought it would probably be a lesson of a somewhat technology-intensive class. But I could not imagine how to achieve it. I had questions about how could it be, how to cover the lessons I needed to cover in line with the curriculum? On the other hand, because I use technology so efficiently, I was very curious about how this could work in the class. I thought the data would be ready for me and that everything was ready and the students would just open and use it. I thought everything would be ready for me in terms of teaching content. But of course, I still had questions on my mind such as "Will I be able to cover what the curriculum asks me to?*

In line with the teacher's concerns, PCA also concluded that they got such reactions from the teachers such as *"Are we doing this the right way? Is this what is required?"*.

As to parents, they were not clear about the goal of the 1:1 initiation and how students use the proposed system in the classrooms. They were also not clear about how students can use tablets at home. Parents complained that they were not informed enough about the process, so they cannot guide their children at home regarding using tablets for academic reasons; instead, they obtained information from their children. Parents were informed by a letter which announced that the school was going to implement the 1:1 initiative and a brief information was given in a school meeting. Apart from that, a hands-on training session was planned to be delivered by the tech company for parents, but it could not be put into practice. Thus, the parents have question marks in their minds such as why the school put the 1:1 initiative into practice, how students and teachers use the smart education system and tablets in the classroom, and how to guide home usage and monitor their children's progress. In addition, PCB indicated that the parents were not informed sufficiently, so they complained that they were not clear about the contributions of using tablets in education. PCA mentioned that a workshop was planned for parents, but the participation was low due to their reflectional view.

T6 and T7 expressed their anxiety based on fear of unknown. But they indicated that the process became clear when they were involved in the implementation. T6 also mentioned that she could not help students when they faced challenges regarding the tablet use because she was not clear about how the smart education platform works on tablets.

On the other hand, in the beginning, A1 indicated her concern about measuring the effectiveness and efficiency of the initiative. As the initiative progressed, A2 expressed her confusion about how using tablets will affect the students. She said:

> *I'm not sure about these as well. Suppose that the student wrote on the tablet but how successful will he/she be? Is he/she good learning it or, in another way, let's say, adapting it when it comes to tests or being able to use the knowledge in real life?*

Similarly, from a coordinator's perspective, PCB indicated that she intensified her efforts to evaluate the current initiative such as assessing the results of the current practice and to understand how the current initiative affects the learning process.

Incoherence about goals

Another issue related to clarity is the incoherence of the goals between the tech company and the school vision. The coordinator from the tech company expressed that they developed the smart education system as a platform for teachers to deliver the course content. But when the company entered the classrooms and met with teachers, the aim of the 1:1 initiative was revised. But it was understood from the school visits and interviews that the revised aim was not clearly realized by the stakeholders. The coordinator from the tech company explained their expectations as:

> *We made it as a mechanism by which teachers can run in the first place, the teacher needed to move forward in that direction... On the topic covered in class, the discipline taught, and the topic shown within that discipline; he must create an area in which it can include many examples, especially doing the reinforcement, and he can enrich the class through practices after presenting the introduction part. It was our expectation. But we saw that the teacher is having difficulty in producing the basic lesson without using technology. In most of the training sessions I have joined, the teacher refuses to return to the real student psychology and learn something…*

In line with their observations, the coordinator from the tech company indicated that teachers do not have a certain standard while giving the classroom education. She also added that teachers cannot give the same quality of education in different branches. Even if teachers use the same educational content, they cannot explain it in the same way, which was identified as a shortage of a standard by the coordinator of the tech company. For this reason, even at the beginning, it was intended to be an interaction from the board to the tablet, tablet to board they shifted the tool to a dashboard to measure the output of the teacher-student interaction but also the performance of the teacher in class. She explained that:

> *Now rather than educational technologies, for extracting a teacher's teaching experience in class, and the learning algorithm of the child within the class, such a technology is a must. We have always proposed using tablets in the class, measuring the child's performance, or let's shorten the time spent for taking notes; this was our proposal of additional value. We have tried to optimize the process, but the main difficulty is the teacher, to check the teacher's teaching, that is, how much the teacher really is teaching, it is the basic need... When the teacher enters the class and starts using the system, we can record everything about the teacher. What time did the teacher enter the class, how long does the class take, what kind of information s/he sent to the students… well, we can interpret it but to a certain extent only. A teacher, an educator, in fact, should observe it… This must be managed by the teacher. This is the part we provide, what is called the tool.*

It was realized that the tech company revised the aim of the project according to the teachers' behaviors that they encountered within the school. As a company, they focus on teachers' performance by checking their logs regarding using smart education platform, but teachers were not aware of that aim and not aware of making use of the platform for that revised aim. Even some of the teachers were frustrated about controlling their system logs by the administration or the tech company.

4.2.1.2. Complexity of the 1:1 technology initiative

The findings related to the perceived difficulty and extent of change to implement the 1:1 initiative was presented under the theme of complexity. As a result of the analysis, two main themes occurred; exploring the tablet potential and preparedness for the implementation. In addition, A2 and PCA expressed that they were in search of help and support from researchers and experts, and they wanted to receive feedback and expert view related to the implementation of the 1:1 technology in the school. For example, PCA spoke as "*...we are giving training on the preparation of contents which is carried out by me. Whether this template is sufficient or not is another important issue. For this, we ask for your support. Do you think this template is sufficient?"*

It seems that also coordinators are not used to prepare learning contents to be used in such kind of platforms. Thus, they want to confirm their work with an expert view to guide the content development efforts. Also, coordinators want to make sure of that they are providing proper guidance in terms of preparing learning materials.

Exploring the tablet potential

The basic use of the smart education platform within the 1:1 initiative was based on exchanging information between the smart board and students' tablets and vice versa within the classroom. But, to ensure the effective use of tablets for learning, the participants expressed their views about going beyond this basic usage and emphasized the need to explore the tablet potential use. In this respect, PCA indicated her views as follows:

> *During our research, we found out that technology needs to be included into teaching according to the SAMR model. This was a chain of implementation steps. We first made the introduction and achieved it. As a result, the teachers learned how to send things from the board to children's tablets and also the students learned how to send some content from their tablets. But these were the practices in the conventional way of education that didn't involve the use of technology completely. The first time I started, I thought that it could be done with merely an information sheets. I then discovered that it was not like that at all and realized that it was a huge ocean to discover.*

The teachers were also complaining about the current usage and they were in search of using the tablets effectively by involving students. The teachers pointed out that tablet usage in the classroom mostly replaced past practices such as using notebooks and pens. T6 expressed that she mostly prepared questions in digital format and sent them to the students' tablets. Similarly, T7 indicated that she mostly used the information sheets, but she indicated her need for resources that will activate students in learning. T8 stated that she could not integrate the tablets apart from exchanging data as shown by the project coordinators because she did not know other types of usage. On the other hand, T2 noted that such current usage of tablets did not have many benefits on student learning. For example, T1 said that:

> *I use the board quite a lot, but I always send the data in the form of a picture to students and the student is a little more passive on the tablet. It is as if the tablet is a screen for you to write, just like in your notebook. What can the student do on the tablet? S/he can only send me through a plain page with her/his own creativity. What I mean is there must be such an interface as we saw in the training that the student should enjoy doing things there. This is no different than a blank notebook page. S/he is not creating a presentation from an internet site. So, the student is still more passive here...*

Similarly, concerning that complaint, T2 interpreted their approach as technocentric and pointed out that they need to go beyond using smart education software that the tech company developed. She said:

> *... In Turkey, if a new system is introduced regarding education, we tend to completely abandon the old and adapt to the new. This is something I'd like to point out and criticize. I believe we cannot differentiate between tablet education and smart education platform. We just concentrated on the company which prepared a software. We keep thinking about what we can do with that software. However, there are indeed many kinds of software, programs, and materials to use. There is no work done on this…*

Also, T2 indicated the need to learn new applications as follows:

> *Geography issues are also in social sciences, you know. The shape of the Earth, latitudes, parallels, longitudes. Due to the presence of some abstract topics such as these, it's hard for students to conceptualize them in their minds even in ninth grade where they have the same topic in Geography lessons. So, it's really a problematic topic for the sixth grades. What do I use to teach this in sixth graders? I make use of maps, a globe for instance. I was amazed by something I saw online. This was a lesson where students had a 3D world in front of them on their tablets and they could touch the world and turn it wherever they liked on the screen. It was almost real for them. It was magnificent. The students were able to calculate the time differences on the tablet. They could also measure the distance between two countries using their tablets. I still use maps, students have atlases but currently, I believe that atlases are more beneficial to students rather than tablets...*

Regarding the experience of T2, she underlined limited benefit of the current usage of tablets. She was in search of applications that can be installed on tablets. By the way,

she will have an opportunity to present the learning content in a different format. Otherwise, she preferred using the methods that she was using before the tablets.

In terms of using tablets, parents also pointed out the extended use of tablets at home. Especially, to support their children, the parents wanted a working platform at home. Similarly, students from all grades indicate the need for exploring new ways of using tablets; for example; including multimedia items such as video; using different applications such as simulations; or using creation programs to develop their own learning material. One student from grade 7 told that they should be informed about how to use tablets for educational purposes and improve at home usage.

Preparedness for the implementation

The participants expressed difficulties in terms of changing their current practices in order to implement the 1:1 initiative. In this part, the participants' perceptions about the difficulties that they encountered in the implementation and the skills that they thought they should have presented. PCA underlined that they were struggling with changing the current habits and quoted that:

> *…everyone reacts at the same time while trying to understand first. Now, where did this come from? What do you need that for? And he's always trying to put out the negative sides so that it doesn't get accepted. On the other hand, there is resistance due to the change of habits of both teachers, students, and parents.*

Parental guidance

The parents referred to the difficulties in monitoring their children's use of tablets and learning experience at home, especially for homework. Some of the parents' views were presented below:

> *I feel like we should be like a spy. Is s/he really working? Or somewhere else? Everybody has that doubt, right? There's actually a lot in there that we do not understand. There is a lot of content. But, we do not know what we have not worked on. It will be presented to us. Parents will be informed*

> *about it. So, we will have our control accordingly. We won't be dependent on the student. As I say, we do not know the program. We do not know how smart education is used. How much of it does the student show us, the students do not show even just to ignore the work.*

Through the reaction of parents, one of the teachers also expressed the difficulties regarding parental guidance. She expressed said:

> *I get a lot of feedback from parents saying that they can't check their children's homework anymore because they aren't able to use tablets. As they are unfamiliar with tablets, they are unable to guide their children in anyway or simply because they do not know how to use tablets. So, when the student is not studying, they cannot guide them. They are confused about what to do. That's why we get a lot of reaction from the parents. For example, one of our parents has not bought a tablet yet and insists on not buying one.*

In addition, the tech specialist of the school indicated the need for educating parents because of receiving a lot of reaction from the parents about using the smart education platform. The parents complained that they were not able to use or control the system.

Use of Technology by Students

The students had difficulties in adopting tablets as a learning tool and using the tablets. Also, the students displayed misuse behaviors regarding using tablets. Issues related to the use of technology by students were explained below.

Adopting tablets as a learning tool

The school chair indicated that the students had some difficulties because they did not use tablets for education before. But he added that resistance of the students was not as complex as that of the teachers or parents. The teachers stated that the students enjoyed using technology, it did not match up with their education because the students have used the tablets to play games until now. It was a new fact for students to have education through tablets. The teachers expressed that the students could not take tablets as a learning tool. T6 stated that the students were not conscious of using

tablets for their learning. She explained that the students used the tablets for playing games mostly. Also, she added that tablets are beneficial for those who use the learning contents with the guidance of their parents but most of the families were having difficulties to help their children. T7 added that the students got used to tablets for educational purposes when rich learning opportunities provided for them. Likewise, T2 concluded that having tablets was not making a difference; instead, it is the teacher who influences how they use it. T8 thought that the students still could not use the tablet for educational purposes. In addition, she added that the current use of tablets inhibited students' meaningful learning as stated below:

> *I am not saying this because they are studying on tablets. They can not think comprehensively since they are involved in too many things about tablets. What I mean is our generation could think of ideas by linking them to each other. Students see everything very shallow now. This is true for everything. Their ability to look deeply and relate things to each other is very limited. I think that this is due to their addiction to playing games and the problems that come along with it. So, education is okay, technology is okay, too. But I do not think children can still make use of it for educational purposes."*

T4 also expressed that the students were using the tablets for games mostly, and they are recently trying to adopt tablets as a learning tool. Students at lower grades indicate that using tablets for the educational purpose was a new concept for them. One of the students, who did not have a tablet before, from grade 4 expressed that it was very complex for her at first because she was not accustomed to using tablets in courses. But after playing around with tablets, she got used to using the tablets within the class with teacher guidance. Another student from grade 4 stated that she had had a tablet before, but she mainly used the tablets for playing games. She found the use of tablets enjoyable and got used to the 1:1 technology implementation in a short time.

T1 indicated that she was concerned about how she can adopt tablets for learning of her students. She added that she had more difficulties to adopt tablets, especially in lower grades. She showed students the use of tablets in learning to motivate her students. For example, she used her phone to search an unknown word and at the same

time explained to her student that she was using her phone as a tool to access knowledge, she did not do things she was not supposed to, such as texting or messaging during the course time. She was trying to adopt tablets as a learning tool and showed her students that it was unethical to text or take photos etc. during the instruction by modeling the instructional use. She also showed her students how to use educational applications on tablets.

Related to students' technology use, in the second year of the implementation, T1 indicated that students should have a pre-training session period before using tablets in the classroom. In the meanwhile, they will have awareness and get ready for the implementation.

> *…I see that last year it was good, but this year I realized that we haven't used tablets in maximum capacity last year. In fact, we had serious issues about it. This does not have anything to do with tablets or the Internet. Students can not embrace the tablet, so we lost one year trying to adapt to it as a tool for teaching. It took us maybe a few lesson hours. Actually, it looks like it was an advantage, but I can say that the trial method and the process led to the loss of many objectives that I have to give to the student.*

T8 expressed that both students and teachers were having difficulty to adapt to the 1:1 technology. She also added that she had difficulty while doing homework in online environments in her university years. But she stated that by means of the 1:1 implementation, the students have a chance to start to use technologies at an early age. So, the students will not have difficulty in the future.

Teachers wondered about how students used tablets for learning and indicated the difficulties in monitoring their practices. T6 stated that she would feel better if she held a view about student practices, such as how they are using tablets for learning. She indicated that she should allocate time to learn students' practices in and out of school. Similarly, T5 shared her concerns that the students need to be guided at home referring to parents' supervision. Because she had question marks in her mind about out-of-school use of tablets. As an example, what are the students doing with their tablets? Are they really trying to learn something? Are they reviewing what they have

learned at school? In the same direction, T8 emphasized informing and educating parents to be able to monitor their children. She quoted that:

> *For example; you say if you have a game on the tablet, delete it. They(students) say it is their private property which does not interest us. Now, after receiving such a reaction, the mother believes in the child as s/he says that s/he is studying for the examination by using the information sheet on the tablet. Then I tell the parent the student's mark as 45. Then the parents ask the reason of this mark and claims that the students always study on the tablet and so on. So, we do not know the truth. Therefore, I believe, as parents or students do not have an awareness, they should be the ones to be trained first, I believe.*

Tablet use skills

In relation to tablets usage skills, PCA indicated that the students were accustomed to using computers mostly, but they had problems in controlling tablets. From that point, T8 expressed some of the problems faced by students by saying:

> *They still get back to me with so much trouble when I give an online assignment that I need to think twice before giving a one now…Now I will give him another assignment online. He will come back to me with countless complaints like "I could not open the site", "I could not upload the Picture", "I could not do it"," I could not put it here". Because; they do not know it, either. In fact, these things can be taught to them. As I said, this also has to do with training… But I do not think we're the one that will give the computer training.*

Regarding tablets use, T2 indicated that the students had a lack of knowledge about how to organize and use the data they received from their teacher during the class or downloaded from the internet.

Misuse of tablets

When the tablet initiative was introduced into the school, some of the teachers indicated their concern that tablets will distract students and A1 underlined the awareness of students to use the tablets. A2 indicated that at the beginning they struggled to stop playing games on the tablets. The chair of the school stated one of

his concern as the possibility of using tablets in non-educational activities by students and addiction to tablets. PCA also thought that the students can be addicted to their tablets and use it for entertainment.

The students complained that tablets were used for playing games during the class or in the breaks. In addition, the students continued the use the tablets for playing games at home. The parents exemplify that even their children said they are going to use tablets for homework, they get involved with games. Similarly, tablets were reported to distract students during the class. The students misuse the features of the tablets such as drawing, searching on google or communication. T1 mentioned about her experience during the class as:

> *Sometimes students open the camera on the tablet, draw pictures, take selfies with it, clicks on different apps. And I can't be everywhere in the classroom at the same time trying to check on all the students. I need to be at the board to teach as well… All these prevent concentration greatly.*

T6 stated that the student was so distracted that he sometimes did not listen or respond to you. Related with that, one student from grade 5 said that:

> *For example, our friends who do not have a tablet go to the ones who have tablets. Then they talk and do other things at the same time. The teacher is telling something there, but they don't listen but only painting.*

The other student from grade 8 spoke that "…*when we play the game on tablets in the break time and enter classes with the tablets, it becomes hard to concentrate like this. They are dealing with other things in class. Because the tablet is facing you in the end".*

The students also indicated that those who misuse the tablets during the class can be logged out of the smart education platform. And then, they complained that they could not receive information through the platform. As a result, the teachers were trying to avoid confusion based on students' misbehaviors and the class time was interrupted.

The teachers and project coordinators underlined the need for social awareness regarding using technology. PCA said that:

> *So, I really think that this is a good educational tool. At this point, we still have a long way to go in terms of social awareness. We do not have a broad vision of how to use the internet, tablets, and computers. I think that in time, they will be used in a much more efficient manner and more positively and purposefully.*

Similarly, a student from grade 7 expressed that contrary to what is believed, they were not good users of technology and mentioned the need to be conscious. Likewise, T7 indicated that they were in the beginning level and pointed the need to have come a long way. In this process, she mentioned the need for raising awareness among students, parents, and teachers for using technology. T4 also indicated that the project will be successful if the digital citizenship skills of students are supported. She said that "*Yes, if technology citizenship is achieved and if we really show that we can make use of technology in the correct way, we will teach kids to use it"*.

The school administrators warned the children not to download and install games on their school tablets. In addition, even the teachers could lock students' tablets by using the platform to prevent downloading and playing games and other misbehaviors, the students found a way to break this rule. The school worked together to overcome the misuse of tablets. The participants thought that there was a need to provide restrictions to prevent playing and downloading games. There was an unlimited internet provided by the school, but the students used it mostly for watching videos or playing games. Thus, the school disconnected the Wi-Fi and students used the limited 3G to access the internet. The tech specialist of the school indicated that the websites that students used for games or watching videos should be banned and only educational websites or web 2.0 applications with educational purposes should be permitted. But the educational coordinator of the tech company thought that prohibiting the internet to encourage student learning was not a good solution. She proposed that the teachers should contribute to responsible use of technologies by students. In relation to students' misbehaviors, the participants indicated the need to ensure awareness of

using technology properly. At the beginning of the project, the school administrator underlined the importance of the internalization process of the student tablet use. As a PCA, she mentioned that she did not approve of refusing or banning technology. Instead, she thought that the adaptation processes need to be managed properly and consciously. The chair and PCA concluded that even there were misbehaviors based on tablet usage, support and guidance from conscious adults in learning environments would be beneficial in terms of self-realization of students. Thus, they indicated that there was a need for knowledgeable and conscious teachers and parents. PCA said:

> *I'm optimistic about it despite being a teacher for many years. I have always been open to technology, but we are in the transition phase right now. On the students' side, it has contributions to productivity initiatives and the use processes. They are gradually becoming technology citizens and they have responsibilities related to being a technology citizen. There is a need for awareness to appreciate all these. Families, teachers, schools and students need to be made aware."*

On the other hand, the teachers agree that if students' consciousness level were higher and when they were well prepared; they would get used to tablets for their own learning and development besides accessing knowledge. In relation to that, T5 indicated that student learning is correlated with the digital citizenship skills owned by students. Similarly, T8 expressed that the students who already had responsibility and consciousness in using technology use tablets for their own good. Similarly, T2 concluded as follows:

> *I'm against the notion that students must be banned from using technology. There are parents who believe they do the right thing by banning computer or technology use. I don't agree with that. We are not good, as families, to deal with teaching our children how to use technology efficiently. I think this is the biggest problem ahead of us and this belief needs to disappear".*

T1 also added that she set an example of the proper use of technologies when she encountered with misbehaviors. T1quoted from her classroom experience about using communication apps on tablets in an undesirable way within the class time. She expressed that the students used the app within the class time to chat with each other.

But instead of uninstalling the app, she expressed the pros and cons of the app to the students and told the students when to use the related app in an appropriate way. Also, T1 stated that students from lower grades show lower misbehaviors than high grades. She realized that in the meetings with the other subject matter teachers from 6^{th}-8^{th} grades. She quoted as following:

> *Because they respect the teacher's authority more. Maybe it's because of that. Middle school students are more conscious. They can be more cunning, and they know what to do where. So, he can easily be more cunning. But the primary school student is naive. Because they are in the naive group, they are completely education-related, even if they lose concentration at times, still it's easier to work with them… They do something with enthusiasm. And when I say it's wrong, it's done. That's why we move very fast on the tablet...*

On the other hand, the parents stated that they also display a misuse in using technology and set a bad example for their children. But they do not support banning technology use. Rather, they promoted raising awareness of their children in the proper use of technology. Some of the parent quotations are shown below:

> *Today, this is the practice in the world now. How fair is that if you turn it off for the kid? What do you think?*
>
> *In fact, we can't close down. We want them to use it as well. To learn, to investigate.*
>
> *There is a contradiction here. In my opinion, today the behavior of using a tablet in the right way is a little off balance. I mean earlier, for example, it was only at the weekend or an hour or two a day, we had such a rule ... that tablet was the tablet of his father. He was asking for permission. Can I take it, can I take a look at it? At least we could control it. Now it's my tablet. I will do my work, I will do this and that with a list of excuses. The limits are now completely self-contained.*

Teacher preparedness to implementing the 1:1 initiative

Under this topic, the teachers' readiness in terms of teaching with tablets was investigated. At the beginning of the implementation, the administrator of the school A1 had some pedagogical concerns such as how tablets can transform teaching and

learning. A1 also articulated her fears about teacher adaption to the change and indicated that their readiness to implement 1:1 technology initiative was not investigated. On the other hand, the counselor of the school characterized the change process as a cultural transformation in the school. The counselor expressed that the teachers were resistant to culture transformation within the 1:1 initiative. She emphasized the need for complementary solutions for teachers to adapt to the change and continued by saying:

> *There is a need for a complementary solution. They are at the very early stages of this work, even teacher training has not been completed. They are not aware of what is expected of them. Teachers are aware that they do not have the time to develop materials and this is starting to build up a certain resistance. The screen is currently being used as a TV or video player.*

PCA stated that tablets will change the learning methods and questioned how learning strategies will be arranged to teach with tablets. In addition, she underlined the teacher inadequacies considering that teaching with tablets will replace teachers past practices. Related to that concern, she said that "*Maybe it's not just because they read the uploaded content on their tablets, but I suspect that it will get more difficult when doing an interactive work with the teacher".*

By pointing out teaching with tablets as a complex process, T2 emphasized that even there were teachers who are not competent in using a word processor and highlighted the teachers' technological inadequacies. She added that she could not able to use the new system if she had not been competent at technology and used technology before. She would use the system in a perfunctory manner that would affect her teaching negatively and would have a negative effect on students and the teacher.

