World Journal on Educational Technology: Current Issues

Volume 10, Issue 2, (2018) 104-114

www.wj-et.eu

Students' views on the use of tablet computers in education

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Suggested Citation:
Semerci, A. (2018). Students' views on the use of tablet computers in education. *World Journal on Educational Technology: Current Issues. 10*(2), 104–114.

Received date October 23, 2017; revised date November 11, 2017; accepted date December 02, 2017.
Selection and peer review under responsibility of Prof. Dr. Servet Bayram, Yeditepe University, Istanbul, Turkey.

Abstract

The aim of this study was to explore high school students' views on the use of tablet computers in education. To achieve this aim, a qualitative research method was employed whereby data was obtained from 16 high school students using one-to-one semi-structured interviews and then, subjected to content analysis. The findings showed that all the participating students expressed a positive attitude towards tablet computers prior to their use in education. However, students stated that, after a short period spent on using the tablet computers, they found that tablet computers affected student–teacher and student–student interaction. A significant number of the students stated that the educational content presented in the Educational Information Network (EBA) Portal was inadequate and inappropriate to their level. Also, in terms of the learning and teaching process, the students raised several concerns. To facilitate the effective use of tablet computers in education, students made several recommendations.

Keywords: FATIH Project, tablet computers, technology integration in education, tablet computers in education.

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1. Introduction

Rapid developments in information and communication technologies (ICT) have moved societies forward into a new era, known as Industry 4.0. Technologies such as horizontal and vertical system integration, the industrial Internet of things, augmented reality, autonomous robots, cybersecurity and cloud technologies have all played an important role in this technological transformation. Such technologies have made it possible to gather and analyse data across machines using faster, more flexible and more efficient processes to produce higher-quality goods at reduced costs (Scalabre, 2018). This technological revolution has undoubtedly affected almost every aspect of our lives, yet human factors remain at the heart of this process of change. Technological advancements have also made life easier for those who keep abreast of these changes. Thus, integrating contemporary technologies such as computers, projectors, interactive boards and tablet computers into education has become an indispensable tool in training individuals, so that they are qualified to meet the requirements of daily life and the labour market.

For example, the tablet computers' potential to work interactively with other tablet computers, interactive boards and many other electronic devices has led to them being perceived as a major educational tool. The effective use of such technologies and the Internet in education will enable learners to keep pace with the latest changes and developments (Uzunboylu & Ozdamli, 2011). Given the tablet computer's potential utility in education, countries such as the U.S.A., South Korea, England, Spain, Portugal and Singapore have all conducted projects on the current use of tablet computers in education (Cetinkaya & Keser, 2014; Gokcearslan, 2017; Ozdamli & Tavukcu, 2016; Pamuk, Cakir, Ergun, Yilmaz & Ayas, 2013; Soffer & Yaron, 2017).

The Ministry of Development's Ninth Five-Year Development Plan clearly describes its policy on the use of ICTs in education as; *'developing and disseminating methods to enable the use of ICTs in lessons'*. Subject to this policy of technological integration, several projects have been implemented to enhance the use of ICT technologies in education (Kalkinma Bakanligi, 2018). In line with national education policies, the Movement of Enhancing Opportunities and Improving Technology (FATIH) project, considered as the most comprehensive project in the world on the integration of technology into education, has been initiated by the Ministry of National Education (MoNE). The project encompasses several services such as: hardware, which includes interactive boards, tablet computers and printers; a secure broadband Internet connection in all classrooms; providing e-content via the Educational Informatics Network (EBA) platform; assistance services and teacher training. The FATIH project aims to provide every student with the best education, the highest quality educational content and equal opportunities in the use of ICT (EBA, 2018; MoNE, 2018a, 2018b).

Several research studies have been carried out within the scope of the FATIH project. These have demonstrated numerous benefits such as improving schools' ICT infrastructure (Aydin, Gurol & Vanderlinde, 2016); increasing the positive perceptions of students towards tablet computer use (Eren, 2015); portability; facilitating individual learning and accommodating different learning styles; increasing students' motivation and success; making learning more enjoyable (Kirali, 2013) and increasing students' interests (Salman, 2013). MoNE has begun to distribute tablet computers based on the successful results of a pilot project. The ministry's aim is to allocate 10,600,000 tablet computers to all secondary school teachers and students nationwide by 2019. When the project is completed, 40,000 schools and 620,000 classes will be connected through a secure broadband Internet connection (MoNE, 2018c).