The chair of the school and PCA emphasized teacher resistance in changing their teaching practices. The teachers were accustomed to using traditional teaching methods and they were having problems while adapting to the new system. PCA concluded as following:

> *Teacher preparation for students is crucial in that the teacher meets the needs of the students after identifying them and prepare a learning atmosphere. This naturally leads to learning and satisfaction of students.*

On the other hand, T4 expressed that teachers' positive beliefs will contribute to the implementation. The teacher T2 quoted that students born in a digital environment were the first adopters of the 1:1 initiative but as for teachers, it was completely challenging. Similarly, PCB indicated that students had high levels of readiness because they get used to tablets at an early age. So, teachers need to improve themselves to guide students. The tech specialists of the school indicated that among teachers, younger ones got used to adapt to the 1:1 initiative easily but it was more difficult for senior teachers who are not competent at technology.

T2 indicated that teacher training was not sufficient in relation to adopting the change. She pointed out that there is a conflict between the demands of the 1:1 initiative and teachers' technological qualifications. She stated that teachers could not keep up with the technology and were not ready to teach with tablets. She explained that she was not having problems but other teachers who were not very keen on technology were having difficulties and not all teachers were at the same level of competence. She added that teachers who are not qualified were feeling under pressure in implementing the 1:1 initiative. PCA criticized the teachers' teaching practices and indicated that:

> *This was the simplest form: instead of writing a summary of the topic in the notebook, the teacher wrote on a file and sent it to the students' tablets. Although it was a very simple start, our teachers had much difficulty even in performing it. They were not accustomed to preparing such content...*

Related to teacher preparedness, T6 said:

> *What worries me is the preparation of questions in the digital environment because our questions are a bit more difficult where drawings are required or such. I did not know how to do the drawings and they worried me but I learned a variety of ways for doing it.*

In relation to teaching with tablets, T8 emphasized the difficulty of getting rid of old habits. She indicated that:

> *First of all, it is hard for people to give up their habits. Though I have not been a teacher for many years, it has been a difficult experience for me as well to adapt to this system. ...I used standard old system smart boards and projection devices. I was used to that system while teaching with it before.*

On the other hand, the coordinator of the tech company drew attention to another point. She expressed that basically, teachers had difficulties in even developing a course content without using technology. She thought that teachers should develop their own course content, but the teachers were not doing it either. She described that teachers were lacking information on basic knowledge and it seemed to put a tile on a roof of a building that has no base.

> *…As a result, we have seen that there are too few teachers who do research on the Internet and add notes to the existing contents, the course content is the basic problem in fact. Especially teachers in private schools are expecting ready-made course notes and most private education institutions are working with publishing houses selling ready contents. Unfortunately, those publishing houses are bound to certain templates… the teachers are not able to use it because they do not know how to use it in the class… We approached the teacher indeed and told that we are going to give him an empty Excel so that you can make a graphic or a table in it, or you can do nothing. This is your class and in your hand. There are teachers who do wonderful things but also those claiming that they have never used it. We first thought that we are problematic in technology and went to customize it according to the need of the teacher. We said that the teacher is having problems here so let's do it…but we actually found the most basic and the most painful result that the teacher does not actually refuse to use the technology due to the difficulty, he wants everything ready to be given to him and he stays in just for showing it. Maybe it is a part of our culture…. The teacher does not change the teaching method about her discipline anymore so she cannot integrate a bit of technology to speed up the process.*

The teachers also emphasized their awareness to implement the 1:1 technology. T2 spoke as following:

> *Awareness absolutely. We return to the point I referred to at the beginning. First, teachers need to be very conscious. The technology has now advanced to the point where we do not use a pen or notebook. We will use this instead. Well, the teacher is still on the front line, the teacher is still in the center of teaching. It is not student-centered. We are still continuing with teacher-centered education. Teachers see this as doing their work for higher report results only. How can we expect students to adapt to it when teachers can't?"*

As a result, teachers used the proposed technologies for the sake of duty of their work. Because an initiative put into practice in their school and they must use the proposed technologies. But teachers were not prepared for using the tablets or the smart education platform consciously to serve for the related course objectives.

Also, teacher beliefs regarding to implementation were investigated. At the beginning of the implementation, some teachers indicated their willingness to use the proposed system. T2 indicated that she was self-confident, and she was disposed to implement 1:1 technology. Similarly, T3 stated that he liked the proposed system. T2 supported the use of technologies in education and believed that technology will facilitate the learning process. Personally, she was satisfied with the 1:1 implementation because she was keen on new technologies and enjoyed using technology. She also thought that students were devoted to using technology. Similarly, T4 said:

> *I am very happy. Because I'm going to use technology. Technology is one of my life's indispensable elements. I am not a teacher who teaches students directly. I am the leading teacher who guides the student. That's why I teach ways to learn. That's why I did not say why technology?*

T5 also added that she was an innovative teacher and supported the use of technologies in education for its contribution to students' development such as supporting children's work and learning by doing in English classes. She thinks that it was an appropriate teaching model in the information era.

T8 expressed her need to use technology to adapt to the changing world. At first, she was approached to investigate how 1:1 technology is used in the world. She stated that as a young teacher she needs to improve herself and said:

> *This world is changing. It evolves. It develops continuously. I need to keep up with it somehow. At first, I had difficulty in accepting. But after I accepted it ... How can I now apply it better? So, I'm trying to apply it better. Indeed, the fact that the world is evolving and changing is motivating me. If the whole world is using this, I must keep up with it, I am still too young, and I have to develop my own self, which motivates me. Obviously because of personal thoughts and a little more of my ambitions.*

Similarly, T7 stated that improving herself in using technology in education was a driving force for her. T5 also believed that by means of the 1:1 initiative she can adapt herself to learn new things in a digital world. She perceived the 1:1 initiative as an innovative idea and satisfied with that. On the other hand, T6 expressed that because of obscurity, she had some fears, but she got used the new system once she was involved in the implementation. Her views are as following:

> *I felt scared. I was very scared. Everything that is unknown is very difficult for me at the beginning. And then as I walked into it, I realized that there was nothing really scary about it. I thought what if I could not. But of course, there is nothing that cannot be done when you deal with it.*

4.2.1.3. Need for the 1:1 technology initiative

According to the Fullan (2007), "many innovations are attempted without a careful examination of whether or not they address what are perceived to be priority needs" (p. 88). Regarding the implementation of the 1:1 initiative, perceived advantages, and limitations were investigated to reveal out the felt need.

Advantages of the implementation

Usefulness

Participants evaluate tablets as purposive to access and store information. Chair of the school pointed tablets as a small computer. He indicated that:

> *Now there can be no better thing than having a computer at home. In the past, it took hours to find out a specific page on a specific book in the library. But now, we have an agreement with the Britannica. Children can access any page of the encyclopedia transferred from the computer on the tablets with just a tap.*

The participants expressed their satisfaction regarding the feature of tablets in terms of accessing course materials such as eBooks of the courses or smartboard records that were shared through the smart education platform. Students can access these materials in and out of the school with their tablets. The parents also indicate that they were satisfied with the use of tablets due to accessing the information quickly. On the other hand, PCA identified tablets as an all-in-one device that enables the user to access different applications in one device such as communication, video recording, or photo taking. PCB said:

> *In other words, rather than carrying a laptop, the only tool needed is a small gadget that can connect through 3G. The student can take it everywhere. He can do and send homework anywhere he wants. He can do his research. In that sense, I think it looks like a good decision.*

The tech specialist of the school stated that they used to carry a backpack in his school life and now the students got rid of those backpacks and easily access all the course material through tablets. The parents are also satisfied with that issue. On the other hand, one of the teachers (T2) quoted that instead of carrying physical materials into the class, it is easy for her to provide learning materials in digital format.

The participants also pointed out the usefulness based on the interaction of tablet and smart board. The smart education platform made things easier and was considered to

save time for students and teachers. Teachers found the interaction of tablets and smart board useful for shortening teachers' writing span within the class. For example, T1 explained her views following "*When I send the picture directly to the tablet, the problem of rewriting the question suddenly goes away. The student solves it from there without needing to write it down."*

T2 stated that by means of electronic course materials prepared beforehand, she used the smartboard less for writing and she had more time for class discussions. She noted as following:

> *But the time I take in writing on my board has become shorter. I write less now. We have presentations, texts, and activities. We can also either prepare a question or make the student prepare one and send to each other at that moment. If used in the right way, it's definitely timesaving. It was really a big waste of time writing down on the board, waiting for students to take notes. Now I have a time for a discussion about a topic, I have time to get students' opinions and brainstorm.*

T6, a mathematics teacher, stated that she saved time in class and solved more problems by means of the smart educational platform. Especially in math's questions that required drawing, it saved time. Similarly, T1 found the functions of the smart education platform useful that facilitate drawing on tablets and smartboard. Similarly, one of the students from grade 5 indicated that saving records from the smartboard made students' work easier and shortened the time required by writing by hand. It is understood that they save time for the classroom work.

T5 indicated that within the 1:1 initiative, it was easy to share information with students. The students did not have to write during the class. Also, she had an opportunity to add multimedia elements to her course as shown below:

> *"What has the tablet brought to us? For example, if the student says he does not have a book, I can immediately send him the file. This is good. We don't have to listen to excuses like "I didn't do my homework "or "My workbook is at home." I can also add videos to my lessons. In the past, I*

> *couldn't make students write very long things because they did not like to write, but now I can open it and lecture by using it...*

The teachers liked the function of sharing information quickly with the students. In this regard, T4 said:

> *I think it's fast. Why? Because I come prepared. I cannot reflect everything I collected from in a book or notebook. But with smart education, I instantly send to tablets for example. I can observe a graphic or picture that I see on the tablet, question and criticize it and get feedback from students again, I can make the student think...*

T8 also emphasized that it is easier to connect to smartboard with tablets. She also liked the quiz function of the smart education platform thanks to providing the immediate assessment. In addition, T2 expressed that smart education platform makes the assessment and evaluation easier. She added the following "*But now, the teacher can see the data related to students needs and can clearly observe student performances according to the data and move forward".*

Additionally, the students and teachers indicated that the platform contributes to individual learning in terms of retention of what have learned. One of the students said:

> *For example, I did not have such an opportunity in the past... I would read the book and solve problems from the question bank. When the student does not understand a topic, s/he can open the tablet and access it over and over again without needing anyone else.*

Similarly, one of the teachers expressed her views as following "*For example, I had a topic in the first term that the children had forgotten. I told the students to go back to the topic, open and revise it, which is quite practical".*

Support on the learning process

The participants also found the facilities of the 1:1 initiative useful in supporting variables on learning. One of them was supporting teacher preparation before the

class. As explained before, the teachers were preparing course materials before the class and uploading into the smart education platform. T4 indicated that use of the 1:1 implementation required teacher planning. She indicated that teachers are preparing course materials according to the steps of Bloom's taxonomy which help avoid complexities of the learning process. Similarly, T2 said:

> *It saves the teacher's time if used correctly and relieves the teacher. It can be time-consuming during the preparation process of a document, trying to find the best materials but once it is done, it can really make the teacher use the energy during the lesson more efficiently...*

Also, T4 was cited as "*It saves us from the complexity ... We are saved from the information garbage. We do not have the garbage of outputs...".* On the other hand, one of the teachers, T4, indicated that technology use within the 1:1 initiative provided a logistic support on delivering the course content. She expressed that in the past she used to make a photocopy of the learning materials for each student. But now she is distributing the course content and exercises on digital format. She added that she both gains time and prevents wastage.

In terms of meaningful learning, T7 also expressed that it will be beneficial for supporting out-of-class learning. She told the following:

> *Students have an idea about the topic even if they do not know it beforehand; there are videos on certain sites they can watch and have some prior knowledge about a certain topic before they come to class. I think it would be better to have a training like this because, in some classes, class hours are not really enough. This is to say we do not have adequate time to practice content and apply it every single lesson. Sometimes it's hard to keep up with the curriculum. It's a good thing in that respect. Therefore, in education with tablets, and with children's active use of them, it will be practical to assign homework with tablets in this way and we, as teachers, can start the course with more prior knowledge and preparedness.*

Another important aspect of the initiative that had a benefit on learning is to enhance communication. T1 stated that she was using websites that enable her to send

homework to students. She added that by the way, students sent their questions back to the teacher about the homework and communicate their teachers through the tablet. So, students can reach their teacher easily even when they are at home. She thought it helped teachers get closer to their students; as a result, students had a sense that the teacher is interested in every aspect of them.

On the other hand, T5 and T6 pointed the communication among students. T5 indicated that there is an interaction among students within the class time in terms of sharing learning content with each other related to the class activity. In addition, students help each other on how to use the smart platform and share learning materials with others if these students had a problem while logging into the smart education platform and could not receive the information that teacher sent.

Benefits on learning

At the beginning of the implementation, the administrator of the school believed that would guide students to research. In addition, by using tablets she underlined the multimedia support in the learning. Also, the counselor of the school indicated that tablets will be effective for students learning if rich learning environments are presented that enable students to develop their thinking.

The participants declared that the 1:1 implementation has a positive effect on student learning in terms of providing meaningful learning and supporting learning by doing. The chair of the school expressed that instead of memorizing tablet-based learning activities, they mostly support the skill of interpreting the knowledge. In terms of meaningful learning, the views of a participant (T2) is quoted below:

> *But Social Studies is a very comprehensive subject. Take the sixth grade, in Geography, there is the shape of the Earth, parallels, latitudes, and it is a difficult issue for the sixth grade as it is an abstract concept because they are not at that level of understanding yet. But thanks to the tablets and the documents I prepared, the children are able to visualize the topic much more easily...*

On the other hand, T7 indicated that using tablets best fits with her discipline area as science and technology. Because instead of lecturing the content, she was able to deliver the content via visual materials that provide concrete examples. Thus, it arouses students' attention and motivates them.

T1 argues that by different forms of knowledge on tablets such as visual or concept maps, the students have an opportunity in terms of the multi-dimensional investigation. She gave an example of GeoGebra as below:

> *It also allows children to analyze in a finer-size, more detailed way. Consider Geogebra, for example, or think of any program. Normally when a child is supposed to write a question directly in the notebook and solve it, he can see it in 3D in the program instead...*

PCA pointed the need for using tools that support multimedia learning for cognitive development of students. She identified the tablet as a tool that supports the visual and auditory perception of learners to promote meaningful learning. Similarly, T8 expressed that tablet is beneficial for meeting individual needs. For example, she pointed tablets as an appropriate tool to provide meaningful learning for auditory and visual learners. Also, the students claimed that they used tablets when they did not understand the topic well. The parents also agree that tablets will support multimodal learning.

On the other hand, T7, who is a science teacher, stated that the 1:1 technology best fits into science classes. There are many abstract topics in science that can be clarified through tablets which could take the students' attention. Also, she thinks that tablets support learning by doing activities. Likewise, PCB expressed that specific applications on tablets support students in learning by doing. So, she considered that the 1:1 initiative as a transformation by changing learning environments by her own words as:

> *How do we transform? …taking the student from the direct listener position, we are moving into an implementing and collaborative position… So he learns to work in teams there. He can learn to work collaboratively, learn to analyze - synthesize. He can learn to use his knowledge. He can learn to transform. He can learn to improve. Therefore, in fact, the teacher is experiencing some changes in her/his own position. So, s/he is not exactly in the teaching position now; moving to the position of the guide.*

In this direction, PCA regarded tablets as an effective tool in terms of student learning because she mentioned that tablets enable students to collect data and students can create their own materials or used tablets for communication. Similarly, T5 stated that:

> *…"I can create something", " I can make them create something". By immediately creating there…I think this supports education because they themselves are doing, I mean, unfortunately, they aren't learning as a result of the teacher lecturing on the stage.*

She also emphasized that tablets are beneficial in English language class thanks to supporting audio-based learning activities which are important for language learning. The teachers also emphasized that implementing the 1:1 initiative within the class positively affected student motivation which ultimately affects learning. T1 indicated that interacting with students through the smart education platform increased students' motivation as follows:

> *They know I am checking. Let me give an example. They send photos and their solutions to the board. I check them on my board and this is some kind of motivation for the students to see that the teacher shows a student's solution on the board in front of the whole class. It may also have a positive influence on student success.*

T5 expressed that students like the interaction provided by the smart education platform. In that way, the students were engaged in the course and tried to solve the problems that teachers shared through the platform. In this regard, she said "*The pro of tablets is that they try to do it. Drafting and sending something to the teacher. All of them are struggling on this matter. As for feedback, all of them are trying to give feedback."*. On that matter, the educational coordinator of the tech company said that:

> *… We thought that the content we sent from the board to the tablet would be…something that would increase their participation, but we did not think about motivation. Within it, the children came up with the motivation to attach their own photos, icons, objects, and logos that they themselves created which is a huge part of social networking today. Students create a small gamification and add a logo and make a design and customize the content. The student, then, send the customized content to the board. This means they increase their own recognition, which is a very important concept for the digital generation and mobile generations these days. The students see the sense of belonging on the board as well. These are the characteristics that we have not seen before but the features that students discover during in-class experience out of their own creativity. We, as teachers, must reinforce this behavior to support students.*

Besides, according to the participants, the 1:1 implementation increased student participation. In this connection, A2 stated that even students that had little attention to the course are now trying to participate in the course. They are trying to solve the problems related to logging in to smart education platform by their tablets or they were in search of solving the problems or examining the content that teacher shared during the class. A2 added that the students wanted to show up in the class and express themselves through the tablets.

T2 and T8 indicate that students' motivation increased because they like to interact with tablets. In relation to that, one student from grade 5 stated that their learning was improved. He explained his situation as follows:

> *We learn better and I never forget the topic. For example, I did not have such an opportunity before... I used to read the book and solve problems from the question bank. When I do not understand it, who's going to tell me? For this reason, it became easier to do homework when technology came into our lives. There is more desire to study on homework.*

Education of students

The teachers also perceived the 1:1 implementation as beneficial to fulfill the needs of today's students and prepare students for the future. They indicated that students were born in a digital environment and there was a need to support students' technology use practices and lead the right way to use technology. T2 stated that

students were familiar with technology and even it was useful to teach students how to use technologies effectively and show them its benefits. On that matter, T4 said that "*If we teach how to use it correctly at early ages, technology knowledge will be developed, and technology citizenship will become more and more conscious".*

T1 expressed her willingness to use technologies within the 1:1 initiative. She told that she was using technology efficiently and she also expressed her desire to contribute to the development of students in terms of technology usage by implementing the 1:1 initiative. T2 expressed that "*Children already use technology very intensively in daily life. I am mostly curious about this. What are the benefits of technology? How is it actually used? It's a great gain even to learn about this".*

Similarly, T8 expressed her ambition to implement 1:1 technology initiative. Because she believed that it would support her students and teachers to be able to adapt to the world as a conscious digital citizen. On the other hand, T5 found beneficial to implement the 1:1 technology initiative to support today's students' learning. Because she thought that students were surrounded in a digital environment and she believed the importance of repurposing technologies and integrate them into teaching to support students' learning. Also, she thought implementing the 1:1 initiative will support visual and auditory learners as today's' students.

Limitations

To identify the felt need, participants' perceived limitations of the 1:1 initiate was investigated. In this regard, the participants underlined the discrepancy between their needs and the offerings of the 1:1 initiative. Also, the participants discussed the relevance of the 1:1 initiative.

Fit between needs and the innovation

In this part, a picture of the instructional practices before the 1:1 initiative was presented. In this direction, the participants indicated that past practices were useful

in terms of satisfying their needs. The teachers mostly criticized the smart education platform that was put into practice with the use of tablets. T5 stated that before smart education platform, they were already using a software in English classes, which was used on the smartboard, that fits with their needs. She also added that she could not able to use the smart education platform in every class. She justified that the parents pay for the English books, so they need to use the book and complete the activities inside the book. She only used the smart learning platform when covering grammar topics.

Similarly, T2 explained that they were using online resources such as Vitamin in the past. She was assigning homework through Vitamin and could monitor the students' progress online. Apart from that, the students can communicate with the teacher easily through Vitamin website. But the teacher indicated that the smart education platform did not feature the out-of-class use truly in terms of providing communication and tracking the students work. She continued by saying:

> *I'm giving homework. The kid is not able to send it back to me. Like that... What am I compensating for there? I'm very satisfied with the assignment on the Vitamin. Why? I can see the percentage of the class. How many people have learned about that topic? How many people did not learn? Who's been sitting at the computer and taking care of it? Who's spent time on it? In fact, this is important to me ...*

Likewise, T2 stated that she was using the Moodle which she considered very effective in terms of supporting commination among student, and between teacher and student everywhere. She can easily share information with students even at home. She said if they have to use the smart education platform, they should develop these parts.

In addition, the students found the tablets beneficial, but they do not think in the same way about the smart education platform. Students from grade 7 explained that they were using tablets to reach and use online resources such as okulistik, but they did not see the same benefit in the smart education platform.

The parents also complained about the features of the smart education platform. One of the parents indicated that her child was using different applications on tablets that allowed at-home use in the previous school. In this way, parents could have an opportunity to easily monitor the student work. Likewise, another parent was stated as follows:

> *In the past, I used to use the Morpa until sixth grade which was recommended by our teacher. For example, I could follow my child from the computer at work and see what percentage of success he achieved. What time and how long he studied. I am at home now, but I cannot control my child. Then I can see no benefits of this for the child...*

Also, one of the parents indicated that their child did not use the tablets at home. They preferred using computers to search for information. Even their child did not use the tablet at all while studying for the exams. Instead, they used books and notebooks that are used in the class. In addition, parents did not see a need to use smart education platform. For example, one of the parents explained the only thing that was done on the tablets was exchanging information between students' tablets and starboard during the class. And they found other applications such as Vitamin or Morpa most effective.

The parents also thought that using a smart education platform in learning does not help to prepare students well for the exams. One of the parents said:

> *We still have even our exams like that. The university exam we entered in our time in 1996, yes, the same exam. We're still coding. We do not push. We do not code like in the smart education. We do not do it from the computer. I mean, I think that's why it's getting worse.*

Other parents thought that students got low grades from written exams because they were lacking writing practice because of using tablets. On the other hand, students from grade 8 expressed that it was more convenient for them to take notes by handwriting and they use laptops at home instead of tablets. They indicate that tablet use makes no difference for them.

Relevance of the implementation

Under this topic, the relevance of the 1:1 implementation to training digital citizens and learning needs were explained.

Relevance on training digital citizens

T2 and T5 criticized the learning methodologies used within the 1:1 implementation. T5 stated that the use of the smart education platform on which the contents prepared beforehand by the teacher and shared through the system caused students to obtain things effortlessly. She explained her views as in this way:

> *So now I see that children are very lucky. The current instruction system is very different now the old one. Sometimes I think that... Are we training them to ask for what is ready-made? I am asking this question to myself. Are we doing something very prepared? Did we present them all, leaving nothing for them to deal with?*

In relation to that, T2 said:

> *The child already reaches Google or anywhere else by using another search engine. It's at his fingertips. Even they can sometimes have the knowledge that their teacher does not have. So, there is no point to present them presenting ready information.*

Relevance to learning

At the beginning of the implementation, the counselor of the school expressed that parents whose children used tablets in their previous school had a negative perception of tablets. Concerning their previous experiences, the parents had a prejudice that some schools purchased for tablets but could not use them. The school counselor indicated that those who have experience in using tablets previously do not feel a need but those who will get it for the first time lean to use tablets. Also, T2 added there were many schools that had bad experiences on using tablets in learning. On the other hand, T3 shared his experience that he tried the implementation for a week but students from grade 8 did not indicate a benefit and pointed out that tablets caused loss of time.

Students indicate that they were learning better in social sciences class when the teacher lectures the content instead of using the smart education platform. One of the students from grade 5 said "*But I do not like the using tablet in my social studies lesson. Our social studies teacher is a very good teacher. …she delivers the class like a tale. It stays in our minds very well. I like it so much".* The other student added the following "*The teacher lectures very well. But if we want to look at a historical place, we can open the tablet and see exactly where this place is. For example, we can see from Google Earth".*

In relation to that, social science teacher T2 mentioned that they should keep up with technology but not just focus on the technology alone in the learning process. As a social science teacher T2 explained that:

> *As I said, social studies involve history too. There is geography, cultural features. Think about a child who is trying to get to know his or her own society and participation is of great importance for the child to understand this lesson. Observations are very important. There is no such thing as an experiment as in math or science. It is a lesson in which the student should develop his analyzing skills… I think this is the contribution to the student. It is not about memorizing those dates or, the oblique axis, or so on. But social science is an important lesson to compare things or learn the cause of events. But is it useful with such methods on tablets only? No, it will not be, but you cannot be without it, either.*

On the other hand, T6 expressed that the students could understand the topic better when she delivered the course by other techniques instead of using the smart education platform. Likewise, T5 said that the students can access information quickly, but she was concerned about how it contributes to student learning.

Another issue was note-taking as identified by both teachers and students. The participants indicated that by means of the smart education platform, students write less on their tablets or notebooks than before. The English language teacher agreed that they should use technology in learning, but still, she was concerned that students might not learn how to spell words because of not writing.

Besides that, the students expressed that using tablets did not affect the learning process positively. Also, the students offered to plan tablet hours within the academic program instead of performing all courses through the smart education platform. Related to the decrease in the learning performance, the students indicated that teachers were sharing course notes through the smart education platform consecutively within the lesson and the students run out of time before examining this content. Also, the students mentioned that they could not allocate time to review the notes received through the smart education platform. One of the students said:

> *I prefer to learn through the old-fashioned way because we would learn better while writing. Everyone is putting the tablet away now. Data received from the board, but he skipped to the other page without reading. He says he will read when he arrives home. But he won't...*

In addition, the students believed that they will learn better by taking notes by hand during the class or by studying at home. Students from grade 7 stated that:

> *There are a lot of people who use the tablet at home before the exams in our class, but frankly, I cannot quite study by tablets. I think writing is a better way. It's true that we can get more detailed information with the tablet, but writing helps memorize information easily.*

Also, one of the students told that they were following the materials through tablets, but it was easier for her to study from the book. On this matter, T7 concluded that; students wanted to use the tablets but some students, who believed that they were learning better while writing, prefer to take notes on their notebooks. But she was trying to explain to the students that using tablets will save time, they could solve more problems, or do activities instead. She said:

> *I mean, kids want to be on the tablet all the time. Of course, there are some who want to write in their notebooks. They are still stuck to that or do not want to get rid of it. They are influenced by the old system… Teacher, can I write? You sent it to our tablet, but I still want to note them down in my notebook, he says. I learn better by writing. As a teacher, you don't want to put pressure on the students. So, I am trying to remind them that we sent*

> *to the tablet to save as much time as possible. During this period, we can solve a few more questions or we can do a few more applications.*

Similarly, T5 questioned that if it will be a withdraw for students who learned better by writing. Thus, the teachers also continue to use notebooks beside tablets. In this direction, T5 said "*As I said, for students who learn by writing, actually there are such students in the class who tell that they have to write. I feel the need to get him to write".* The parents also agree with the students that learning will be most effective by writing. They indicated that learning through smart education was superficial and believed that learning will be more effective if students commit to writing. As another point, the parents thought that the way of using tablets in the learning process makes students lazier. They say that the students move away from books and writing. Similarly, T5 stated that the students got used to receiving ready information from teachers and there was a need to provide learning activities that will make students active users. The parents had some suspects that students were got away from writing by hand. The parents were not satisfied with the learning materials used on tablets. They agree with the teachers that the students did not make an effort for learning instead information was presented for them. Thus, the parents indicated that the students were used to receiving ready information and they were having problems with writing by hand and using their minds. Also, the parents think that although an attempt was made to computerize the education system, the exam system was still paper and pen-based and students started to grow accustomed to receiving ready information. In addition, one of the parents expressed that tablets did not make any contribution to the student's academic success by saying:

> *I have already mentioned that I am not happy with this situation. There is no benefit…. For example, there was a test on math…If the students were fine with just what is on the tablet, they could have answered the questions correctly.*

Similarly, students from grade 5 and 7 indicated that they got accustomed to receiving ready information from teachers with the 1:1 initiative. They requested the teachers to share data from the smartboard. A student from grade 5 said "*In the past, students*

would write, but now they become lazy. They are too lazy to write anything with their hands. They directly shut the tablet down without even looking at what the teacher has sent".

In addition, T2 was against to use tablets instead of books or notebooks. She stated that students were having problems while writing on tablets. And, she mentioned that it is important for students to express themselves by their writing, and using tablets inhibits students' self-expression skills. She added that the students did not review the notes even they took on tablets because tablets never substituted books or notebooks. She said " *What's more, these children are in the concrete operational period. Because they are not mature enough to understand abstract concepts, they are inclined to touch and do and so on…"*.

As another point, the parents thought that the way of using tablets in the learning process seems to make students lazier. They indicated that students move away from books and writing. Similarly, T5 stated that students got used to receiving ready information from teachers and there was a need to provide learning activities that will make students active users on tablets.

Health concerns

The first reactions of T3 to the 1:1 implementation was health concerns such as radiation or risks of Wi-Fi connections. Also, one of the students indicated that she had a headache when tablets were used in the class intensively and she started to wear the glasses. Similarly, one parent indicated that her sons' vision problems have increased. The parents told that their children were playing games too much except for the learning on tablets. Also, one parent who attended a conference about technology stated that the technology surrounding their children had a negative effect on children's health.

T8 continued by saying "*There's a big question as to whether the use of tablets or technology has an impact on children's brain cells…".*

4.2.1.4.Quality of the 1:1 Technology Initiative

The participants' perceptions about the practicality of the 1:1 technology initiative and resources and support to implement the initiative were examined under this theme. As a result, three main themes were found as the quality of the resources, practically of the implementation, and teacher training needs.

Quality of the resources

Under the quality of the resources, problems regarding the infrastructure and teaching materials were addressed.

Infrastructure problems

Related to the infrastructure, the participants mentioned problems about using the smart education platform, hardware and design issues, and tech access for teachers. At the beginning of the implementation, A1 expressed her concern as they did not have a ready system to use the 1:1 initiative. Besides, through the implementation, the participants reported many problems related to the performance of the smart education platform and inadequacies of tablet quality or internet connections.

In terms of smart education platform, the participants mostly complained about the connection problems with smart board and tablets, login problems, and displaying the content within the platform. T8 mentioned that one of the things that stopped her from implementing the 1:1 initiative was the system which was not fully established. She explained as following:

> *I am starting to see myself as an insufficient teacher because the system is not established. You connect yourself to a system. If that system is not working enough that day, your lessons will be influenced negatively. Naturally, you start to think about what you going to do. Seeing that 15 minutes have passed, you start to hurry. You cannot do anything in a panic. That's why my biggest worry is that this system can be applied in the best way. This can be done when the system functions properly, maybe I can develop myself for it…*

Likewise, T2 explained how problems in smart education affected her during the class:

> *This is a problem I encounter quite often. There is a website where we upload our documents. Then, we used it in class so that both students and we can see them from the tablet. If half of the children can see, the other half cannot. In addition, think of the little ones and the mess. "Teacher, I can't open it, can you look at me, too? And so on. This way, you lose 15 minutes. We have such an issue. So, I'm rushing in the breaks, trying to open things in advance. So, if the infrastructure problem is solved, motivation can be further increased in these lessons.*

In addition, the students complained that they were dropped out of the smart education platform during class time. One of the students from grade 4 said:

> *… sometimes we have problems, for example, we are aborted from the smart education platform, or it stops working. Then, we have to log in again. It sorts of interrupts the class. For this reason, the teacher does not prefer to do a lesson on it.*

On the other hand, the students were having problems in receiving the content that the teacher sent through the smart education platform. Also, they got the error message saying that the smart education platform has stopped. Besides, they were having problems in displaying the content that teacher uploaded to the platform. The parents were also having problems based on the failure in displaying or using the system at home properly. Related to the problems of the platform, the Tech specialist of the school stated that the internet infrastructure of the school building is not enough to support the network connections within the school. PCA added that the strength of the connections was measured in the building, which showed signals were decreasing in

some areas. The teachers also reported problems related to internet connections. As an example, the opinions of T1 are quoted as "*If the Internet is cut out and even a child, only one child is having trouble with the tablet, then I felt like shutting down all the tablets. I get demotivated as a teacher when this happens".*

Most of the students indicated that they were having troubles with the tablets' charges. Some of them said that "*Because there was a charging problem, for example, some of them would have to move their chairs to the board to reach the socket".* Students offered that jacks should be provided in the class near the desks to overcome the power problems. T6 referred to the same issue saying that classrooms should be designed in a way to allow carrying out the 1:1 implementation. She also specified that there was a need to design digital classrooms. In addition, the teachers adhere to smartboards and there is a need to design classroom seating to facilitate the 1:1 implementation. She said:

> *The seating plan should be changed. I believe children should sit around a rectangular table like this and the teacher should be able to walk around them. I think he should be able to intervene the board from a distance. The most important reason why teachers used to be more successful was the fact that they could be active around the class a lot. We used to check whether the student wrote or not, but I cannot do it now ... So, having sockets in the class, placing tablets inside the student desks would be a great advantage. This way, students don't need to carry the tablet with them all the time. It would also be easier for the teacher to see them...*

Even during the first school visit, T1 indicated that teachers need to have tablets besides students. As the implementation progressed, PCA also underlined the need for providing tablets for teachers to be used in the classroom to interact with students and provide physical support for teachers. By the way, teachers can be able to manage the smart board and interact with students through his own tablet by using smart education platform while walking around the students.

Similarly, T1 stated that she needs to control the class from the smartboard that inhibited her from walking around the students. Besides, T2 told that she bought a

tablet for herself to obtain a control over the tablets regarding how the smart education platform was running on tablets. In addition, some of the teachers stated that the school should provide the necessary technologies for their use. PCA also agrees with the teachers defending that the school should support teachers in access to technology.

Lastly, the participants mentioned the technological quality of the tablets. Beside the recharging problem, the participants said that tablets should be used that function properly and are in good quality. As a result, the tablets were replaced in the second year and failures based on tablet quality were decreased.

Learning materials

Providing learning materials was on the school's agenda from the beginning. On the first school visit, A1 indicated her concerns as there was not a material development unit within the 1:1 implementation. Besides, the counselor of the school expressed that it would be beneficial to go into a partnership with a company that offers educational solutions to speed up the process.

In terms of preparing learning materials, the school decided to use Bloom's taxonomy and the teachers were guided to prepare their own materials based on the taxonomy. A2 indicated that there were learning materials provided by the publishers in portable document format. But A2 and PCA stated that teachers need to create their own learning materials by benefitting from different resources. PCA believed that they should not use standard learning materials developed beforehand by others if they want to provide quality teaching. She said:

> *I have a concern that the ready contents will not fit children's needs and when they fail to understand, or they are left behind due to those contents, they could feel disheartened. In terms of preparing for the class, there are too many ready-made publications on their hands for which they got used to… This is the reason why learning did not succeed… because every class has a culture. The students in every class have differences… That material prepared somewhere and distributed to every child make the teacher's job easier but inhibits the child's learning...*

PCA also told that it will be beneficial if teachers prepare their own content and use these contents to interact with students in the learning process. T2 agreed with PCA about using teacher-created learning materials. She mentioned that each teacher uses a different teaching method, ways of communicating with students, and ways of lecturing. Thus, she argued that the learning materials should be exclusive to teachers. But the teachers indicated that they had no time to prepare learning materials, especially at the beginning. The teachers expressed that because of their workload, they could not allocate time for material development, as cited from T8:

> *… the problem with the preparation for the lesson based on this point. I had a teaching system but after that, I was told to use the information sheets… telling me to teach the lesson like that. Okay, then, there is a need to prepare the materials. …but they give me 30 topics to prepare in 2 weeks. This is impossible to do in detail. I did it in that way first. I tried to do it very well first …1-2-3… another 27 of them were standing behind me. What am I going to do now with the 27? Quite a lot time has passed. Well, what did I do this time? Doing it anyhow. Take it from there, take it from here, paste it here, put it here. So what happens next? I see a mistake when I lecturing in the class…*

For example, one of the teachers indicated the presence of efficient content will greatly affect the child and this will be the driving force for her.

On the other hand, the students found out that learning experiences with the teacher-prepared content were superficial. One of the students said that the questions they solve through smart education platform are simple, there were not complex questions prepared for the students to deal with the course content.

In addition, the learners stated that materials apart from the information and worksheets prepared by teachers could be uploaded into the smart education platform related to course objectives including video lectures or examples. Similarly, the parents regarded the learning materials within the tablets as superficial and inadequate in supporting students' learning. T1 indicated that she could not able to select and use the learning applications to be used in her class compared with mathematics and science. Also, she mentioned that learning materials in a good quality should be

uploaded into the students' tablets at the beginning of the school term instead of carrying the process over information and worksheets developed by teachers. Similarly, T8 underlined the need for high-quality learning materials. She regarded the learning materials they developed as limited. She explained her views by saying:

> *Tablet is convenient, but these contents are not the contents that I can use in a favorable way for my Turkish lesson. But as I said, it is more suitable for using in grammar teaching in Turkish lessons. It can also be used in text interpretation as well. Texts can be prepared. But as I said, the content is also important here.*

T2 also stated that the administration collects and examine the teachers' data in the smart education platform, such as how much teachers used the platform and how many learning contents they uploaded into the system. She added that because of these investigations, these teachers felt anxious and even they sometimes uploaded a material into the system which was not in good quality, just for the sake of uploading many materials into the system. T8 also indicated the need for quality learning materials as reflected below:

> *I do not mean using the ready content… but at least it will direct me on how to teach the topic... I can prepare the exercise. But it would be better if a system were developed to guide us in terms of providing a guidance for teaching a certain topic.*

On the other hand, the educational coordinator of the tech company emphasized the need for good quality content produced by teachers. She said:

> *…well, in fact, you are subject to human beings… Actually, while setting off for the products, errr…. we often set off thinking that technology must be invisible and facilitate the user's work in the existing case. Our intention was to make things easier for the teacher indeed. We intended to prevent loss of interaction as the teacher turns to the board leaving the student behind. But for this, there is a need for the preparation of contents. If the teacher doesn't keep the content available, she will have to write on the board again. Therefore, the student will continue to learn the same. This time, the teacher will turn around and say 'I used to write on the board in the past, too. Even I was faster with a piece of chalk. I was faster with a board marker. I am writing and doing on this board. It is difficult to delete. Though I can delete with my hand, okay, let me do that, too, but*

some of them I can't do. They have come out with excuses and so on. This way, the teacher will tell that this technology is no good.

Teacher training needs

Training of teachers was organized by the tech company when the initiation was introduced and then teachers were expected to implement the 1:1 initiative. During the first school visit, the counselor of the school expressed her thoughts about the teacher training as:

> *... With such a large group, training cannot be given to a group with different needs. I do not think the training will work. In order to keep the adult in education, there must be a clear benefit that is useful, or he should be included in the process and education should be made interactive. The aims, the individuals and the disciplines are very different. At least clustering was required based on disciplines. The materials should be brought in and shown on the tablet. The time between the 1st and the 2nd training is too much...*

In addition, the teachers stated that the training was insufficient since they have shortcomings in implementation and involve teachers with a diverse background as to technology knowledge. Through the implementation, the participants' views were examined as to their perceived quality of teacher training. Their views to meet their training needs were presented under two codes; organizing teacher training and content of the training.

Organizing teacher training

It was found out that the teachers were not satisfied with a one-shot or interrupted training sessions. T7 expressed that there was a need to allocate time for teacher training and added that "*As I said, the authorities come to campus. They do meetings at certain times. Maybe if these meetings are a little more frequent, it might be even more useful"*.

T7 also indicated that it will be beneficial if a course will be scheduled for teacher training within the school. Similarly, T2 mentioned not to limit teacher training within

two or three hours and offered to plan regular meetings with teachers. In addition, T2 and T4 stated that there was a need to initialize the teacher seminars earlier at the beginning of the term and make use of the time well in midterm breaks.

Another issue related to teacher training was to provide guidance in terms of developing learning materials or informing teachers with updated information about technology integration. As mentioned before, the tech company provided the first training for teachers. Then, it was expected from the teachers to learn the use of the smart education platform from each other. Throughout the first year, PCA and PCB were assigned to coordinate the implementation including planning teacher education. A2 indicated that there were specialists for providing technical help during the process. But she added that they needed leaders for content development as an instructional support. A2 implied that for content development they need a unit from which teachers could obtain learning materials developed through the discussions held by experts.

> *… A unit that prepares the contents with the discipline groups… Such a unit is needed in this process. Then it becomes easier, the teacher at least uses it, sits down and discusses… suggest doing something in a certain way. He uses it later.*

Similarly, PCA stated that teachers needed specialized help to guide content developments. She indicated that it would be a specialist in the school to whom teachers got advice from and felt relieved. Likewise, the teachers indicate the need for someone who can guide them through the implementation to access learning materials and reach the updated information about the initiative in the school. T2 expressed that a technology leader within each discipline area could inform teachers related to accessing learning materials and online resources in their area. T5 indicate that she needed to gain updated information from leaders about the 1:1 initiative. She told that the initiative was being updated in the light of the teacher' responses and she wanted to be informed about the current and new features of the smart education platform.

On the other hand, the teachers criticized the completed training for being narrative

and underlined the need to design teacher training activities through the approach of learning by doing.

Most of the teachers stated that they received the theoretical information on how to use the smart education system without putting it into practice. For example, T2 said:

> *A training was held at the beginning of the year, but I did not find it satisfying. For example, a training is given to the teacher on tablet training, without any on-screen application…We just listened to presentations suggesting that there is such a program, you can use it, you can do that and so on. I doubt if any of the teachers even remember it.*

In addition, the teachers indicated that they need a hands-on training to implement the initiative in terms of educational use of tablets. T2 stated they need examples on how to integrate tablets into the learning process. T1 stated that within the second year of the implementation she participated in a TPACK workshop organized by the Project Coordinators. The workshop was beneficial for her because there she had an opportunity to explore by herself and prepare a technology supported learning activity under the guidance of an expert on TPACK, as quoted below:

> *I do not understand anything that I cannot dig into like a phone… let me discover it myself. I will look into it and make a presentation. That's training for me. That's what happened at the TPACK workshop. We did it ourselves. And I can prepare it easily now. And this happened in just a day. But how could we do that? It's because we prepared it by ourselves. … we sat down and started preparing by exploring. Therefore, it was efficient.*

She also proposed that a series of learning by doing workshops will be beneficial instead of covering all things in one session and said "*What we saw in the TPACK workshop, I would like to have them in more details...for example, one program on one whole day, and another complete training on another day. One day completely applied storyboarding".*

Interestingly, while teachers complained that the training was unsuccessful in supporting how to use the proposed technologies in learning, the educational coordinator of the company said:

What I taught the teachers was just a half-day practical training of three hours. In this three-hour practice training, as I asked most teachers where or how they will use it… or the basic expectation from them in the training; I could not get any response.

Other factors concerned with teacher training needs were teachers' level of competence and training with small groups. T1 and T2 indicated that teachers have a diverse background so that teachers should be trained according to their technology knowledge levels. On the other hand, T1, T2, and T8 advised that teachers should be trained in small groups or they should be grouped according to their area of study. T8 expressed that teachers will interact effectively in a small group and take advantage of learning from other teachers. T1 also regarded the training provided at beginning of the school terms as insufficient. She pointed out one-to-one studies organized by project coordinators for being the most powerful.

Contents of the teacher training

Another issue stated by teachers was the content of the teacher training. Some of the teachers stated that they would like to have training related to the detailed functions of the smart education platform by applying it. T1 and T2 expressed that they would like to have training in which they can learn to use various kinds of technological platforms deeply to develop their own content. Similarly, T4 pointed the need for a training which covers the content development for teachers. She said:

Moreover, preparing content is a training itself. It is also a training to prepare the information sheets, the worksheet, the activity pages. Because not every teacher can prepare it ... These are also a training process. It is much better if the teacher gives education to the class in a trained manner, thus it won't waste the student's time.

Practicality of the implementation

The participants reviewed the quality of the smart education platform considering software usability and taking notes on tablets.

System usability

The most common feature of the student tablet was the exchange of information between the smart board and student tablet as explained in the student tablet guide. The images sent by a teacher from the smart board were automatically saved in the students' gallery. In the same way, the images sent by students after being modified were also saved in the gallery. If students want to add the selected images to their digital notebook on the smart education platform, they need to select the desired image and place it on the notebook. The students indicated they received many images from the teacher and it was hard to arrange these images. To get rid of confusion, the students proposed that the images sent by the teacher should be collected in the course gallery as a separate folder. Another student indicated that when their gallery was full, they delete some images, but it was also deleted from their digital notebooks.

Teachers can take the attendance from the smart board. But one of the teachers indicated that they did not use the tablets at all time in the lessons. So, she did not find the attendance tool practical.

As regards to student notebooks, one student indicated that she could not scroll down the pages, but she had to move to the next page when there is no space which she did not find practical.

Another point stated by the participants was the data exchange through the smart education platform. The teachers complained that only images were supported in exchanging information through the platform. For example, T2 said:

> *You know we prepare a document and send to the child. For instance, when there is a video, you cannot send the video. You can give a link only. But the child can hardly open the link within the presentation. In fact, that's not a good idea.*

In addition, the teachers mentioned the utility problems of assigning homework to students and monitoring students. T6 said that she can send a message to students such

as homework they have to do. But she cannot give feedback to the students related to the assignments. T5 added that interaction was needed in the smart education platform to keep the progress of the student learning so that feedback can be given to students while they are at home. In addition, T8 indicated that she liked the quiz function of the smart platform but thought that the platform will enable teachers to prepare different types of questions such as open-ended, filling the blanks, or matching. Even in these types of questions, the student was able to check their answers upon submitting.

On the other hand, a student from grade 5 stated that the students were trying to send their answers to the board and sometimes they send for several times if a problem occurred based on the network. In that case, the teachers received more data and got confused. Also, they could not sort the students' answers or give feedback.

PCA stated that the smart education platform needs improvement to support students' out-of-school use. In relation to that, T5 expressed that the smart education platform should support teachers in monitoring students work. She indicated that she could monitor the students over the platform regarding the homework she had given. Also, T8 stated that she liked to take control as a teacher. Thus, she expressed that the smart education platform should enable teachers to monitor students' tablets during the classroom.

Some of the students indicated that using tablets through the smart education platform in class or at home was inconvenient and it takes time to complete the tasks compared to traditional methods.

Typing on tablets

The students expressed that taking notes on tablets was not practical. It takes more time to take notes on tablets by writing their fingers. Furthermore, sometimes they miss the teacher's presentation while trying to write on tablets. On this matter, a

student from grade 4 said "*I take notes by hand on the tablets. Writing can be bad when you write by hand. It can take up a lot of space"*. Because of their bad writing, students have difficulties while studying their notes. In addition, the teachers agree with the students. For example, T4 indicated that they also used a notebook to take notes beside tablets during the class. T1 indicated that in math's classes, the students had problems in solving the problems on tablets by writing their fingers, as below:

> *When I send the picture to the tablet right away, the problem of re-writing the question suddenly fades away. They are solving it on the tablets. But there is a problem like this. Children do not like to write on the tablet. They like the tablet very much, but they are not able to write on the tablet. It becomes too big or too small. Then the child does not want it. It decreases the child's self-confidence. This is bad in the end. So, he's doing it on the notebook. Only he writes the results on the tablets and sent to me. He cannot make operations for long. Because our operations are very long… One thing is also missing on tablets. I wish you can drag and stick numbers... Even if there is a keyboard, where he must go to the equations and use the virtual keyboard. Every time you turn on the keyboard and type it will turn the keyboard back on and cover the screen, you need to close the keyboard again. This is a waste of time. For mathematics, I wish we had, for example, something like this on a tablet; dragging numbers directly, dragging mathematical functions.*

4.2.2. 1:1 Practices

Practices regarding the implementation of 1:1 initiative were presented in this section. Namely, lesson preparation, use of the technologies, planned future use based on the current usage and organizational challenges encountered during the implementation were explained.

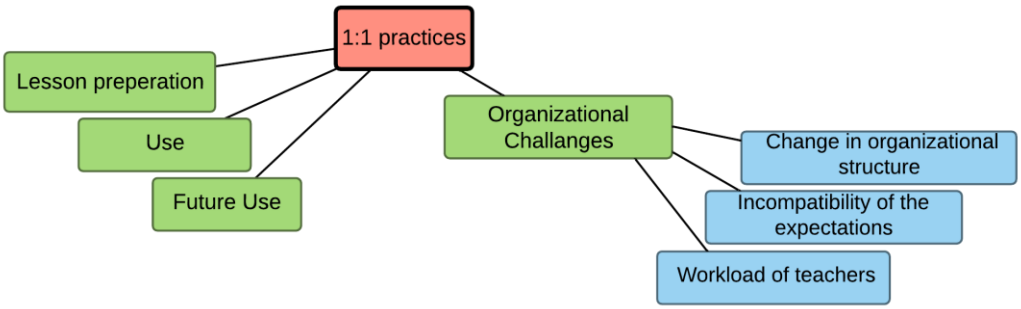


Figure 4.3. 1:1 Practices during the implementation

4.3.1.1. Lesson preparation

The teachers were expected to prepare information and worksheets to be used in the smart education platform based on Bloom's taxonomy. The teachers were split up into groups according to their discipline and shared the content of the courses to prepare the materials. They worked cooperatively in this process; prepared the part reserved for themselves and shared with the others. The teachers prepared these course materials before the term had started and uploaded into a file transfer system established among teachers and education coordinators of each discipline. Next, the educational coordinators of each discipline area review the contents and share the last version of the material to be used in the courses. In addition, some of the teachers indicated that they also review the course materials prepared earlier and make necessary adjustments before the class. T5 indicated that:

> *I'm looking first. What was my topic? I'm looking at my plan. We already prepare our materials…. Because they were prepared in a very short time at the beginning of the year. I am looking at the inadequacies. What can I else prepare for children to do? What should I do for their better learning?*

Also, some of the teachers allocate time to prepare questions to be used in the quiz function of the platform or to share with students during the class. On the other hand, T1 mentioned that she only prepares the information sheets, but with the TPACK

workshop she realized how to prepare a learning environment for students with tablets.

4.3.1.2. Use

Tablets were used in the class as a regular learning material like books or notebooks. When the course started, teachers launched the smart education platform on smartboard and students logged into the course by using their tablets. Below in Table 4.1, it was shown that how tablets were used within the 1:1 initiative.

Table 4.1. *Tablets usage with the 1:1 initiative*

Usage	Description
use for data exchange	• Use for sharing examples, questions or activities between smartboards and tablets and vice versa • Sharing a picture to ask why and how questions • Use for making a quiz
access course materials	• access the electronic books of the courses • access teacher-prepared materials • review the content that teachers shared during the class • access homework assignments
note taking	• Use electronic notebooks within the smart education platform to take notes during the class or collect teacher-shared data
accessing external resources	• Use online learning platforms such as okulistik, project umbrella, morpa or vitamin • Online resource related to the content areas (esl-related sites, youtube videos etc.) • Use google search • Electronic dictionary • Use web 2.0 tools • Use simulations

The use of tablets mostly based on the using smart education platform. According to the classroom observations and interviews the most common ways of using the tablets were exchanging information between students' tablets and smart board, accessing the course materials by means of smart education platform, note taking during the class.

Also, some teachers guided students to use online platforms to support learning. And very few of the teachers were tried to integrate web 2.0 tools such as storyboarding tools and simulations for science classes.

4.3.1.3. Future use

Based on their current usage and experiences on the implementation process, the teachers explained their intended use of the 1:1 initiative. T5 indicated that there was a need to improve home usage of tablets. She expressed that students will be ready for the class in the meantime and time will be saved for classroom activities. One of the teachers who participated in the TPACK workshop indicated that by means of the workshop she had learned to make teamwork by using tablets and addressed the importance of using different approaches for integrating technology. She said that:

> *If that system really gets in place…, if we can implement it in a reasonable way, we will get a fruitful result. Because, as I said, I will make group work for the first-time using technology with the children thanks to the TPACK. It's exciting me, frankly. Also, when I talked to PCB, I said that I want to apply different approaches…I think we can get better results by adapting something modern to a slightly different modern education system.*

In addition, T7 expressed that she wanted to use the applications on tablets. She mentioned that as the implementation progressed, she learned how to reach and use different platforms and resources. She stated that they can use the lab at certain times and place emphasis on practical work in science courses. Thus, she wanted students to take advantage of the applications installed on the tablets. T1, T5, and T7 also place importance on students' products and pointed out the online resources that student can use on their tablets and create their own learning materials. T1 indicated that:

> *From now on, I will prepare the information sheets for myself. Not sending the child the information sheets; I am planning to send the documents like worksheets to the child. And as much as possible, I would like the child to create by herself/himself with those 4-5 different internet sites we have taken in the TPACK workshop. Because I enjoyed it, I had a lot of fun. Now we should really start with using the tablet.*

Likewise, T5 underlined the importance of activating students for taking their own responsibility in learning. She was quoted as follows:

> *Now, for example. The smart education system we use is a good system… I think children should undertake responsibility. Or they will not learn. How can I say, it will go beyond sending of some information to their tablets.*

4.3.1.4. Organizational Challenges

Throughout the three years of implementation, the school has encountered various challenges. Even some of the challenges are listed under the related themes above, additional challenges are explained below.

Change in organizational structure

One of the challenges was the change in organizational structure. PCB indicated that their plans related to providing education or student/parent involvement were interrupted due to these changes. Through the second-year, the school administration hired another educational technologist for the entire schools for their institution to review the 1:1 implementation apart from project coordinators. Also, PCA had to leave the job for personal reasons and PCB was assigned to work in the general directorate instead of only working in the school that investigated during this research. During the site visits, PCB told that are having problems due to the new structure. In relation to these changes, the educational coordinator of tech company shared views as following:

> *…there used to be a group in the past, PCA and her sub-team they were owning, watching, and directing those who were there. This group hasn't been in its places in the school for about two years, there is no contact with this business and there is not anybody who owns it and I think that the school also has serious shortcomings in academic terms. A teacher needs to study at least two years and three years in order to be able to acquire the culture of a school, but if the teacher is replaced every year… Giving training to new teachers and upgrading the old teachers. Like taking Math's 101 first and then Math's 102. Last year, they took Smart Education 101 and we targeted to give 102 this year. We have seen that a considerable number of teachers, nearly 90 percent, have left the system,*

> *exposed to a hard circulation. And they are all new teachers. ... Those units have changed at least six times in the last three years, that is, the head of the mathematics department changed six times in three years, this is not a normal thing, it has changed.*

After the two years of the implementation, IT units within the school were closed within the and the technical and instructional support was provided from the general directorate if needed. For this reason, teachers and administrators of the school stated many problems that their problems were not solved on time. During the school visit, A3 indicated that teachers' workload has increased in the absence of the support unit in the school. Thus, teachers are not able to pay attention to their professional development regarding using tablets for learning or supporting digital citizenship skills of the students.

Incompatibility of the expectations

Another issue was incompatibility of the expectations of the tech company with teachers' readiness. The educational coordinator of the tech company explained that they assumed that the teachers were competent at using technology. The company planned to move through on this assumption, but the implementation process was stuck. She explained that:

> *We were aiming to run product training and, when we started this, we said as a prerequisite that we should have teachers who know to use the internet, have an e-mail account, able to reach a content from the internet, created a lesson note. We take it as a default… But we found out that it is really few that teachers who do a research on the internet, add notes to their lesson notes… the lesson note is actually the main trouble, there are few teachers who are able to produce lesson notes... I have realized that we have been talking about the ideal world…*

Workload of teachers

On the other hand, teachers' heavy workload was revealed out as another factor that inhibited teacher performance. In the first year, A1 was concerned that teachers would be overwhelmed by their duties in the school such as coaching students or social club

activities. The counselor of the school also discussed that issue. She indicated that teachers need to spend 4-5 hours a day for teaching. Apart from that, a teacher must be able to save time to prepare alternative teaching activities and develop materials for the 1:1 initiative. Or there is a need to receive support from a unit within the school in learning and teaching with technology. The counselor mentioned that the school should have taken this into the consideration in human resource planning and she said that "*There is a need for awareness of needs, there is the intention. The only obstacle is that teachers can take their time and submit inputs to the system".*

PCA agrees with the considerations about teachers' workload. She mentioned that teachers' work hours need revising because of the requirements of teaching with tablets such as preparing learning contents. Even though the learning materials are provided by the school administration, the teachers need to adapt these materials into their learning environments and make improvements.

The teachers also confirmed the challenges related to their workload. T5 stated that she needs more time to prepare to teach with tablets. T8 also mentioned that due to the shortage of time, she could not prepare the learning materials in the desired quality. On the other hand, T6 talked about their responsibility in covering the course curriculum. She mentioned that if she uses the programs like GeoGebra, she will fail to cover the topics in the curriculum. Similarly, T8 said the following:

> *But in this way when I am preparing something, trying to use it, and when I have a little time ahead of me; the result is failing, therefore… for example; we are preparing something about pronouns. We perform Karagöz and Hacivat on the storyboard. …it is very nice. But as I said, I cannot always do this; If it was my only job, or if I had the time to prepare.*

In addition, T8 indicated that her schedule was full, and she needs to cover the books besides using the smart education system. Because the students were still using the books and parents pondered why the books they have purchased were not used in the class.

4.2.3. Support and monitoring

Under this theme, the support and monitoring efforts of the administrators and coordinators to promote the implementation of the 1:1 initiative are presented.

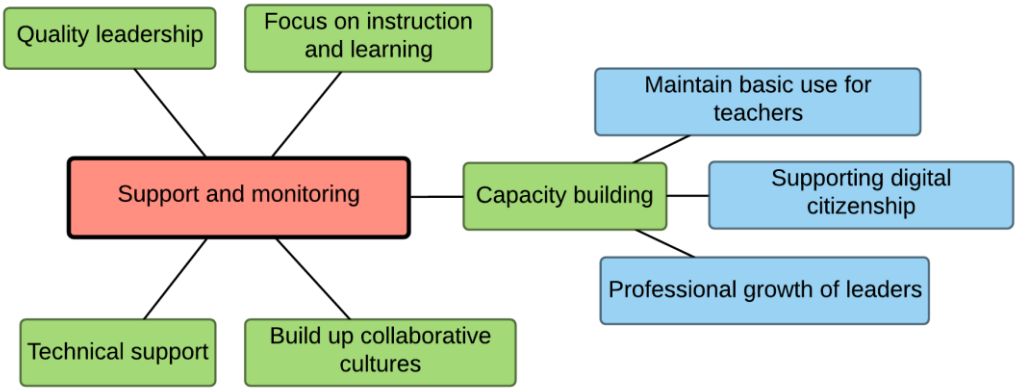


Figure 4.4. Support and monitoring efforts

4.2.3.1.Build up collaborative cultures

PCA defines the 1:1 implementation as a culturing process. She believed in the initiative as a person who is in charge of the 1:1 implementation. She expressed that she was motivated by the teachers and students who also believed in the initiative and there was a need to be patient. She mentioned that the school is in the transition period and believed that it will be internalized as time progresses. PCA indicated that the only person who likes change is a wet baby with a wet diaper and interpreted the transitional period as "*This is not new tricks to old dogs. It is completely about introducing a new thing. And teachers who will guide it and raise awareness in the country must change the crust, frankly. This is not very easy".*

Another issue related to the redesigning of the organization was establishing collaborative work structures. Both project coordinators and the administration of the school supported the efforts to initiate the collaborative practices. PCA and PCB stated

that they communicate with the external factors such as faculties of education to be guided for the implementation. PCA indicated that her views concerning the use of technology in education became apparent upon this collaboration. Similarly, PCB said:

> *…we have met friends who have done this for years and are able to act as a guide on how to do it. They showed example practices; what kind of a program can we make in our own school; how can we make progress? We have worked on them for a long time ... So, it helped us a lot while we were planning our work. We benefited from them.*

The tech specialist of the school indicated that his unit collaborated with the PCA and PCB in guiding the implementation. He said:

> *Together we are actually on the same road, on the same line. At times, they help us, at some other times, we help them. Smart education is like this. We are preparing the infrastructure part. Teacher training was under the responsibility of the Department of Educational Technology Coordination. …everyone has done their part.*

In addition, the tech specialist stated that they worked collaboratively with the tech company at the beginning through e-mail or meetings regarding the current status of the initiative. But their collaboration was limited to schools' agreement with the tech company. The tech specialist of the school noted the following:

> *We used to meet quite a lot in the past because they also want feedback. They're doing a program and they want to open up to the Turkish market with this program. We were constantly giving feedback... but the requests were not responded completely. Material concerns were involved. I mean even if we say something, the last decision was made by school chair in fact.*

On the other hand, the administrators and coordinators make the time for involvement and enlightenment of parents. The parents were reactional because the tablets were not in use and students' displayed too many misbehaviors such as playing games. A2 indicated that they will get rid of these issues by collaborating with parents. The school chair indicated that they received the parents' reactions and prepared seminars and meetings for parents to overcome their needs. For students, digital volunteers were

selected from each class. PCA indicated that they held meetings with the volunteer students and prepared digital citizenship agreements for students. The volunteers share the agreements within their class and put it on the wall of each classroom. But she indicated that in the second year of the implementation, studies planned with the students were neglected due to other actions that need to be taken related to implementation. PCA indicated that teachers were involved in the process of training of their peers. The volunteer teachers were selected to guide the other teachers by taking side with PCA. These volunteer teachers were expected to spread out their knowledge and guide other teachers. PCA said that:

> *It seems useful to work with this style of throwing a stone into the sea for a while. When you provide a whole group training, they can miss the points. It's one-to-one... I am choosing volunteers in the second phase to guide one-to-one studies with teachers. It is also important to choose volunteers and proceed with them in the form of workshops.*

Also, the teachers expressed that the head teachers of each discipline guided the teacher training in terms of preparing course content, uploading materials into the system, and their usage.

4.2.3.2.Capacity building

In this section, efforts to contribute the knowledge and skills are presented. PCA and PCB worked collaboratively with the tech specialist of the school to contribute to the development of others within the school. Also, the Tech Company provided training for teachers. In the third year, the educational coordinator of the tech company said:

> *I think we are now trying to provide an experience from the board to the tablet, from tablet to board. Now teachers are not as inexperienced as we were three years ago. At least they have a basic education about using web 2.0 tools. There were teachers who did not an e-mail account at the beginning. There were teachers who have never been on the internet. There were teachers who used small lecture notes or books from that they got from the school only. Now teachers can do some research on the*

internet at least, they think there is a need about these, and they have training.

Maintain basic use for teachers

In the beginning, the tech company provided the teacher training including an introduction to the features of the smart education platform and its use. Then, the project coordinators ran training for teachers to maintain uploading a document into the system and providing in-class use. PCA said:

It was in the form of writing the summary of the topic on a file to send to the students' tablets instead of having them write the summary in their notebooks. It was a very simple primitive beginning ... We first did the beginning part and we did it. Now teachers are used to sending things to children's tablets from the board, and children send some content to the teacher from their tablets.

In this process, PCB described her task as ensuring understanding of the platform by teachers and the use of its tools efficiently. She added that before providing training that bears the integrating of the technologies within the 1:1 initiative into learning they need focus on the use of the smart education platform itself. Because they think that

teachers need to gain knowledge about the smart education platform and the use of its tool. Thus, it was ensured that the teachers got up to use the system at the basic level.

As mentioned before, the tech specialist worked collaboratively with the teachers. He stated that they provided Office training for teachers to help them in preparing information and worksheets. Also, they show teachers how to use the file sharing system to share the learning materials they prepared.

Professional growth of leaders

Another point indicated by the chair of the school and project coordinators was professional development of themselves. The former told that they were participating in international conferences to keep up with what's going on in the world. PCA

indicated that they collaborated with the universities and attended conferences to improve their knowledge and then applied the knowledge they gained in their context. PCB indicated that she attended a certificate program on educational technology. She spoke as following:

> *There we have met friends who have done this for years and are able to act as a guide on how to do it. They showed example practices; what kind of a program can we make in our own school; how can we make progress? We have worked on them for a long time ... Next, we issued the smart education manual.*

PCA indicated that they learned different activities and programs to be used in the tablets. In addition, she expressed that they learned different approaches such as SAMR and TPACK to integrate technologies into the learning process.

PCA said that they improved their knowledge first; then, they shared what they have learned with the teachers through the meeting or one by one training sessions. In addition, she tried to identify the needs of teachers and students in implementing the initiative.

Quality leadership

From the beginning, the administrators of the school and project coordinators took responsibility to guide the implementation. Approaches used to guide the implementation were presented in this section.

From the beginning, the administrators and project coordinators showed a supportive leadership. The school chair explained that as a school administration they supported the teachers and parents when they faced a problem during the implementation. T1 concluded that the vision of the chair related to the implementation of the 1:1 initiative was an enabler for her as an external force. She expressed her views by saying:

> *The clear vision of the school chair, it is the driving force above all. So, I have to do this already. I need to learn this. It's a driving force. I can't ignore it. Look, our supervisor will not give up in any way and will surely*

put it into practice. Then if I am in this school, I have to be one of those who does it in the best way... even if it is broadcast on some television programs, it means that maybe I will be able to get there someday. Then I have to learn this in detail...

The teachers confirm the efforts of the administrators, T8 said:

Of course, our school administration always supports. And when we share a problem, she always communicates it to the relevant authorities for the solution. I did not have any problems… When I told them a problem, they definitely tried to solve it. It is very important to me. Because I know that when I say something, it is valued and taken into consideration.

Also, T7 referred to the school's support as a facilitator for her. She was satisfied with the support provided and got help whenever she needs, and she knew that there was someone to ask for help. In addition, the roles of the administrators and coordinators were coupled with combined pressure and support. The teachers were expected to change their practices and implement the 1:1 initiate. In this transition process, the administration helped teachers fulfill their expectations. A2 indicated that at the beginning the teachers were resistant because of their negative believes in taking the action, especially preparing the digital materials such as information and worksheets. A2 mentioned that they offer and provide help for teachers who were having problems in implementing the initiative. Similarly, PCA stated that putting pressure on teachers is a not a solution itself and there was a need to provide supportive activities. She said:

When you go with compulsion, it seems to me that we cannot quickly reach the process of making things valuable. On the contrary, we think that internalization will be stronger if we take the process of acceptance of the teachers well, so we offered to our teachers, we included our office programs into the teacher proficiency.

Related to her approach, PCA explained that she initiated discussions with teachers instead of ordering something. PCA indicated that she created a test environment for teachers and let them try and got teachers' opinions. In relation to the coordinators' approach, T1 mentioned that she received help whenever she needed. She indicated that she had hard times to prepare the learning materials, but the school was very

supportive to accomplish her goal and provide simple solutions without judgment.

Regarding supporting the teachers, the administration paid attention to encourage teachers to provide emotional support to reinforce their belief in the 1:1 initiative. PCA and PCB pay attention to strengthen the teachers' beliefs in the implementation of the 1:1 initiative.

On the other hand, the school provided a facilitative orientation for their teachers. In this direction, the preparation of digital learning materials was guided by the administration. PCA stated that she personally showed teachers how to prepare the materials step by step and provided feedback for teacher-created materials. Apart from the whole teacher training sessions before each term, starting from the second year PCA put one-to-one training into practice for teachers. PCA and PCB provided one-to-one training sessions together. PCA said:

> *In these processes, we had to work with teachers in pairs with a great patience. Because we have seen that teachers do not get much gain from collective seminars. How will it be when we get back to work? We have seen their needs for at least making a sample together. For this reason, we worked one-by-one a lot.*

T7 expressed her experience by saying:

> *Yeah. Awareness is actually growing. I mean, I was prejudiced at first when I went into one-by-one work. I have a lot of work; I teach for 30 hours. I have to check these assignments and, so on. I was prejudiced at first. But when you really start, I'm convinced. But for example; I was not persuaded by the information sheets. I mean, I just saw it as a burden I had to do.*

The chair of the school stated that they were providing seminars for teachers before each term and he underlined the need for continuous support. Also, PCA stated that they were working with teachers in line with the TPACK framework and she said that there was a need to observe teachers to monitor their progress.

Another leadership practice provided by the administration was about offering concrete experiences. PCA mentioned that the people were reactional, and they were trying to reveal out the negative sides of the implementation at the beginning. But when they realized that the innovation serves their needs, they accept it more quickly. She said:

> *In general, people give reactions like 'Where did this come from? I've been doing it somehow'. But as they start using and seeing the benefits, things changes. I mean when people see that it meets some of their needs, they accept it more quickly. I think that people will accept it as they see that the technologies facilitate their work and the related applications bring deeper knowledge and skills to students.*

Similarly, the school planned a hands-on training for parents. But the participation rate was unsatisfactory due to the reactive approach of parents. PCA indicated that even though the participation rate was low, they offered a positive experience for parents to try the features of the tablets. She said:

> *Above all; parents were very happy when they learned that the child did not write in his notebook, but he did it just because the teacher sent to their tablets, or because he saved the information on tablets, that information is stored in tablets, so they can come back after. We took parents and put in classes, like kids. We gave them tablets. The teacher sent questions to them from to smartboards and wanted them to answer. The participating parents were very happy when the teacher showed how many of them gave wrong or correct answered.*

The other factor about leadership was keeping the track of the implementation. The chair of the school indicated that they review the smart education platform logs to analyze teachers' technology use in class. On the other hand, PCA indicated that they work in the field to observe the implementation of the initiative in its own context. For this purpose, a checklist was used during classroom visits to control technical issues and technology use in class. PCA stressed managing the implementation in its context and attached importance on working closely with teachers. She is quoted as below:

> *I believe that I give people the necessary support in this regard. I visited the classes myself. I listened to the children themselves. I shared with them the benefits that I believed through question and answers guiding them to give answers, rather than by imposition. I never left the field in school. I did not manage this from the office. I got into the job. It is the way it must be. I mean, on this new job; school principals, coordinators, national education directors, whoever related must be in the field to establish this.*

In addition, the tech specialist of the school expressed that they reviewed the system logs within the smart education platform and defined the teachers who used the system on less frequent basis. He also visited the classrooms to observe deficiencies. Upon this examination, they planned a training and invited teachers to overcome these deficiencies or solve technical problems.

Supporting digital citizenship

Practices were planned to support digital citizenship to involve students actively in the implementation of the 1:1 initiative. The chair of the school stated that they were trying to establish a digital citizenship system in the school. In this connection, PCB said that:

> *We should have attached importance to digital citizenship issues. We noticed that. Because there were shortages regarding the use by students, especially about the use of the internet. Again, about digital citizenship, they had such shortcomings. In fact, these were the issues that can be improved. ...We first completed the issued open to improvement…*

Focus on instruction and learning

PCA and PCB also played a role to support the instructional dimensions of the 1:1 implementation. Both the chair and A2 expressed that they were focused on preparing the learning materials at first because of the learning content gap. PCA prepared the guidelines to prepare information and worksheets and distributed it to teachers by showing how to prepare. Also, she worked with teachers and visited the classrooms to observe the instructional use of the technologies in the classroom. Teachers were satisfied in relation to those efforts and felt comfortable about preparing information and worksheets with the instructional leadership of project coordinators.

In addition, PCA expressed that they organized a TPACK workshop to support the instructional use of the tablets. After that, they planned training and one-to-one meetings with teachers to guide studies that combine technology, content, and pedagogy together with PCB. PCB expressed her role in this process as:

> *We established the infrastructure. We gave them training. Everyone is now using them at a certain level. Next, we have started to work in combining pedagogy, technology, and content knowledge.*

4.2.3.3.Technical support

The tech specialist of the school takes in charge of troubleshooting. The teachers and students also stated that the tech specialist provides an immediate solution for their problems. T1 told that the tech specialist was solution-oriented and that her problem was solved immediately. The specialist describes his duties as:

> *In this process, we are setting the infrastructure first. We have a server room. There are Cash Servers for the smart education platform… we are controlling them. ...Wi-Fi network in school, the cable network, this is very important for us. We are trying to bring the cable networks to the highest level in the shortest distance as far as it reaches the end of the board. We place the Wi-Fi, the access points in quite critical points so that students can receive signals from anywhere. Because our programs run on the Wi-Fi, we provided them. The tablets of students inevitably break down. Often caused by students' faults. They are uninstalling the programs, or they forget their passwords. We take them back.*

4.3. Elements related to sustainability

Participants were asked to express their opinions related to implement and sustain the 1:1 initiative successfully. The reasons for the lack of continuation were the same ones that influenced implementation, except that their role became more sharply defined.

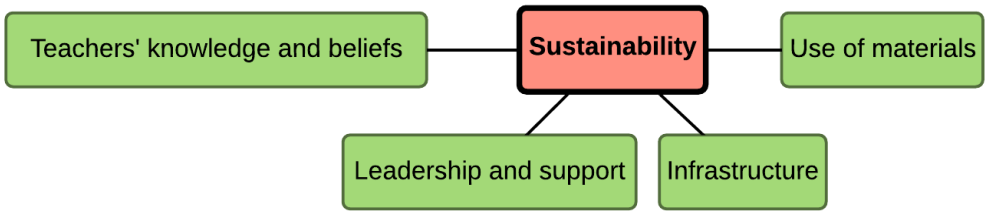


Figure 4.5. Elements related to sustainability

4.3.1. Infrastructure

The participants drew attention to using trouble-free technology to implement the 1:1 initiative successfully and need for improving infrastructure. The chair of the school indicated that there is a need to attach importance on the infrastructure to implement the 1:1 initiative properly. The teacher stated that they do not want to get into trouble while using technologies during the instruction based on power problems and technical problems of tablets, login and usage problems of smart education platform, and the quality of the internet connections. The project coordinators also underlined the importance of the internet infrastructure and better-quality tablets for students. In addition, T6 stated that the classrooms should be designed according to the 1:1 implementation; for example, providing charge units or appropriate desks to place tablets.

4.3.2. Leadership and support

PCA, as a person who guides the initiative, said that schools need to support stakeholders to make them believe the importance of the 1:1 initiative and feel the need. She expressed that the world is in a transformation process and there was a need to take the lead for raising awareness of the stakeholders. On the other hand, organizational support was mentioned by the participants to provide a structure to work together, support from central administration, and provide opportunities for teachers. The chair of the school stated that as a director you need to stand behind the initiative and fight against difficulties. Besides, PCA stated that the central

administration should be conscious of the efforts within the school to implement and sustain the initiative. She offered that schools should put the initiative on their agenda, work out the problems within the initiative patiently, and plan meetings where discussions were made on the problems and solutions where offered. Also, PCB indicated that the communication and a working structure need to be established among stakeholders. She said:

> *As I have mentioned, I believe that everyone should be aware of each other; first and foremost, the educational coordinators, the educational technologies coordinators, training technology managers, IT supervisors, IT managers, school principals, vice principals, student leaders, and technology leader teachers, I also think that everybody should know where they are on this project. And I think that they should all work together.*

Another issue related to the organizational support was to provide opportunities for teachers to develop themselves. The chair of the school drew attention to the training of teachers and stressed the need to appropriate funds and allocate time for teachers. T2 expressed that there was a person to guide their preparations and help them in the implementation process, but she cannot go around all the teachers. Thus, T2 indicated a need for a unit to put support behind teachers in terms of content development. She underlined that the teachers were expected to prepare the contents; however, poor quality learning materials were generated due to their limited knowledge and skills. She said "*...now we are constantly being asked to prepare content... I think it is a separate field in its own right. I'm sure every teacher is good in their area, but it's really a very different competency to adopt this technology.".*

Also, T1 stated that information about practical programs that students can use in their tablets will be provided for teachers and training sessions will be organized. The tech specialist proposed that a venue can be reserved for teachers to make discussions and explore the programs to be used in their courses. As a result, teachers can work collaboratively with the educational technology coordinator and technology specialist to discuss the practicality of their work. Besides that, the educational coordinator from the company gave an example of a school that she visited before. She indicated that

there was a library in this school for teachers' studies as indicated by the tech specialist above. On the other side, the parents indicated that to keep pace with the 1:1 initiative, the school should provide information and training for them. Additionally, a strong relationship should be established between parents and the school to be informed about the recent updates of the initiative. T1 also explained that hands-on training should replace presentations for parents to guide their children consciously.

Monitoring strategies were the other element regarding leadership. The chair of the school indicated the need for providing ongoing support for the stakeholders and being up to date. The chair said, "*In other words, investment in education technology is not an investment to be made at once and then to be forgotten".* He also defined the initiative as a long-term project and indicated that the administrators should stay in the course. On the other hand, PCA stated that there was a need to walk through the classrooms and observe the initiative in its context, discuss with teachers, and provide one-to-one training in order to monitor teachers' work.

4.3.3. Teachers' knowledge and beliefs

The other factor implied by participants was about teachers' professional knowledge. PCA regarded the preparations of teachers to implement the 1:1 initiative as an important factor. She thought that instead of sharing the same material (information and worksheets) with all students, teachers need to create their own learning material by using different sources. She continued saying:

> *…I learned it while studying pedagogy. A topic comprises of two parts. One is the essence and the other is the story. You have to help comprehend the essence through the story. So, when you need to teach the essence, you need to make use of it, to make it a story, to script, to make a video, to discuss, to open a discussion environment ... That kind of thing has to be decided by the teacher.*

Also, T5 stated that being a teacher means being organized. In terms of teacher knowledge, assessing learning outcomes was put forward by PCB. She indicated that

assessment of learning outcomes in technology-driven environments differed from the traditional classroom learning. Thus, she suggested that teachers need to be knowledgeable about the appropriate assessment techniques, in the following words:

> *First, administrators, then teachers. Maybe they can be replaced. But they both need to be able to evaluate the results of a training environment built using technology. They must come to that competence so that applications of pedagogy, technology, and content knowledge continued., they can be effective and efficient.*

T2 underlined the development of teachers, she indicated that teachers need to be trained substantially and be enthusiastic. She also expressed that teachers need to master problems while implementing the 1:1 technology and said:

> *You know the smartboard stuck sometimes. Or there is a problem. Although it is something that can be done very easily, the teacher is looking for someone in school, looking for an IT staff. Then the class time was interrupted. For example, yesterday I uploaded the documents. It did not show up in the smart education system. In the meanwhile, I called someone in IT, he was not there. There is nobody from the tech company? But seriously, the lesson was interrupted… And I am thinking. I have to both finish teaching the curriculum and follow these things.*

The teachers also argue that they should have the necessary technology knowledge to implement the initiative. In that respect, T5 drew attention to operating tablets or similar technological interfaces. In addition, T8 mentioned that she benefitted from some basic web 2.0 tools to produce her course activities, but she felt inadequate in terms of knowledge of the programs that can be used. She said "*Using the storyboard that… okay, to some extent. But I do not know many programs to prepare these, frankly. …maybe these programs can be taught to us. I think it would be better"*.

And PCB pointed out the difficulties based on teachers' limited technology integration knowledge. She phrased her views as following:

> *I think that the biggest problem of schools is to integrate technology within their structure. It was necessary to integrate technology with pedagogical*

knowledge. But they do not know the way for it. They do not know how to do it. There is a challenge here. There is a problem. If you overcome this, I think it will be well-established in the schools.

4.3.4. Use of materials

T2 said that they focus on technology instead of focusing on how to use it. She explained that instead of integrating smart education platform into their field, they have been the part of technology which is getting boring for teachers. She also criticized the initiative because of being far away from research and development. In addition, the participants indicate the need regarding the extent of alteration in the use of tablets. PCA and PCB placed emphasis on using technology with an approach such as TPACK and supporting teachers' knowledge to get used to the TPACK. T2 stated that they should benefit from the software and other related programs that enable teachers to apply different teaching methods, instead of using teacher-centered technology. In addition, the teachers underlined student-centered technology use to ensure that students own their learning. T5 and T7 also indicated that students' out-of-class use should be supported to engage them in the learning process through the approach of learning by doing.

The tech specialist of the school agreed with other stakeholders on the extent of alteration in the use of technology. He mentioned that using the smart education platform limited the use of tablets. He proposed that teachers need to select and use the technologies that provide benefit for them. He continued saying:

…there should not be only one option. You can't make it by constraining teachers. But when you offer some options, like Google, use google if you like. We have a smart education platform. You can use it. There's Kahoot, there's something called QS. There are millions of options like this that do not come to mind right now. There are so many choices when you do a research.

On the other hand, the parents indicated that the smart education system should support home usage and they should able to use the system to keep track of their children. A summary of the themes and codes are shown below.

Table 4.2. Summary of the themes

Theme	Sub-theme	Category	Code	Sub-code
action plan	instructional planning	-	content to be used with tablets	
action plan	instructional planning	-	focus on instruction	
action plan	organizational issues		building a work team in school	
action plan	organizational issues	-	planning is built into the doing	
action plan	technical issue	-	get the infrastructure ready	
action plan	technical issue	-	learn the technology	
motivations	-	-	advocacy from admin	
motivations	-	-	bureaucratic orientations	
motivations	-	-	existence and quality of innovations	
motivations	-	-	external change agents	
motivations	-	-	school tech vision	
1 to 1 practices	-	-	lesson preparation	
1 to 1 practices	-	-	future use	
1 to 1 practices	-	-	use	
1 to 1 practices	-	-	organizational challenges	change in organizational structure
1 to 1 practices	-	-	organizational challenges	workload of teachers
1 to 1 practices	-	-	organizational challenges	incompatibility of the expectations
perceptions	clarity	-	incoherence about the goals	
perceptions	clarity	-	unclear goals and means	
perceptions	complexity	-	exploring the tablet potential	
perceptions	complexity	preperadeness for implementation	parental guidance	
perceptions	complexity	preparedness for implementation	use of technology by students	
perceptions	complexity	preperadeness for implementation	teacher preparedness	
perceptions	need	advantages	tsefulness	
perceptions	need	advantages	support on the learning process	

Theme	Sub-theme	Category	Code	Sub-code
perceptions	need	advantages	benefits on learning	
perceptions	need	limitations	education of students	
perceptions	need	limitations	fit between needs and the innovation	
perceptions	need	limitations	relevance of the implementation	relevance on training digital citizens
perceptions	need	limitations	relevance of the implementation	Relevance to learning
perceptions	need	limitations	relevance of the implementation	Health concerns
perceptions	quality	quality of the resources	infrastructure problems	
perceptions	quality	quality of the resources	learning materials	
perceptions	quality	teacher training needs	organizing teacher training	
perceptions	quality	teacher training needs	contents of the teacher training	
perceptions	quality	practicality	system usability	
perceptions	quality	practicality	typing on tablets	
support and monitoring	-	-	build up collaborative cultures	
support and monitoring	-	capacity building	maintain basic use for teachers	
support and monitoring	-	capacity building	professional growth of leaders	
support and monitoring	-	capacity building	quality leadership	
support and monitoring	-	capacity building	supporting digital citizenship	
support and monitoring	-	-	focus on instruction and learning	
support and monitoring	-	-	technical support	
sustainability	-	-	infrastructure	
sustainability	-	-	leadership and support	
sustainability	-	-	teachers' knowledge and beliefs	
sustainability	-	-	use of materials	

CHAPTER 5

DISCUSSION AND CONCLUSION

This study investigated the implementation of a specific 1:1 initiative within a school. Findings were presented according to the categories of Fullan's model: initiation, implementation, sustainability (continuation) in line with the research questions. Such kind of investigations was considered critical to establishing effective implementations (Harper & Mailman, 2016).

5.1. Discussion on the first research overarching question related with the initiation

The 1:1 initiative in the school was put into practice with the assertive leadership of the school chair and a top-down approach was applied which was commonly used in technology integration studies. Even limited success was reported for the initiatives that used the top-down approach, either bottom-up initiatives were not succeeded because of failing to connect authority structure when they do not have a chance to make a good start (Fullan, 2007). Similarly, in some cases of bottom-up approaches initiators did not get adequate support and attention from the authorities to implement the change (Andzenge & North, 2013). In this context, Fullan (2007) stated that teacher-initiated innovations can be actualized when teachers have adequate information, access, time, or energy; and when they get support and help from the administration and other teachers within the school. Therefore, Fullan (2007) suggested combining the top-down approach with empowerment and motive people to implement the change. Besides that, putting the change into action by paying attention to teachers' past classroom practices and teacher beliefs were important to empower teachers for the implementation (Heath, 2017). Thus, administrators or coordinators who lead the project should empower teacher voices and provide the opportunity for their teachers to interact with other teachers to come up with new ideas

and improve their professional knowledge.

In this study, the readiness of teachers or other stakeholders were not taken into consideration when initiating the change. But volunteer teachers and students were selected to receive their support and be able to better communicate the idea of 1:1 initiative to the rest of the school. But these attempts were not monitored and disseminated throughout the implementation. On the other hand, as an external change agent tech company had a big role in the initiation process of 1:1 technology initiative. But it was stated that even the existence of external change agents is important, strong leadership internal to the school was pointed as a crucial variable. Otherwise, the proposed innovation will be uncoordinated and will not sustain over time (Fullan, 2007). Also, the role of principals was emphasized in proceeding with change at the school level and they were characterized as "gatekeeper" of change. Similarly, the leadership of school principals was indicated as a driving force for teachers to integrate technology into their courses and contribute to teachers' technological qualifications. Moreover, principal leadership in terms of developing and implementing a vision related to the technology in the school were underlined (Chang, 2012; Pautz & Sadera, 2017). In this study, the tendency of the school chair to integrate technology and school vision were important factors in the initiation of change.

Additionally, school technology leaders as project coordinators took part in the process. This kind of leadership efforts was also viewed as an important support for effective technology integration in schools (Anderson & Dexter, 2005). In addition, during the initiation process, administrator of the school which later became the coordinator of the 1:1 initiative built an initial work team within the school to be prepared for the implementation. Even the work team has interrupted over the time, basic steps were taken with the help of them. So, it is curial to ensure that the best and the right people must work in the transition period. Moreover, it is important that most qualified teachers and administrators should work in the process to overcome the obstacles. Thus, incentives and other resources can be used to motivate the people working in this process (Fullan, 2007).

Regarding planning in the initiation phase, the school had no exact plan to implement the initiative and the planning is built into the doing. Similarly, instead of skipping the planning session Fullan (2007) suggest reducing the distance between planning and action and adopt "ready-fire-aim" mindset and taking corrective action. But in this study, the school started to implement the initiative without working on key problems such as planning teacher professional development or providing learning materials which caused uncertainties during the implementation.

Another important aspect of the initiation process was the planning of the technical and instructional issues. Studies showed that having adequate infrastructure and providing instructional support are the critical elements to be able to use the new technologies within the 1:1 initiative (Gerger, 2014; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2009). At the beginning of the 1:1 initiative, with the help of the technology specialist the project coordinators make an effort to prepare the infrastructure ready for the implementation. In addition, the project coordinator started to work on the pedagogical use of the tablets and she proposed a pedagogical strategy to prepare the learning materials.

5.2. Discussion on the second overarching research question related with the implementation

Regarding implementation, stakeholders' perspectives were investigated in terms of the characteristics of the 1: 1 technology initiative, namely clarity, complexity, need, and quality. Also, practices and support and monitoring regarding implementation were investigated.

In terms of clarity of the 1:1 technology initiative administrators, teachers, and parents indicated the vagueness of the initiative that hindered the implementation of the technology. Project coordinators expressed the difficulties regarding how to manage the 1:1 initiative and guide the stakeholders. Similarly, as the initiative progressed project coordinators indicated that they were not clear about measuring the

effectiveness and efficiency of teaching with tablets and evaluating teacher work. Also, teachers were struggled with how to transform their teaching and make use of tablets for learning. Thus, focusing on stakeholders' need will help to decrease the confusion and provide clarity on how to use technology in 1:1 environment (Donovan, Hartley & Strudler, 2007). Moreover, in the initial stage of the implementation, clear goals and methods of accomplishing these goals should be determined and communicated to the key stakeholders.

Another issue related to clarity was incoherence about the goals between the tech company as a change agent and the school. Fullan (2007), stated that when parties ignore the subjective world of the each other the change will not succeed, and he drew attention to the quality of relationships between provincial ministries and local school boards, administrators, and teachers; between state departments and local districts; and between federal project officers and local authorities. Thus, establishing a processual relationship, which includes providing more than intermittent progress reports on what is being done or external evaluations, was recommended for the clarification of the issues related to implementation.

In terms of the complexity of the 1:1 initiative the stakeholders were faced with difficulties in adopting tablets into the learning and exploring the ways of adoption. As for the instructional part, most of the teachers' practices were based on the exchange of exemplary materials between student tablets and smart board. Thus, the technologies within the 1:1 technology initiative were used as a logistic support as a first step. But even this kind of usage provided flexibility in learning, stakeholders were in search of how to use these technologies effectively. Thus, teachers want to use the tablets as an opportunity to achieve new instructional goals and change their previous instructional practices (Pareja Roblin, Tondeur, Voogt, Bruggeman, Mathieu, & van Braak, 2018). Penuel (2006) also stated that providing information about the design and implementation of 1:1 initiative will help the stakeholders to guide and realize the innovation to change their practices. In the current practice, teachers benefitted from Bloom taxonomy to prepare the information sheets as a

learning material to be used in tablets. However, there is a need to consider what can be used apart from using information sheets or what can be done to enrich the content in order to design and deliver a course in 1:1 learning environment. In this point, Reigeluth (2005) emphasized the need for new teaching theories and strategies to meet learning needs in the information age. As mentioned, in terms of teaching with tablets the school proposed preparing information sheets according to domains of Bloom's Taxonomy and expected teachers to enrich each of the domains with technological tools and activities if appropriate. But, only introducing the idea of integrating tablets with the information sheets constrained teachers' perspectives of using tablets for learning. Because teachers have limited knowledge of technologies such as apps or web tools to design a learning activity in their discipline areas to teach a certain topic. Aslan, Huh, Lee, & Reigeluth (2011) found that teachers use of technologies varied by the learning tasks and their discipline areas in terms of subject and content. For example, when language studies teachers prefer using discussion forums, math teachers prefer using the quiz function. Thus, school policies should allow and support teachers to select and use the technological tools appropriate for the learning objectives.

Also, practices of teaching with tablets seemed to fell within Puentedura's (2006) *Substitution, Augmentation, Modification, and Redefinition* (SAMR) model's Substitution and Augmentation steps. These two steps included the use of technology to replicate past practices and enhance the process. Even this kind of usage provided flexibility and time-saving practices, there is a need to take advantage of technological opportunities in order to transform teaching and learning.

Likewise, students were in search of effective use of tablets apart from exchanging information between their tablets to the smartboard. Thus, different types of tablet usage can be introduced and modeled for students and students should be supported in terms of tablet usage skills (Ditzler, Hong, & Strudler, 2016).

Similarly, stakeholders expressed their perspectives to indicate the complexities regarding preparedness for the implementation. As for parents, out of school use was the main question. Parents explicitly want to see how tablets contribute to their child's learning process and knowledge of parents was appeared as an important factor to guide their children, especially in early grades. Similarly, according to a study which investigates parents' perceptions within a laptop initiative concluded that parents were having difficulty in terms of monitoring their children's computer usage (Jin & Denise Schmidt-Crawford, 2017). In this study parents also complained that they are not able to guide their children's work on tablets. Thus, workshops should be designed for parents to get familiar with the tablets and functionalities of the innovation that was proposed. In addition, these workshops should provide opportunities for parents to share experiences and learn how to benefit from the innovation for the good of their children. By the way, awareness can be provided for parents to adopt the innovation and the digital culture transformation within the school (Retalis, Paraskeva, Alexiou, Litou, Sbrini, & Limperaki, 2018)

Teachers and project coordinators reported that using tablets in the learning process contributed to students' awareness of digital citizenship and technology literacy skills and engage students. Similarly, active engagement, student-led projects, and developing digital literacy were noted as opportunities of 1:1 learning for students (Chou, Block, & Jesness, 2012). But there are limited studies related to academic achievement regarding 1:1 initiative (Major & Hennessy, 2015). Also, according to students' tablet usage experiences, it was noted that students at early grades were more motivated to use tablets. This situation was explained by the applications run on the tablets and activities implemented. Beside confirming these facts, a study that covers students' experiences within an iPod Touch / iPad Project indicated that students at higher grades were engaged to use these devices within a non-traditional activity through these devices (Crichton, Pegler, & White, 2012).

On the other hand, even today's students were assumed as having adequate digital competencies some deficiencies were indicated by stakeholders in terms of using

technology wisely. Also, students had some difficulties while using tablets for learning such as controlling their own learning or managing the tablets. Even Prensky (2001) identified contemporary generations as "digital natives" teachers and administrators need to focus and support digital citizenship skills of students in order to in order to maximize learning and student involvement. Furthermore, there is a need to support students to add value to their life by using digital technologies, display proper technology use, and access information and solve the problems in their life in line with the rights and responsibilities with the help of technology (Çubukçu & Bayzan, 2013). Similarly, studies concluded that, learning to use various technological devices since from early years does not contribute to digital competencies (Li & Ranieri, 2010; Šorgo, Bartol, Dolničar, & Boh Podgornik, 2017) and very few of the students used technology to learn something or explore information which affects their learning process negatively (Ng, 2012).

Quality of the resources such as technical problems and providing learning materials to be used in tablets, teacher training needs, and the practicality of the tablet use in the learning process was indicated by stakeholders to draw attention to the quality of the 1:1 implementation. In this study, technical problems were important barriers that affect the quality of the innovation. Teachers got frustrated when they have problems while using the smart education platform that arose from the technical issues which interrupted the learning process in the class such as logging out of the smart education platform. In addition, infrastructure problems such as internet connections or design of the classrooms to implement the technology were identified by the stakeholders and observed by the researcher during the implementation. Also, the quality of the student tablets became prominent to implement the 1:1 initiative successfully. Likewise, it was stated that technologies will support learning when infrastructure facilitated the use of digital resources introduced into the system (Diaz, Nussbaum, & Verela, 2014).

In terms of the quality of the 1:1 initiative, especially teachers complained about the limited time to prepare learning materials which caused having poor quality materials. In addition, students regarded the learning materials used in tablets at a basic level and

indicate the need for advanced materials that support learning.

Training of teachers was another important issue that emerged under the quality of the implementation. Teachers indicate the need for an ongoing professional development program within the school instead of interrupted training sessions which was held with entire teachers. Teachers were satisfied with the TPACK workshop which was held with small groups of teachers provided an environment for the teacher to interact with the tablets and develop their own learning material by learning by doing. Thus, professional development should be a component of the 1:1 implementation and project coordinators and leader teachers should play a role in developing and delivering the training and guide the content development efforts. In addition, a unit should be placed within the school that teacher can freely communicate their technology integration ideas with other teachers, got support from them, and develop their artifacts.

In terms of practicality, stakeholders report some usability problems related to smart education platform. Thus, smart education platform which was developed by the tech company should have been developed to facilitate students' and teachers' work. Some of the usability problems were related to use of the platform itself and some of them were the functionality of the platform such as assessment and out of school use. In this context, Reigeluth et al. (2015) studied the technology functions of a Personalized Integrated Educational System (PIES) which can be defined as a learning management system to serve learner-centered paradigm of education. They have indicated four major functions of PIES, namely recordkeeping for student learning, planning for student learning, instruction for student learning, and assessment for student learning. Thus, the smart education platform that used as an LMS in this study should meet the needs of the teachers, students, and parents; should consider the design specifications and include technological tools to facilitate the learning process.

Also, typing on tablets were stated as a problematic issue by the students. Related with that, providing students with note-taking instruction, allowing students to

experience the use of different note-taking materials such as concept maps, and modeling and teaching different note-taking strategies by considering the content areas and age levels will help them to solve the problems with the typing problems (Bennet, 2017).

In addition, stakeholders' perceptions were investigated to find out how innovation address their needs. Thus, advantages and limitations of the 1:1 initiative was taken into consideration to determine the felt need. Even stakeholders indicated benefits of using tablets in education, they indicated that they got much benefit from the other technologies that they used before. Also, there is no answer to how the 1:1 initiate fit the needs of the stakeholders. On the other hand, teachers indicated the advantages of using tablets in the learning process to fulfill the needs of today's students. But some of the teachers underlined that today's students have an easy access to technology and information in their lives and indicated to do much more beyond only providing information through tablets. In addition, students believed that in some courses they learn better without tablets. This can be explained the appropriateness of the instructional method with course objectives. Furthermore, teachers' knowledge and skills of using orchestrated strategy to integrate digital and non-digital resources are critical for student success (Díaz, Nussbaum, & Varela, 2015).

During the implementation process, peer relations among teachers became important to share experiences and explore the new practices. Relationship with other teachers also stated by Fullan (2007) as a critical variable and interactions and the quality of relationships among teachers was pointed as a primary basis for social learning during the change process. In addition, individual characteristics of teachers were indicative in terms of openness to experience in this study. Similarly, emphasized put on teachers as learning designers who were innovative, open to change, and adapt the changing roles of teachers and students in technology-driven environments to implement 1:1 initiative successfully (Walling, 2014). Besides, teachers did not want to be a part of the technology which made available by the 1:1 initiative, instead if it is necessary, they want to integrate the innovation into to their teaching and learning environment

with the appropriate pedagogies. Teachers were also digital content developers in this study. In this regard, project coordinators' role and leadership skills became evident in guiding teachers.

Regarding support and monitoring issues, the project coordinators showed a supportive leadership to facilitate the change process within the school from the beginning of the initiative. But, due to some institutional decisions from the top, their roles within the initiative has changed during the implementation and their efforts were interrupted. However, it was stated that efforts to sustain the development of staff within the innovations should be an ongoing activity and emphasize should be placed on adapting to new practices (Hughes, Boklage, & Ok, 2016). In addition, having a full-time person who was in charge of coordination of the innovation was indicated as a powerful element to support teacher commitment within 1:1 initiative by providing support, guidance, and modeling (Stanhope & Corn, 2014). In addition, it was stated that as a leader, project coordinator should bear multiple roles such as learner, change agent, technician, instructional leader or evaluator (Oliver, Mollett, Corn, 2012).

5.3. Discussion on the third overarching research question related with the sustainability

As described in the literature, accessing and using a trouble-free technology are important for stakeholders to proceed with the change (Pareja Roblin, Tondeur, Voogt, Bruggeman, Mathieu, & van Braak, 2018). In this study, stakeholders underlined the tablet quality in terms of battery and technical problems of tablets, login and usability problems of smart education platform, and the quality of the internet infrastructure. Also, teachers laid emphasis on the design issues of the classrooms in terms of providing charge units or having appropriate desks to place tablets. Thus, having a strong infrastructure in terms of the quality of the hardware and software, and design of the learning environments were important to provide sustainability of the innovation.

Beside the technical support providing instructional support is critical in terms capacity building of teachers (Gerger, 2014). Fullan (2007) indicated that "*Educational change is technically simple and socially complex"* (p.84). In this study, teachers' beliefs and knowledge of teaching with technology were stated as an important factor to extend and sustain the practices within 1:1 initiative. Studies showed that only putting 1:1 initiative into practice did not shift teachers' pedagogical practice and indicated the need for supporting teachers to change their perceptions and attitudes (Garthwait & Weller, 2005; Peled, Blau, & Grinberg, 2015). Thus, professional development activities were designed to provide concrete experiences for teachers to change their current practices (Fullan, 2007).

In addition, instead of focusing on the technology itself, in this case using smart education platform on tablets, teachers were in search of the ways to integrate the proposed technologies into their knowledge area. Teachers and project coordinators want to learn about the technologies to be used on tablets which will enrich the lesson under study. TPACK workshop which was planned for the teacher training was found as beneficial by teachers in terms of learning to integrate different kinds of technologies into their discipline. Thus, in terms of supporting teachers' knowledge and beliefs approaches such as TPACK can provide tools and strategies to effectively integrate technology into discipline areas (Jang & Chen 2010).

Providing leadership and support were other issues related to sustainability. In this point, Fullan (2007) suggests monitoring the progress and taking corrective action. Through the three years, the initiative progress as a developmental cycle which affects the implementation in a positive way, but constantly changing school structure and management was found as a negative factor in terms of sustainability of the 1:1 initiative. In this point, Fullan (2007) underlined the lack of planning general orientation and support for new members who arrive after the program is started that block the new members' participation. On the other hand, Huberman and Miles (1984) stress that sustainability of innovations depends on whether or not the change (1) gets embedded or built into the structure (through policy, budget, timetable, etc.); (2) has,

by the time of the institutionalization phase, generated a critical mass of administrators and teachers who are skilled in and committed to the change; and (3) has established procedures for continuing assistance (such as a trained cadre of assisters), especially relative to supporting new teachers and administrators. Thus, organizations need to develop their capacities and know how to operate to be successful in such kind of complex environments (as cited in Fullan, 2007, p.102).

5.4. Implications for the practice

This study investigates the implementation process of 1:1 technology initiative through the experiences of key stakeholders within a school by using Fullan's educational change model as a lens. Based on the experiences of the stakeholders; implications proposed for the practitioners and policymakers for initiating, implementing, and sustaining the innovations.

5.4.1. Initiation

Issues to consider regarding initiation of the 1:1 project are presented in this section. Before deciding to proceed with a 1:1 initiative as a policymaker or advocate there is a need to consider the driving factors. The contributions of initiating a 1:1 technology in the school should be analyzed. In addition, an investigation should be made to find out that if a guidance or help of external partner will be required or not. If needed, there is a need to identify what kind of guidance will be provided.

Before setting off for the implementation the institutions should deal with the planning. Instead of making a strict plan, it was advised to work on some critical aspects such as organizational and instructional planning, and technical issues. In terms of organizational planning, an action plan which will be updated during the implementation should be prepared to guide the process. It was non-realistic to expect planning every issue related to implementation, but a flexible plan will be provided at the first hand and should be improved as the implementation progress. Also, there is a need to build a work team in the school and determine the possible duties for each

person within the team and plan a collaborative work structure. This team will be the core to facilitate the process to be ready for the implementation.

As for the instructional planning, the coordinators of the projects should consider what kind of learning materials will be used, how the materials will be provided, and if teachers are going to be content developers what kind of guidance will be provided for them. In this point, there is a need to pay attention to adopting technologies proper with the pedagogy. Thus, a pre-determined pedagogical approach should be used under the guidance of project coordinators and teachers should be informed of this.

Regarding the technical issues, the administration, technical staff and project coordinators must be sure that the infrastructure is working properly and adequate to implement the proposed initiative. As for the guiding team, especially technical staff and project coordinators must have a control over the hardware and functions of the software used. They should operate the technologies within the initiative.

5.4.2. Implementation

Issues to consider regarding the implementation of the 1:1 project is presented in this section. To implement the initiative successfully administrators or project coordinators should be clear about the goals and requirements of the implementation. Then they should make clear the issues related to the roles of each stakeholder such as teachers, students or parents during the 1:1 implementation. Stakeholders should be aware of the implementation and what should they do during the process. There is also a need for consistency in stakeholders' understandings of the project goals.

The other issue is complexity related to the implementation. There is a need to be prepared to implement the initiative successfully, make use of the proposed technologies in a full capacity, and benefit from the affordances of the technology.

In terms of preparedness, difficulties that stakeholders encountered in the process must be noted. There is a need to support parents in terms of guiding their students at home.

Parents should be informed about the monitoring techniques and be familiar with the tablet interfaces. Thus, a practical session should be provided for parents. As for the students, positive experiences regarding using tablets in learning will be provided. Also, discussions or activities should be organized for students to create awareness of using technological tools consciously, and support students to become digital citizens.

Teachers also having difficulties for teaching with tablets. They are struggled both with content development and delivering the course via technology. Thus, a community in the school such as instructional technology center may help to solve the problems of teachers. In addition, the leadership of instructional designer or educational technology specialist is helpful to guide this community. So that, teachers able to discuss their instructional plans and technology usage scenarios before testing in the class and received support from an expert. In addition, technology integration cases and examples should be provided for teachers to minimize their resistance.

In the 1:1 implementation, teachers mostly used the information sheets that they developed beforehand. But teachers could not get much benefit from that kind of usage and they were in search of using tablets in different ways. In this point, introducing teachers to various web technologies may help to widen teachers' perspectives and adapt and repurpose these technologies into their courses. Thus, instead of using a techno-centric approach, teachers can improve their knowledge about teaching with technology and be able to select and use the appropriate tools for their courses.

Related with the need regarding implementation the 1:1 initiative some issues must be made explicit. For example, the advantages of using tablet technology should be compared to other technological devices. Also, benefits of using tablet technology to deliver the course and supporting learning outcomes must be questioned. Not only the tablet technology itself but the usability of the software within the tablets is an important issue. It should be analyzed that how the proposed technology fit with the needs of students and teachers, and parents. It should be discussed that how the new

method adds value the previous learning methods and what kind of opportunities does the software provide for teachers such as communication outside the class and giving on time feedback.

Another issue related with the implementation is quality which covers quality of the resources, teacher training, and practicality. In terms of the resources, there is a need to ensure that the infrastructure is working properly such as internet connections, launching the software or programs on the tablets, having a tablet in good quality. Also, there is a need to pay attention to the design of the classrooms to use the tablets effectively in the courses. For example, seating arrangement of the students and providing charge units should be considered.

On the other hand, the way of providing learning materials to be used in tablets should be clarified. The role of teachers in preparing learning materials should be discussed; are teachers going to prepare the learning contents or are they going to be the designer of the technology supported lesson by benefiting from various media. Related to this issue, teacher training is another important issue for quality. Teachers do not prefer one-shot or interrupted training sessions instead an ongoing supporting mechanism should be settled within the school. Thus, teacher training sessions should be modified according to discipline areas and technology literacy levels. In addition, subject-specific examples of using the tablets in the learning process should be provided for teachers. Teacher training should include practical and theoretical aspects of integrating tablets and smartboard in the learning process to meet the needs of teachers. By the way, teachers have an opportunity to realize what was expected for them and able to design a 1:1 technology enhanced learning for their course objectives. On the other hand, technical information related to implementing 1:1 initiative can be provided online, and teachers can access technical information related to the system usage whenever they want.

In terms of practicality, tablets and software within the tablets should serve to user needs. Thus, system usability checks should be made. Furthermore, in this study,

students used tablets to take notes during the class and indicate many problems with typing on tablets.

During the implementation, the school faced with some organizational challenges. One of them is about the change in the school structure. The vision of the incomer administrators changes the way of implementing the 1:1 initiative and some of the attempts were interrupted. Thus, determining an educational technology unit with the pre-determined vision may help to maintain the progress of the implementation. In addition, the implementation process should be clarified by specifying the general framework, objectives, how the process will be managed, who will take part in the process, and the duties and responsibilities of the people involved. Also, teachers should be included in the decision making regarding 1:1 implementation such as in determining teachers' technology needs. Accordingly, objectives should be determined at the beginning of the process to be able to measure the outputs of the 1:1 initiative. In addition, process evaluation should be performed during the implementation according to the project objectives. By the way, through the examining of the current situation, an awareness can be raised for the management of the school to solve the related problems. Also, the establishment of an audit mechanism within the school consisting of experts in educational sciences, school counselor and learning technologists can help the guide the process.

On the other hand, a need analysis should be made before the implementation to check teachers' readiness to teach with technology. Thus, precautions can be taken for the issues to be encountered in the implementation process.

Finally, another important issue regarding the implementation is providing support and monitoring. Transformation of school with the technology requires collective efforts. Thus, a collaborative culture should build up between the stakeholders. Also, the school should pay attention to the capacity building. The quality leaders should maintain the basic usage for the rest and expand their horizons about using tablets in education. But before, as leaders, they need to develop their capacities in terms of

knowledge of tool to be used on tablets in the learning process and technology integration methods.

5.4.3. Sustainability

Even many of the issues were explained above to sustain the 1:1 initiative, some issues were stated again in this part regarding sustainability. An infrastructure which is in good-quality and functions properly is an important factor to sustain the innovations. Also supporting mechanisms for both infrastructure, teacher work, teachers training, and organizational issues are other important factors. Even the administrators are the gatekeepers of the innovations, there is a need to focus on teachers to sustain the innovations. There is a need to strength teachers' beliefs and support their professional developments. In addition, offering different kinds of usage of tablets in education such as applying new methods and using new platforms will support teachers to stay tuned.

5.5. Future Suggestions

This study aimed to address how 1:1 initiative was put into practice and implemented in a school by considering the contextual factors. Also, different kinds of stakeholders were included in the process. Thus, the researcher able to develop an understanding of how 1:1 initiative was evolved in the school and have an opportunity to examine the implementation through experiences of different stakeholders. Future studies should also consider the interrelationships among the stakeholders and contextual factors that affect the implementation process of technology implementation. For example, it can be researched that how the support of the administration affects teachers' technology integration practices and by the way how student learning was affected. In addition, quantitative studies can be performed to measure the construct related to the factors affecting the implementation process. On the other hand, with the integration of mobile devices in education there is a need to research pedagogical use of mobile devices for learning in and out of school. Especially out of school use of tablets should be taken into consideration to support learning beyond classrooms

and support students' learning. This study used Fullan 's model to investigate the whole process. Apart from that, related theories can be used to reveal out stakeholders' practices of using 1:1 technology deeply.

REFERENCES

Alberta Education (2006). *One-to-one mobile computing: Literature review*, Alberta, Canada: Department of Education and Training (pp. 1–65). Canada: Alberta. Retrieved from http://www.assembly.ab.ca/lao/library/egovdocs/2006/aled/158124.pdf

Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly, 41*(1), 49–82. DOI: 10.1177/0013161x04269517

Andzenge, S.T. & North, S.F. (2013). Experiences of a faculty-driven iPad integration initiative in teacher education. In J. Herrington, A. Couros & V. Irvine (Eds.), *Proceedings of EdMedia 2013--World Conference on Educational Media and Technology* (pp. 1616-1622). Victoria, Canada: Association for the Advancement of Computing in Education (AACE).

Aslan, S. & Reigeluth, C. M. (2011). A trip to the past and future of educational computing: Understanding its evolution. *Contemporary Educational Technology. 2*(1), 1-17.

Aslan, S. (2012). *Investigating "the coolest school in America": A study of a learner-centered school and educational technology in the information age.* (Order No. 3550777, Indiana University). ProQuest Dissertations and Theses, 303. Retrieved from http://search.proquest.com/docview/1316886672?accountid=13014. (1316886672).

Aslan, S., Huh, Y., Lee, D., & Reigeluth, C. M. (2011). The role of personalized integrated educational systems in the information-age paradigm of education. *Contemporary Educational Technology*, *2*(2), 95-117.

Balanskat, A. & Garoia, V. (2010). *Netbooks on the rise: European overview of national laptop and netbook initiatives in schools.* Brussels: European Schoolnet.

Bauer, J. & Kenton, J. (2005). Toward Technology Integration in the Schools: Why It Isn't Happening. *Journal of Technology and Teacher Education, 13*(4), 519-546. Norfolk, VA: Society for Information Technology & Teacher Education. Retrieved from https://www.learntechlib.org/primary/p/4728/.

Bennett, J. (2017). *Determining the Effectiveness of a Note-taking Intervention in a 1-to-1 iPad Mathematics Classroom*. Robert Morris University.

Blair, N. (2012). Technology integration for the "new" 21st century learner. *Principal, 91*(3), 8-11.

Butler, D., Leahy, M., Twining, P., Akoh, B., Chtouki, Y., Farshadnia, S., ... & Valtonen, T. (2018). Education Systems in the Digital Age: The Need for Alignment. *Technology, Knowledge and Learning*, *23*(3), 473-494.

Çağıltay, K., Çakıroğlu, J., Çağıltay, N., & Çakıroğlu, E. (2001). Öğretimde bilgisayar kullanımına ilişkin öğretmen görüşleri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *21*, 19-28.

Chang, I. H. (2012). The effect of principals' technological leadership on teachers' technological literacy and teaching effectiveness in Taiwanese elementary schools. *Journal of Educational Technology & Society*, *15*(2), 328-340.

Cho, J. Y., & Lee, E. (2014). Reducing Confusion about Grounded Theory and Qualitative Content Analysis: Similarities and Differences. *The Qualitative Report, 19*(32), 1-20. Retrieved from https://nsuworks.nova.edu/tqr/vol19/iss32/2

Chou, C.C., Block, L., & Jesness, R. (2012). A case study of mobile learning pilot project in K-12 schools. *Journal of Educational Technology Development and Exchange, 5*(2), 11-26. DOI: 10.18785/jetde.0502.02

Cottrell, R. (2007, October 18). *The Economist Debate Series: Education. The Moderator's statement.* Retrieved from http://www.economist.com/node/10003313.

Creswell, J. (2007). *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, CA: Sage Publications.

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Crichton, S., Pegler, K., & White, D. (2012). Personal devices in public settings: Lessons learned from an iPod Touch/iPad project. *Electronic Journal of E-Learning, 10*(1), 23–31.

Cristia, J., Ibarrarán, P., Cueto, S., Santiago, A., & Severín, E. (2017). Technology and child development: Evidence from the one laptop per child program. *American Economic Journal: Applied Economics*, *9*(3), 295-320. DOI: http://dx.doi.org/10.2139/ssrn.2032444

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. Teachers College Press.

Cuban, L. (2001). *Oversold and Underused: Reforming Schools Through Technology*, 1980- 2000. Cambridge MA: Harvard University Press.

Cuban, L. (2013). Why so many structural changes in schools and so little reform in teaching practice?, *Journal of Educational Administration*, *51*(2), 109-125. DOI: https://doi.org/10.1108/09578231311304661

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813-834. DOI: https://doi.org/10.3102/00028312038004813

Çubukçu, A. & Bayzan, Ş. (2013). Perception of digital citizenship in Turkey and methods of increasing this perception by using the internet conscious, safe and effective. *Middle Eastern & African Journal of Educational Research, 5*, 148-174.

Díaz, A., Nussbaum, M., & Varela, I. (2014). Orchestrating the XO computer with digital and conventional resources to teach mathematics. *Journal of Computer Assisted Learning, 31*(3), 202-219. doi:10.1111/jcal.12081

Ditzler, C., Hong, E., & Strudler, N. (2016). How tablets are utilized in the classroom. *Journal of Research on Technology in Education, 48*(3), 181-193.

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of research on technology in education, 39*(3), 263-286. http://dx.doi.org/10.1080/15391523.2007.10782483

Duffy, F. M. (2009). The need for systemic transformational change in school districts (Part 1). Retrieved from http://cnx.org/content/m19579/latest/

Duffy, F. M., Rogerson, L. G., & Blick, C. (2000). *Redesigning America's schools: A systems approach to improvement.* Norwood, MA: Christopher-Gordon Publishers.

Erişti. B. (2010). Eğitimde dönüşümler. In H. Ferhan Odabaşı (Ed.), *Bilgi ve İletişim Teknolojileri Işığında Dönüşümler* (pp. 1-18). Ankara: Nobel Akademik Yayıncılık.

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47-61.

Freeman, A., Adams Becker, S., Cummins, M., Davis, A., & Hall Giesinger, C. (2017). *NMC/CoSN Horizon Report: 2017 K–12 Edition.* Austin, Texas: The New Media Consortium.

Fullan, M. (2007). *The new meaning of educational change (4th edition)*. New York: Teachers College Press.

Garthwait, A., & Weller, H. G. (2005). A year in the life: Two seventh grade teachers implement one-to-one computing. *Journal of Research on Technology in Education, 37*(4), 361-377.

Gerger, K. (2014). *1:1 tablet technology implementation in the Manhattan Beach Unified School District: A case study (Order No. 3647116).* Available from ProQuest Dissertations & Theses Full Text. (1630090350). Retrieved from http://search.proquest.com/docview/1630090350?accountid=9676

Harper, B., & Milman, N. B. (2016). One-to-one technology in K–12 classrooms: A review of the literature from 2004 through 2014. *Journal of Research on Technology in Education, 48*(2), 129-142. DOI: https://doi.org/10.1080/15391523.2016.1146564

Harris, J., & Hofer, M. (2009). Instructional planning activity types as vehicles for curriculum based TPACK development. In Maddux, C. D. (Ed), *Research highlights in technology and teacher education* (pp. 99–108). Chesapeake, VA: AACE.

Heath, M. K. (2017). Teacher-initiated one-to-one technology initiatives: How teacher self-efficacy and beliefs help overcome barrier thresholds to implementation. *Computers in the Schools, 34*(1-2), 88-106.

Hooft Graafland, J. (2018). *New technologies and 21st century children: Recent trends and outcomes*, OECD Education Working Papers, No. 179, OECD Publishing, Paris, DOI: https://doi.org/10.1787/e071a505-en.

Hughes, J., Boklage, A.., & Wook Ok, M. (2016). A case study of technology leadership in Situ. *Journal of School Leadership*, *26*(2), 283-313.

Inan, F. A., & Lowther, D. L. (2010). Laptops in the K–12 classrooms: Exploring factors impacting instructional use. *Computers & Education*, *55*, 937–944.

Topper, A., & Lancaster, S. (2013). Common challenges and experiences of school districts that are implementing one-to-one computing initiatives. *Computers in the Schools*, *30*(4), 346– 358.

Jang, S. J., & Chen, K. C. (2010). From PCK to TPACK: Developing a transformative model for pre-service science teachers. *Journal of Science Education and Technology*, *19*(6), 553-564.

Jin, Y., & Schmidt-Crawford, D. (2017). Parents' perceptions of the first-year implementation of a one-to-one laptop initiative in a Midwestern high school. *Computers in the Schools, 34*(1-2), 73-87, DOI: 10.1080/07380569.2017.1293470

Jonassen, D. H., Howland, J., Marra, R. M., & Chrismond, D. (2008). *Meaningful learning with technology*. Upper Saadle River, NJ: Pearson, Merrill, Prentice Hall.

Jonathan, A. (2010). *ICT transforming Education. A regional guide*. Bangkok: UNESCO.

Keleş, E., Öksüz, B. D., & Bahçekapılı, T. (2013). Teknolojinin eğitimde kullanılmasına ilişkin öğretmen görüşleri: FATİH projesi örneği. *Journal of Social Sciences*, *12*(2), 353-366.

Kızılet, E. & Özmen, K. S. (2017). ICT Integration in Turkey: Evaluation of English Language E-Content of the FATİH Project. *The Turkish Online Journal of Educational Technology (ERIC, Scopus), 16*(4), 33-41.

Koç, M. (2005). Implications of learning theories for effective technology integration and preservice teacher training: A critical literature review. *Journal of Turkish Science Education, 2*(1), 2-18.

Kocak, U. (2015). *Student engagement with 1:1 tablet computer- based teaching in the secondary English, history, and mathematics classroom: Multiple case studies of a program implementation*. (Doctoral dissertation). Northeastern University Research Archive.

Kozma, R. B. (2003). Technology and classroom practices: An international study. *Journal of Research on Technology in Education, 36*(1), 1-14. DOI: https://doi.org/10.1080/15391523.2003.10782399

Lai, K. & Pratt, K. (2004). Information and communication technology (ICT) in secondary schools: the role of the computer coordinator. *British Journal of Educational Technology, 35(4),* 461–475. DOI: https://doi.org/10.1111/j.0007-1013.2004.00404.x

Lai, K.W., Pratt, K. & Trewern, A. (2002). *e-Learning Initiative: Current state of ICT in Otago Secondary Schools*. Dunedin, New Zealand: Community Trust of Otago.

Lambert, J. & Cuper, P. (2008). Multimedia Technologies and Familiar Spaces: 21st Century Teaching for 21st Century Learners. *Contemporary Issues in Technology and Teacher Education, 8*(3), 264-276. Waynesville, NC USA: Society for Information Technology & Teacher Education. Retrieved from https://www.learntechlib.org/primary/p/25318/.

Li, Y., & Ranieri, M. (2010). Are 'digital natives' really digitally competent? A study on Chinese teenagers. *British Journal of Educational Technology, 41*(6), 1029-1042.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.

Lois, R. C. (2012). *A case study exploring technology use and incorporation of 21st century skills in elementary classrooms* (*Education Doctoral Theses*). 71.

Maddin, E.A. (2002). *Factors that influence technology integration in elementary instruction*. Unpublished doctoral dissertation, University of Cincinnati, USA.

Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (Vol. 41). Sage publications.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: A sourcebook*. Beverly Hills: Sage Publications.

Mishra, P. & Koehler, M. J. (2008, March). *Introducing technological pedagogical content knowledge*. Paper presented at the Annual Meeting of the American Educational Research Association, New York City.

Ministry of National Education (MONE). (2017). About Fatih Project. Retrieved from http://fatihprojesi.meb.gov.tr/

Neumann, M. M. (2014). An examination of touch screen tablets and emergent

literacy in Australian pre-school children. *Australian Journal of Education, 58*(2), 109–122. DOI: https://doi.org/10.1177/0004944114523368

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065-1078.

Oliver, K. M., Mollette, M., & Corn, J. (2012). Administrative perspectives on the implementation of one-to-one computing. *Journal of Information Technology and Application in Education, 1*(4), 125-142.

Pareja Roblin, N., Tondeur, J., Voogt, J., Bruggeman, B., Mathieu, G., & van Braak, J. (2018). Practical considerations informing teachers' technology integration decisions: the case of tablet PCs. *Technology, Pedagogy and Education, 27*(2), 165-181. DOI: https://doi.org/10.1080/1475939X.2017.1414714

Partnership for 21st Century Skills (2009). *Framework for 21st Century Skills.* Retrieved from http://www.p21.org/our-work/p21-framework.

Patton M. Q. (2002). *Qualitative research and evaluation methods (3rd edition)*. Thousand Oaks, CA: SAGE.

Pautz, S., & Sadera, W. A. (2017). Leadership practice in a one-to-one computing initiative: principals' experiences in a technology driven, second-order change. *Computers in the Schools, 34*(1-2), 45-59.

Peled, Y., Blau, I., & Grinberg, R. (2015). Does 1:1 computing in a junior high-school change the pedagogical perspectives of teachers and their educational discourse? *Interdisciplinary Journal of e-Skills and Life Long Learning, 11*, 257-271. Retrieved from http://www.ijello.org/Volume11/IJELLv11p257-271Peled1969.pdf

Penuel, W.R. (2006). Implementation and effects of one-to-one computing initiatives: a research synthesis. *Journal of Research on Technology in Education, 38*(3), 329-348. DOI: 10.1080/15391523.2006.10782463

Pouezevara, S., Dinçer, A., Kipp, S., & Sarışık, Y. (2013). Turkey's FATIH project: A plan to conquer the digital divide or a technological leap of faith. *Turkey: RTI International & Education Reform Initiative (ERI)*.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1-6.

Puentedura, R. (2006). Transformation, technology, and education [Blog post]. Retrieved from http://hippasus.com/resources/tte/

Reigeluth, C. M. (1995). Educational systems development and its relationship to ISD. In G. J. Anglin (Ed.), *Instructional technology: Past, present, and future* (pp. 84–93). Englewood, CO: Libraries Unlimited.

Reigeluth, C. M., Aslan, S., Chen, Z., Dutta, P., Huh, Y., Lee, D., … Watson, W. R. (2015). Personalized integrated educational system: technology functions for the learner-centered paradigm of education. *Journal of Educational Computing Research, 53*(3), 459–496. https://doi.org/10.1177/0735633115603998

Reigeluth, C.M. (2005). New instructional theories and strategies for a knowledge-based society. In J. Spector, C. Ohrazda, A. Van Schaack, & D. Wiley (Eds.), *Innovations in Instructional Technology: Essays in Honor of M. David Merrill*. Mahwah, NJ: Lawrence Erlbaum Associates.

Retalis, S., Paraskeva, F., Alexiou, A., Litou, Z., Sbrini, T., & Limperaki, Y. (2018). Leveraging the 1: 1 iPad approach for enhanced learning in the classroom. *Educational Media International, 55*(3), 213-230.

Rogers, E.M. (1995). *Diffusion of Innovations*. New York: Free Press.

Seo, J. (2008). *SMART education in Korea.* Retrieved June 10, 2018, from http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/images/wsis/SIS_Forum_2012/55515-SmartEducationInKorea.pdf

Shapley, K., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2009). *Evaluation of the Texas Technology Immersion Pilot: Final outcomes for a four-year study (2004–05 to 2007–08).* Austin, TX: Texas Center for Educational Research.

Sharples, M., Taylor, J., & Vavoula, G. (2007). Theory of Learning for the Mobile Age. In R. Andrews and C. Haythornthwaite (eds.) *The Sage Handbook of Elearning Research*. London, UK (Sage), 221-247.

Šorgo, A., Bartol, T., Dolničar, D., & Boh Podgornik, B. (2017). Attributes of digital natives as predictors of information literacy in higher education. *British Journal of Educational Technology, 48*(3), 749-767.

Spatariu, A., Peach, A., & Bell, S. (2012). Enculturation of young children and technology. In Blake, S., Winsor, D. L., & Allen, L. (Eds.), *Technology and Young Children: Bridging the Communication Generation Gap*. (pp. 24-48).

Stanhope, D. S., & Corn, J. O. (2014). Acquiring teacher commitment to 1: 1 initiatives: The role of the technology facilitator. *Journal of Research on Technology in Education, 46*(3), 252-276. Doi: 10.1080/15391523.2014.888271

Ten Brummelhuis, A. C. A. (1995). *Models of educational change: the introduction of computers in Dutch secondary education.* Enschede: Universiteit Twente

Traxler, J. (2016). Inclusion in an age of mobility. *Research in Learning Technology*, 24. Doi: 10.3402/rlt.v24.31372

Trucano, M. (2010). *Big educational laptop and tablet projects: Ten countries to learn from*. Retrieved from http://blogs.worldbank.org/edutech/big-educational-laptop-and-tablet-projects-ten-countries

Twining, P., Broadie, R., Cook, D., Ford, K., Morris, D., Twiner, A., & Underwood, J. (2006) *Educational change and ICT: an exploration of priorities 2 & 3 of the DfES eStrategy in schools and colleges*. Coventry, UK: Becta.

Twining, P., Evans, D., Cook, D., Ralston, J., Selwood, I., Jones, A., Underwood, J., … (2005). *Tablet PCs in schools: Case study report: A report for Becta by the Open University*. Becta, Coventry, UK.

Twining, P., Heller, R. S., Nussbaum, M., & Tsai, C.-C. (2017). Some guidance on conducting and reporting qualitative studies. *Computers & Education, 106,* A1–A9. https://doi.org/10.1016/j.compedu.2016.12.002

Uluyol, Ç. (2013). ICT integration in Turkish schools: Recall where you're coming from to recognise where you're going to. *British Journal of Educational Technology*, *44*(1), 10–13. Doi: 10.1111/j.1467-8535.2012.01314.x

Walling, D. R. (2014). *Designing learning for tablet classrooms: Innovations in instruction*. New York: Springer.

Yin, R. K. (2003). *Case study research: Design and methods (3rd edition).* Thousand Oaks, CA: Sage.

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record*, *104*(3), 482-515.

APPENDICES

A. INFORMED CONSENT FORMS

Gönülü Katılım Formu

Bu çalışma, Arş. Gör. Tuğba BAHÇEKAPILI tarafından [redacted] okullarında yürütülen teknoloji entegrasyonuna yönelik süreci incelemek amacıyla gerçekleştirilmektedir. Çalışmanın amacı, öğretmenler, öğrenciler, ebeveynler, okul teknoloji koordinatörleri olarak ana paydaşların deneyimleri ve görüşleri doğrultusunda, Özel [redacted] okullarında uygulanmaya başlanan tablet bilgisayarların öğrenme sürecine dahil edildiği bire bir teknoloji uygulamasının değerlendirilmesidir ve bu uygulamanın ardından bir uygulama modelinin oluşturulmasıdır. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Görüşmede, sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamimiyle gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Görüşme, genel olarak kişisel rahatsızlık verecek soruları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda görüşmeyi gerçekleştiren kişiye, görüşmeye devam etmek istemediğinizi söylemek yeterli olacaktır. Görüşme sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Arş. Gör. Tuğba BAHÇEKAPILI (Tel: 0530 3460281 ; E-posta: tuba29@gmail.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyad Tarih İmza

----/----/-----

B. CONSENT FORM FOR PARENTS

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY
06531 ANKARA-TURKEY

1956

Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü
Computer Education and Instructional Technology Department

Veli Onay Mektubu

Sayın Veliler, Sevgili Anne-Babalar,

Orta Doğu Teknik Üniversitesi, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümünde doktora öğrencisiyim. Prof. Dr. Kürşat ÇAĞILTAY danışmanlığında "Bire bir teknoloji entegrasyonu uygulamasının incelenmesi: Bir okulun yolculuğu" isimli doktora tezini yürütmekteyim. Araştırmamızın amacı öğretmenler, öğrenciler, ebeveynler, okul teknoloji koordinatörleri olarak ana paydaşların deneyimleri ve görüşleri doğrultusunda, Özel Mektebim okullarında uygulanmaya başlanan ve tablet bilgisayarların öğrenme sürecine dahil edildiği bire bir teknoloji uygulamasının değerlendirilmesidir. Bu amaç doğrultusunda çocuklarınızın ve sizin bazı görüşlerine ihtiyaç duymaktayız.

Katılmasına izin verdiğiniz takdirde çocuğunuzla gerçekleştirilecek görüşmeler okulda uygun bir zaman aralığında planlanacaktır. Ebeveyn görüşmeleri de belirlenen uygun zaman aralığında Mektebim okulları Beykent Kampüsü'nde gerçekleştirilecektir. Çocuğunuzun görüşme süresince cevaplayacağı soruların onun psikolojik gelişimine olumsuz etkisi olmayacağından emin olabilirsiniz. Sizin ve çocuğunuzun görüşmelerinden elde edilen bilgiler kesinlikle gizli tutulacak ve bu bilgiler sadece bilimsel araştırma amacıyla kullanılacaktır. Bu formu imzaladıktan sonra hem siz hem de çocuğunuz katılımcılıktan ayrılma hakkına sahipsiniz. Araştırma sonuçlarının özeti tarafımızdan okula ulaştırılacaktır.

Görüşmeye katılarak bize sağlayacağınız bilgiler, tablet bilgisayarların öğrenme sürecinde kullanılmasına yönelik durumların ortaya konulması açısından önemli bir katkıda bulunacaktır. Araştırmayla ilgili sorularınızı aşağıdaki e-posta adresini veya telefon numarasını kullanarak bize yöneltebilirsiniz.

Saygılarımızla,

Tuğba BAHÇEKAPILI
Araştırma Görevlisi, Karadeniz Teknik Üniversitesi, Trabzon
Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Doktora Öğrencisi, Orta Doğu Teknik Üniversitesi, Ankara
Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Tel: (0530) 346 02 81
e-posta: tugbabahcekapili@ktu.edu.tr
tuba29@gmail.com

Lütfen bu araştırmaya katılmak konusundaki tercihinizi aşağıdaki seçeneklerden size en uygun gelenin altına imzanızı atarak belirtiniz ve bu formu çocuğunuzla okula geri gönderiniz.

A) Bu araştırmaya tamamen gönüllü olarak katılıyorum ve çocuğum .....'nun da katılımcı olmasına izin veriyorum. Çalışmayı istediğim zaman yarıda kesip bırakabileceğimi biliyorum ve verdiğim bilgilerin bilimsel amaçlı olarak kullanılmasını kabul ediyorum.

Baba Adı-Soyadı..... Anne Adı-Soyadı.....

İmza ..... İmza .....

C. INTERVIEW QUESTIONS FOR TEACHERS

Görüşme yeri ve saati:

Merhaba,

Ben Tuğba BAHÇEKAPILI. Öncelikle, görüşmeyi kabul ettiğiniz için teşekkür ederim. Ben okulunuzda yürütülen birebir teknoloji programı hakkında bir araştırma yürütmekteyim. Özellikle okulunuzda kullanıma sunulan tablet bilgisayarın eğitim/öğretim süreçleri ile bütünleştirilmesi sürecini inceliyorum. Bu görüşmemizde sizin konuyla ilgili görüş ve tecrübelerinizden faydalanmak istiyorum. Kişisel bilgileriniz ve cevaplarınız kesinlikle gizli tutulacak, sadece bu araştırma için kullanılacak ve araştırma sonunda toplu halde sunulacaktır. Kayıtlarda isimler yerine size verilen kodlar kullanılacaktır. Bu görüşmemiz, tahmini olarak 30 dakika sürecektir ve istediğiniz zaman görüşmeyi bitirme hakkınız bulunmaktadır.

- Bütün bu açıklamalardan sonra verdiğiniz bilgilerin araştırmada kullanılmasına izin verir misiniz?
- Görüşmeyi kaydetmemde bir sakınca var mı?

O halde ilk soruyla başlayalım.

Bölüm 1. Kişisel Bilgiler

- Branşınız nedir?
- Kaç yıllık öğretmensiniz? Bu kaçıncı okulunuz? Deneyiminiz nedir?
- Şu an kaçıncı sınıfları okutmaktasınız?
- Hangi üniversiteden/bölümden mezunsunuz? Hangi yıl?
- Kendinizi günlük hayatınızda teknoloji kullanımı konusunda nasıl hissediyorsunuz? Neler yapıyorsunuz? Teknolojiyi kullanma konusunda mesleki gelişiminizi nasıl tamamlıyorsunuz?
- Derslerinizde bilişim teknolojilerini kullanıyor musunuz? Evet ise, nasıl?

Bölüm 2. Ana Görüşme Soruları

- Öğrenme sürecine tablet bilgisayarı entegre etme fikri size neler düşündürdü? Herhangi bir çekinceniz oldu mu? Eğer olduysa bunun kaynağı nedir?
- Sizce öğrencilerin tablet bilgisayarlara sahip olması öğrenme sürecini hangi açılardan/nasıl etkilemektedir? Tablet bilgisayar öğrenme sürecine ne katıp ne götürecektir?
- Okulunuzda uygulanacak birebir teknoloji programına yönelik;
    - Tablet bilgisayarı öğrenme sürecine entegre etmeye yönelik derslerinize nasıl hazırlanıyorsunuz? Bu süreçte neler yapıyorsunuz?

- Tablet bilgisayarı derslerde kullanmak öğrenme süreçlerinize yönelik yani öğrenme yöntemlerinizde ve derse hazırlanma biçiminizde nasıl bir değişim meydana getirdi?
- Tablet bilgisayarı öğrenme sürecine nasıl entegre ediyorsunuz? Örnekler verir misiniz?
- Tabletler üzerinde hangi içerikleri kullanıyorsunuz/ uygulamaları çalıştırıyorsunuz? Ve bu içeriklere/ uygulamalara nasıl erişiyorsunuz?
- Derslerinize tablet bilgisayarı entegre etmek disiplin alanınıza ne derece uygun?
- Bire bir teknoloji programı
- Öğrenme sürecinde tablet bilgisayar kullanma deneyimlerini düşündüğünüzde, bu durumun öğrencilerin öğrenme süreçleri üzerinde gözlemlediğiniz etkileri nelerdir? Tablet bilgisayar kullanımı öğrenciler ve sizin aranızda ne gibi etkileşimler sağlıyor?/ işbirliğini destekliyor mu?

- Bire bir teknoloji programı kapsamında okul tarafından nasıl bir destek alıyorsunuz? Eğer alıyorsanız ;
  - Bu destek size ne derece yardımcı oluyor?
  - Verilen desteğin içeriği ile ilgili görüşleriniz nelerdir?
  - Verilen desteğin ne yönde/nasıl düzenlenmesini istersiniz / isterdiniz?
- Bire bir teknoloji programı kapsamında düşündüğünüzde sunulan teknolojileri öğrenme sürecine dahil etme noktasında itici güçler nelerdir? /engel oluşturan unsurlar nelerdir?
- Bundan sonraki süreçlerde tablet bilgisayarın öğrenme süreçlerine nasıl entegre etmeyi düşünüyorsunuz? Sahip olduğunuz deneyimlerden yola çıkarak tablet bilgisayarı öğrenme sürecinde etkili bir biçimde kullanma konusunda neler yapılmalıdır? Önermek istediğiniz iyileştirmeler var mı? Varsa bunlar nelerdir?

Size sormadığım ama sizin bu konu üzerine eklemek istediğiniz herhangi bir şey var mı?

Görüşmeye katıldığınız için teşekkürler.

D. INTERVIEW QUESTIONS FOR STUDENTS

Görüşme yeri ve saati:

Merhaba,

Ben Tuğba BAHÇEKAPILI. Öncelikle, görüşmeyi kabul ettiğiniz için teşekkür ederim. Ben okulunuzda yürütülen birebir teknoloji programı hakkında bir araştırma yürütmekteyim. Bu görüşmemizde sizin konuyla ilgili görüş ve tecrübelerinizden faydalanmak istiyorum.

Kişisel bilgileriniz ve cevaplarınız kesinlikle gizli tutulacak, sadece bu araştırma için kullanılacak ve araştırma sonunda toplu halde sunulacaktır. Kayıtlarda isimler yerine size verilen kodlar kullanılacaktır. Bu görüşmemiz, tahmini olarak 30 dakika sürecektir ve istediğiniz zaman görüşmeyi bitirme hakkınız bulunmaktadır.

- Bütün bu açıklamalardan sonra verdiğiniz bilgilerin araştırmada kullanılmasına izin verir misin?
- Görüşmeyi kaydetmemde bir sakınca var mı?

O halde ilk soruyla başlayalım.

13. Bölüm: Kişisel Bilgiler

- Kaçıncı sınıftasın?
- Günlük hayatında (okulda, evde) teknolojiyi (Bilgisayar, tablet, dizüstü, akıllı telefon) ne kadar ve ne yapmak için kullanıyorsun? Teknolojik cihazları kullanmayı seviyor musun?
- Ne kadar zamandır tablet bilgisayara sahipsin?
- Ailen bu tür cihazları kullanman konusunda ne/ler düşünüyor?

14. Bölüm: Ana Görüşme Soruları

- Tablet bilgisayara sahip olmanın olumlu ve olumsuz yanlarını nasıl açıklarsın?
- Tablet bilgisayarlarla öğrenme konusunda ne düşünüyorsun? Neler hissediyorsun? (Ör. Dersler teknolojik cihazlarla daha eğlenceli, öğretici mi yoksa daha karmaşık sıkıcı mı?) Tablet bilgisayar kullanmak öğrenme konusunda sana ne kazandırıyor?
- Derslerinizde tablet bilgisayarları nasıl kullanıyorsunuz? Örnekler veri misin?
- Evde tablet bilgisayarı nasıl kullanıyorsun? Örnekler veri misin?
- Tablet bilgisayar kullanmak ders çalışma yönteminde bir değişiklik yaptı mı? (Ör. Kitap yerine tabletten okumak, araştırma yapmak, konu ile ilgili ek kaynaklara ulaşmak, arkadaşların ile iletişime geçerek birlikte yapmak vs.)
- Daha önceki öğrenme deneyimlerinle kıyasladığında tablet bilgisayarla öğrenmenin farkı nedir?
    - Daha önceki öğrenme deneyimlerinle kıyasladığında tablet bilgisayarlı öğrenme sürecinde kullanmanın avantajları nelerdir?

- Daha önceki öğrenme deneyimlerinle kıyasladığında tablet bilgisayarla öğrenme noktasındaki zorlukları nasıl ifade edersin?

- Tablet bilgisayarları öğrenme sürecinde etkili kullanmaya yönelik neler yapılmalıdır? Belirtmek istediğin öneriler var mı?

Size sormadığım ama senin bu konu üzerine eklemek istediğin herhangi bir şey var mı?

Görüşmeye katıldığınız için teşekkürler.

E. INTERVIEW QUESTIONS FOR PROJECT COORDINATORS

Görüşme yeri ve saati:

Merhaba,

Ben Tuğba BAHÇEKAPILI. Öncelikle, görüşmeyi kabul ettiğiniz için teşekkür ederim. Ben okulunuzda yürütülen birebir teknoloji programı hakkında bir araştırma yürütmekteyim. Özellikle okulunuzda kullanıma sunulan tablet bilgisayarın eğitim/öğretim süreçleri ile bütünleştirilmesi sürecini inceliyorum. Bu görüşmemizde sizin konuyla ilgili görüş ve tecrübelerinizden faydalanmak istiyorum. Kişisel bilgileriniz ve cevaplarınız kesinlikle gizli tutulacak, sadece bu araştırma için kullanılacak ve araştırma sonunda toplu halde sunulacaktır. Kayıtlarda isimler yerine size verilen kodlar kullanılacaktır. Bu görüşmemiz, tahmini olarak 30 dakika sürecektir ve istediğiniz zaman görüşmeyi bitirme hakkınız bulunmaktadır.

- Bütün bu açıklamalardan sonra verdiğiniz bilgilerin araştırmada kullanılmasına izin verir misiniz?
- Görüşmeyi kaydetmemde bir sakınca var mı?

O halde ilk soruyla başlayalım.

12. Bölüm: Kişisel Bilgiler

- Branşınız nedir?
- Kaç yıldır yöneticilik yapıyorsunuz? Bu kaçıncı okulunuz? Deneyiminiz nedir?
- Hangi üniversiteden/bölümden mezunsunuz? Hangi yıl?
- Bire bir tablet uygulaması programındaki rolünüz ve sorumluluklarınız nelerdir?
- Eğitimde bilişim teknolojileri kullanımı hakkında görüşleriniz nelerdir? Sizce teknoloji sizin öğretim süreçlerinize ne katıp ne götürecektir?

13. Bölüm. Ana Görüşme Soruları

- Okulunuzda uygulanan bire bir teknoloji programına dönersek, bu programı okulunuzda uygulamaya nasıl karar verdiniz? Sizi motive eden neydi?
    - Tablet bilgisayarları öğrenme sürecinde kullanmaya yönelik okulunuzda bir plan oluşturuldu mu? Bu süreçleri nasıl geçirdiniz?
    - Karar verme süreçlerine kimler dahil edildi?
    - Kullanılacak teknolojik cihazlara nasıl karar verdiniz?
- Tablet bilgisayarları öğrenme sürecinde kullanılması konusunda ne düşünüyorsunuz? Mevcut öğrenme ortamında ne tür dönüşümler yaratacaktır? Öğrenme sürecini nasıl etkilemektedir? Sizce artıları ve eksileri neler?

- Bu süreci yöneten bir kişi olarak bire bir teknoloji programının yürütülmesine nasıl destek oluyorsunuz?
    - Öğretmenlerden/ öğrencilerden ne gibi tepkiler aldınız? Bire bir teknoloji programı ile ilgili tutumlarını nasıl değerlendiriyorsunuz?
    - Velilerden nasıl tepkiler aldınız? Bire bir teknoloji programı ile ilgili tutumlarını nasıl değerlendiriyorsunuz?
- Bundan sonraki süreçlerde tablet bilgisayarın öğrenme süreçlerine nasıl entegre etmeyi düşünüyorsunuz? Sahip olduğunuz deneyimlerden yola çıkarak tablet bilgisayarı öğrenme sürecinde etkili bir biçimde kullanma konusunda neler yapılmalıdır? Bunlardan sonraki süreçlerde neler yapmayı planlıyorsunuz? Önermek istediğiniz iyileştirmeler var mı? Varsa bunlar nelerdir?

Size sormadığım ama sizin bu konu üzerine eklemek istediğiniz herhangi bir şey var mı?

Görüşmeye katıldığınız için teşekkürler.

F. INTERVIEW QUESTIONS FOR PARENTS

Görüşme yeri ve saati:

Merhaba,

Ben Tuğba BAHÇEKAPILI. Öncelikle, görüşmeyi kabul ettiğiniz için teşekkür ederim. Ben okulunuzda yürütülen birebir teknoloji programı hakkında bir araştırma yürütmekteyim. Özellikle okulunuzda kullanıma sunulan tablet bilgisayarların öğrenme süreçleri ile bütünleştirilmesi sürecini inceliyorum. Bu görüşmemizde sizin konuyla ilgili görüş ve tecrübelerinizden faydalanmak istiyorum. Kişisel bilgileriniz ve cevaplarınız kesinlikle gizli tutulacak, sadece bu araştırma için kullanılacak ve araştırma sonunda toplu halde sunulacaktır. Kayıtlarda isimler yerine size verilen kodlar kullanılacaktır. Bu görüşmemiz, tahmini olarak 30 dakika sürecektir ve istediğiniz zaman görüşmeyi bitirme hakkınız bulunmaktadır.

- Bütün bu açıklamalardan sonra verdiğiniz bilgilerin araştırmada kullanılmasına izin verir misiniz?
- Görüşmeyi kaydetmemde bir sakınca var mı?

O halde ilk soruyla başlayalım.

1. **Bölüm: Kişisel Sorular**

- Çocuğunuz
    - Kaçıncı sınıfa devam ediyor?
    - Okul dışında teknolojiyi kullanıyor mu? Kullanıyorsa hangi teknolojileri (masaüstü bilgisayar, dizüstü, tablet bilgisayar) ne amaçla kullanıyor?
    - Kendinizi teknolojiyi kullanma konusunda nasıl değerlendiriyorsunuz?

2. **Bölüm. Ana Görüşme Soruları**

- Çocuğunuzun okulundaki öğrenme sürecine tablet bilgisayarı entegre etme uygulamasını duyduğunuzda ne düşündünüz? Zaman içerisinde düşünceleriniz değişti mi?
    - Uygulamaya yönelik yeterince bilgilendirildiğinizi düşünüyor musunuz?
- Öğrenme süreçlerinde tablet bilgisayarların kullanılması konusunda ne düşünüyorsunuz?
    - Sizce öğrenme sürecinde tablet bilgisayar kullanımı çocuğunuzun öğrenme hayatını nasıl etkiliyor/ etkileyecek?
    - Sizce bu durumun artıları ve eksileri neler?
- Çocuğunuz evde tableti dersleri ile ilgili olarak/ders dışı nasıl kullanıyor? Mümkünse örnek veriniz.

- Tablet bilgisayarları öğrenme sürecine entegre etme konusunda öğretmen ve yöneticilerin tutumlarını nasıl değerlendiriyorsunuz?
- Çocuğunuz okulunda yürütülen tablet bilgisayar uygulaması konusunda rolünüzü nasıl görüyorsunuz? Bu durum size ne gibi yükümlülükler getirecektir? Çocuğunuzun tablet bilgisayardaki öğrenme deneyimlerini takip edebiliyor musunuz?
- Sahip olduğunuz deneyimlerden yola çıkarak tablet bilgisayarı öğrenme sürecinde etkili bir biçimde kullanma konusunda neler yapılmalıdır? Önermek istediğiniz iyileştirmeler var mı? Varsa bunlar nelerdir?

Size sormadığım ama senin bu konu üzerine eklemek istediğin herhangi bir şey var mı?

Görüşmeye katıldığınız için teşekkürler.

G. CLASSROOM OBSERVATION FORM

Gözlemci_____ Öğretmen _____ Tarih_____

Sınıf Seviyesi_____ Konu Alanı _____

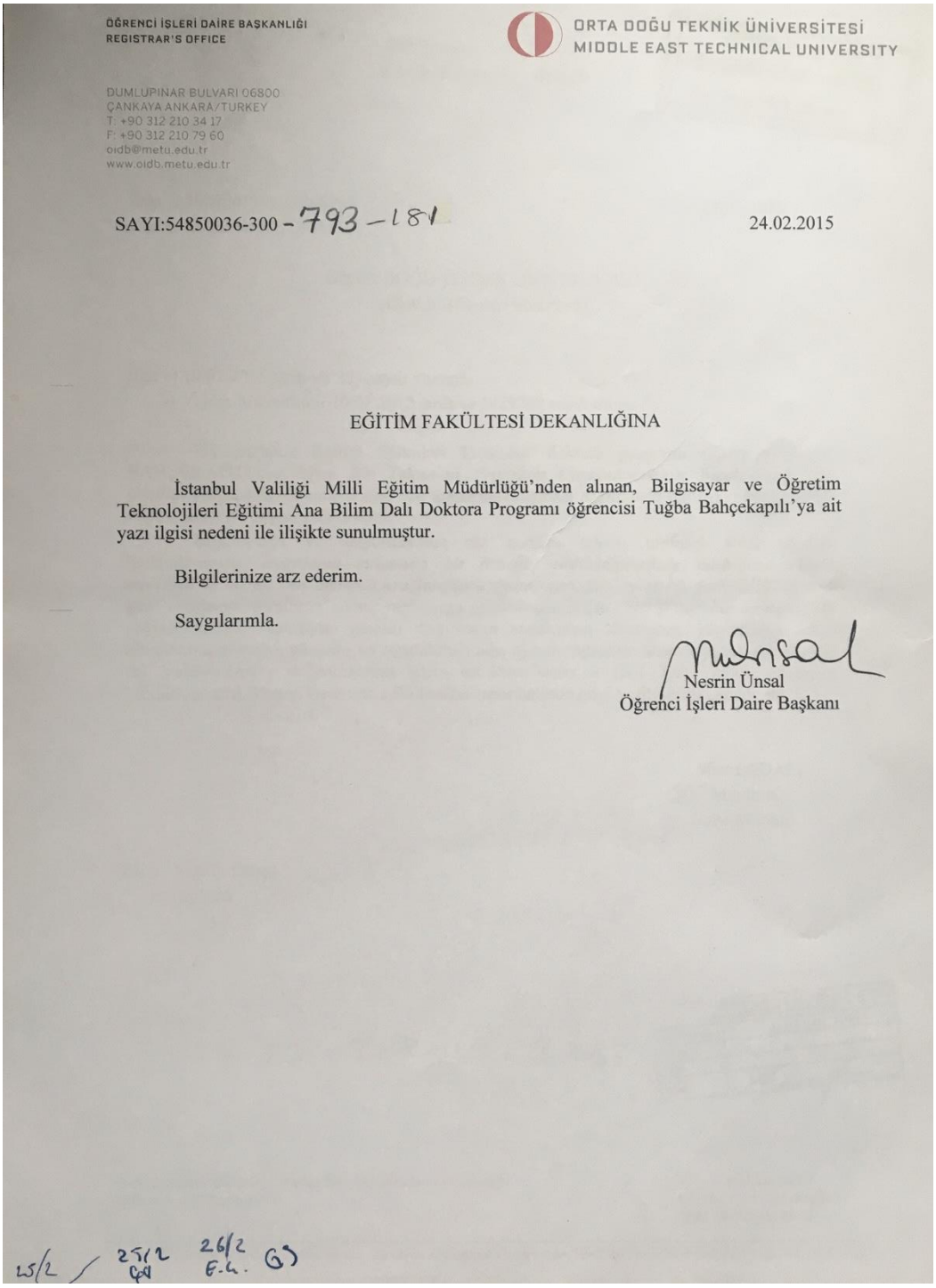
Temel Öğrenme Amaçları____

Derse katılan öğrenci sayısı_____
Teknoloji (derslikte hangi teknolojilerin olduğu ve sayıları, nasıl yerleştirildikleri) _____

Öğretim programı konu başlıkları	Ana öğretim stratejileri /öğrenme etkinlikleri	Dijital / Dijital olmayan teknolojiler

Tabletler, etkileşimli tahta ve varsa diğer teknolojilerin hangi etkinlikler için nasıl kullanıldığını ayrıntılı yazınız.	
Gördükleriniz	Düşünceleriniz
Ders sırasında ne tür sorun(lar) yaşandı ve nasıl çözüldüler.	
Gördükleriniz	Düşünceleriniz
Öğrenciler ve öğretmen arasında nasıl bir etkileşim olduğunu yazınız. Öğretmenin ne tür sorular sorduğuna ve öğrencilerin nasıl cevap verdiklerine odaklanın. Öğrenciler aktif olarak derse katılıyor mu?	
Gördükleriniz	Düşünceleriniz
Öğrencilerin birbirleriyle olan etkileşimini gözlemleyerek yazınız. İşbirliği yapıyorlar mı? Birbirlerine yardımcı oluyorlar mı?	
Gördükleriniz	Düşünceleriniz
Sağlanan teknoloji dışında başka malzemeler (çalışma sayfaları, kitap, vb.) kullanılıyor mu? Bu malzemeler nasıl kullanılıyor?	
Gördükleriniz	Düşünceleriniz

H. PERMISSION OF ETHICAL COMMITTEE



ÖĞRENCİ İŞLERİ DAİRE BAŞKANLIĞI
REGISTRAR'S OFFICE

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

DUMLUPINAR BULVARI 06800
ÇANKAYA ANKARA/TURKEY
T: +90 312 210 34 17
F: +90 312 210 79 60
oidb@metu.edu.tr
www.oidb.metu.edu.tr

SAYI:54850036-300 - 793 - 181

24.02.2015

EĞİTİM FAKÜLTESİ DEKANLIĞINA

İstanbul Valiliği Milli Eğitim Müdürlüğü'nden alınan, Bilgisayar ve Öğretim Teknolojileri Eğitimi Ana Bilim Dalı Doktora Programı öğrencisi Tuğba Bahçekapılı'ya ait yazı ilgisi nedeni ile ilişikte sunulmuştur.

Bilgilerinize arz ederim.

Saygılarımla.

Nesrin Ünsal
Öğrenci İşleri Daire Başkanı

25/2 25/2 26/2 G.Ü.

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name	: Bahçekapılı, Tuğba
Nationality	: Turkish (TC)
Date and Place of Birth	: 7 September 1984, Maçka
Marital Status	: Married
Email	: tugbabahcekapili@trabzon.edu.tr / tuba29@gmail.com

EDUCATION

Degree	Institution	Year of Graduation
Ph.D	Middle East Technical University Computer Education and Instructional Technology	2018
MS	Karadeniz Technical University Computer Education and Instructional Technology	2011
BS	Karadeniz Technical University Computer Education and Instructional Technology	2007
High School	Tevfik Serdar Anatolian High School	2002

WORK EXPERIENCE

Year	Place	Enrollment
2012-Present	Karadeniz Technical University, Computer Education and Instructional Technology Department	Research Assistant
March 2016-July 2016	Florida State University, Instructional Systems & Learning Technologies	Visiting Scholar
2007-2012	Recep Tayyip Erdogan University, Elementary Education Department	Research Assistant
2007	Ataturk Elementary School	Teacher

FOREIGN LANGUAGES

Advanced English

PUBLICATIONS

Journal Papers

1. Karal, H., & Bahçekapılı, T.(2010). New perspective to educational technology: Interdisciplinary cooperation "An example of faculties of education and engineering". *The Turkish Online Journal of Educational Technology, 9*(1), 132-142.

2. Bahçekapılı, E., Bahçekapılı, T., Fiş Erümit, S., Göktaş, Y. & Sözbilir, M. (2013). The factors affecting definition of research problems in educational technology researches. *Educational Sciences: Theory & Practice, 13*(4), 2317-2335. DOI: 10.12738/estp.2013.4.1684.

3. Keleş, E., Öksüz, B. D., & Bahçekapılı, T. (2013). Teknolojinin Eğitimde Kullanılmasına İlişkin Öğretmen Görüşleri: Fatih Projesi Örneği. *University of Gaziantep Journal of Social Sciences, 12*(2).

4. İslim, Ö. F., Bahçekapılı, T., Şendurur, P., & Cevizci-Karataş, E. (2016). *How scholars define the field of computer education and instructional technology? Turkish Online Journal of Qualitative Inquiry, 7*(3),199-223.

Manuscripts in Preparation (in order of completion)

1. Izci, B., Yalcin, Y., & Bahcekapili, T. A. Parental Decisions about Young Children's Tablet Use Comparison Between the United States and Turkey. (Blog post: http://blogs.lse.ac.uk/parenting4digitalfuture/2017/06/28/seeking-high-quality-digital-content-for-children-in-turkey/)

Conference Papers

1. Bahçekapılı, T. & Cagiltay, K. (2018). Findings From a 1:1 Technology Initiative: An Evaluation through the Lens of Fullan's Educational Change Model. *European Conference on Educational Research (ECER),* Bolzano, Italy, September 3-7, 2018.

2. Atabay, M,. Bahçekapılı, T., Çakıroğlu, Ü., & Bakır, E. (2018). Yetişkinlerin Çevrimiçi Öğrenme Ortamına Yönelik Memnuniyet Durumlarının Belirlenmesi. *12 th International Computer & Instructional Technologies Symposium*, 2-4 May 2018, Izmir/ TURKEY.

3. Izci, B., Jones, I., Yalcin, Y., & Bahçekapılı, T. (2017). Parental Decisions About Young Children's Tablet Use: A Comparison of the United States and Turkey. *European Conference on Educational Research (ECER),* Copenhagen, Denmark, August 22-25, 2017.

4. Bahçekapılı, T., & Çebi, A. (2017). Lise Öğrencilerinin Dijital Okuryazarlıkları ve Web 2.0 Kullanım Durumları. *11 th International Computer & Instructional Technologies Symposium*, 24-26 May 2017, Malatya/ TURKEY.

5. Reisoğlu İ., İslamoğlu H., Çebi A., Çolak C., Bahçekapılı T. (2016). The relationship of presence, self-regulation, and achievement in educational social networks. *Society for Information Technology & Teacher Education 2016 International Conference*, 21-25 March 2016, Savannah, Georgia.

6. Reisoğlu, İ., Bahçekapılı, T., & Çebi, A. (2015). Öğretmen adaylarının çevrimiçi bilgi arama stratejilerinin incelenmesi. *9th International Computer & Instructional Technologies Symposium*, 20-22 May 2015, Afyon/ TURKEY.

7. Ursavas, Ö.F., Bahçekapılı, T., Camadan, F. & İslamoğlu, H. (2015). Teachers' behavioural intention to use ICT: A Structural Equation Model Approach. In D. Slykhuis & G. Marks (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* 2015 (pp. 2875-2880). Chesapeake, VA: Association for the Advancement of Computing in Education (AACE).

8. Bahcekapili, T., Altan, T., Uygun, E., Cilsalar, H., & Baran, E. (2014). AECT International convention. Integrating TPACK into Technology Education: A Workshop Case with Pre-service Technology Teachers. *Association for Educational Communications and Technology Conference*, November 2014, Jacksonville, Florida.

9. Çebi, A., Reisoğlu, İ., & Bahçekapılı, T. (2014). Investigating of Online Information Searching Strategy of CEIT Pre-Service Teachers Regarding Various Variables. *8th International Computer & Instructional Technologies Symposium*, September 2014. Trakya University, Edirne.

10. Bahçekapılı, T., Cevizci Karataş, E., İslim, Ö. F., Şendurur, P., & Yıldırım, S. (2014). Computer education and ınstructional technology departments in Turkey: How faculty members and graduate students define the field?. *8th International Computer & Instructional Technologies Symposium*, September 2014. Trakya University, Edirne.

11. Baran, E., Uygun, E., Altan, T., Bahçekapılı, T., & Cilsalar, H. (2014). Investigating Technological Pedagogical Content Knowledge (TPACK) in

Action: Workshop Design Cases. *EdMedia Conference*, June 2014. Tampere, Finland.

12. Şimşek, A., & Bahçekapılı, T. (2014). Böte öğretmen adaylarının tekno-koçluk deneyimi: Blogların eğitime entegrasyonu. *2nd International Instructional Technologies & Teacher Education Symposium*, May 2014. Anadolu University, Afyon.

13. Uzun, C., Uçak, Ş. S., Demirel Uzun, F., Bahçekapılı, T., Arslan, O., & Yıldırım, S. (2012). ICT integration, innovation and change in education, professional development and teacher training. *6th International Computer & Instructional Technologies Symposium,* October 2012. Gaziantep University, Gaziantep.

14. Ursavas, Ö. F., Bahçekapılı, T., & Camadan, F. (2012). Öğretmenler İçin Teknoloji Kabul Ölçeği: T-Tam. *6th International Computer & Instructional Technologies Symposium,* October 2012. Gaziantep University, Gaziantep.

15. Karal, H., & Bahçekapılı, T. (2011). Educational technology leaders as mentors in the technology integration process: realizing roles. *5th International Computer & Instructional Technologies Symposium*, September 2011. Fırat University, Elazığ.

16. Karal, H., & Bahçekapılı, T. (2010). Efficacy of teacher training programs to develop "Technological Pedagogical Content Knowledge". *10th International Educational Technology Conference*, April 2010. Boğaziçi University, İstanbul.

17. Karal, H., Bahçekapılı, E., Bahçekapılı, T., & Bakır, E. (2009). Assessment of computer-aided learning materials developed to improve attention skills of children with attention deficit hyperactivity disorder. *3rd International Computer & Instructional Technologies Symposium*, October 2009, Karadeniz Technical University, Trabzon.

18. Bahçekapılı, T. & Baş, Ş. (2009). Prospective teachers in the process of developing computer aided material: creativity factor. *3rd International Computer & Instructional Technologies Symposium*, October 2009, Karadeniz Technical University, Trabzon.

19. Bahçekapılı, T. (2009). Information technologies formatter teachers in the process of technology integration. *3rd International Computer & Instructional Technologies Symposium*, October 2009, Karadeniz Technical University, Trabzon.

20. Karal, H., Bahçekapılı. T. & Reisoğlu, İ. (2009). The usability of testing apparatuses renewable energy resources oriented in constructivist class environment. *World Conference on Educational Sciences*, 2009, Near East University, Cyprus.

21. Sezen, G., Bahçekapılı, T., Cerrah Özsevgeç, L., & Ayas, A. (2008). Development of a computer assisted instruction material for genetics unit and evaluation of its application. *8th International Educational Technology Conference*, May 2008, Anadolu University, Eskişehir.

22. Karal, H., Bahçekapılı, T. & Bakır, E. (2008). Assessment of computer aided instruction used for concept learning in preschool settings. *International Conference on Educational Sciences*. International Conference on Educational Sciences (ICES), June 2008. Famagusta, Cyprus.

Conference Presentation (National)

1. Karal, H. & Bahçekapılı, T. (2012). A model based on collaboration among teacher candidates towards technology integration. *9th Annual Best Practices in Education Conference*. April 2012, Sabanci University, İstanbul.

2. Çakıroğlu, Ü., Akkan, Y., Bahçekapılı, T. & Bakır, E. (2008). Use of learning objects for science and technology course in elementary school: matter and energy unit. *8th National Science and Mathematics Education Congress*. Abant Izzet Baysal University, Bolu.

Master thesis

"Experiences from Collaboration between Information Technologies Teacher and Classroom Teacher Candidates Orientated by the Technology-Supported Instruction", Karadeniz Technical University, Graduate School of Natural and Applied Sciences, Computer Education and Instructional Technology, January 2011.

SELECTED HONORS and AWARDS

1. Republic of TURKEY, Ministry of National Education, Web Based Education Content Development, Ranked 3rd.

2. Prof. Dr. Cevat Alkan Award (Paper presentation at the meeting of the 5th International Computer & Instructional Technologies Symposium “Educational Technology Leaders as Mentors in The Technology Integration Process: Realizing Roles”)