There are several interconnected factors influencing the successful use of tablet computers in education. Aside from infrastructure, software and hardware aspects, other issues include national education policies, appropriate implementation strategies and the attitudes and perceptions of both teachers and students. However, qualitative research by Pamuk et al. (2013) has found that the use of tablet computers in classrooms is extremely low. Furthermore, other research findings have shown that tablet computers can adversely affect students' motivation and they can become a means of

entertainment used to listen to music, watch movies and play games rather than its use as educational tool (Aksu, 2014; Ayvaci, Bakirci & Basak, 2014; Cetinkaya & Keser, 2014; Cukurbasi, Isbulan & Kiyici, 2016; Oz, 2015; Pamuk et al., 2013; Yazar, 2015). Moreover, Duran and Aytac (2016), found that the use of tablet computers and interactive boards can cause health problems such as headache and eye fatigue. Kaysi and Aydin (2014) also argued that limitations arising from both educational content and the interactive dimension could reverse students' positive expectations regarding the use of tablet computers in education.

Therefore, although the FATIH project is one of the world's most comprehensive technology integration projects, more research is needed that focuses on the perspectives of tablet computer users themselves. This is essential if the best possible educational outcomes are to be achieved and the project is to remain sustainable (Bardakci & Keser, 2016; Cetinkaya & Keser, 2014; Cukurbasi et al., 2016; Duran & Aytac, 2016). This study will, therefore, explore high school students' views on the use of tablet computers in education. To achieve this, the following research questions will be addressed.

1. How does the use of tablet computers affect the attitudes of students?
2. How are tablet computers used in the learning and teaching process?
3. How does the use of tablet computers affect interaction?
4. What problems do students encounter?
5. What recommendations do students make to ensure tablets are used more effectively?

2. Method

In this section, the research method, study sample, data collection technique and data analytic process will be presented.

2.1. Research method

In accordance with the objectives of the study, a qualitative research method was employed. Observations and interviews are some of the data collection methods used to explore perceptions, cases, facts and events in a natural, realistic and holistic way (Yildirim & Simsek, 2016). In this research, a one-to-one interview technique was used as this a powerful way of accessing participants' perceptions, emotions and experiences in relation to the research topic (Maxwel, 1996; Yildirim & Simsek, 2016).

2.2. Study sample

The study sample consisted of 16 high school students. In total, 75% (12) of the participating students were males and 25% (4) were females. All the students attended high schools in Ankara and all received tablet computers as part of the FATIH project. A purposeful sampling method, frequently employed in qualitative research (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2012), was used to assign students to the sample. The number of students recruited was based on the following criteria: the focus of the research, the amount of data and the theoretical sampling criteria (Yildirim & Simsek, 2016).

2.3. Data collection

A semi-structured interview format was used to collect the data. This technique is preferred because it avoids the limitations of questionnaires, facilitates in-depth, systematic and comparable information gathering on the topic being investigated, and allows for flexibility in the interview process. The interview was prepared by the researcher based on the relevant literature. The interview schedule was then presented to two experts on the subject matter to ensure content validity (Yildirim & Simsek, 2016). The interviews were then conducted on a one-to-one basis. If more in-depth

information was required during the interview process, alternative questions and probes were used. Careful attention was paid to issues that needed to be taken into consideration to ensure the interview process was effective and productive (Yildirim & Simsek, 2016). Thus, at the beginning of each interview, interviewees were informed about the aim of the study. They were also informed that their names and the audio recordings would be kept strictly confidential and would only be used within the parameters of the research. The questions were asked in speech-form and maximum efforts were made to ensure the neutrality of the researcher. Interviews were conducted in pre-selected environments convenient for voice recording. The interviews were recorded using the audio recording feature of a mobile phone. The researcher took care not to interrupt the interviewees and to avoid asking leading questions. The shortest interview lasted about 7:44 minutes, while the longest one lasted 31:55 minutes.

2.4. Data analysis

The audio recordings were then transferred to a computer and transcribed verbatim. Subject to an initial examination, some of the research data were extracted and content analysis was used to analyse the data. In using this approach, a framework for data analysis was established from the research questions, the conceptual framework of the research and the features that emerged through the interviews. In line with the requisite coding procedure, the data were then analysed and coded. This meant that the data were categorised according to codes and themes, following which the findings were then interpreted (Yildirim & Simsek, 2016). Within the findings, direct quotations from the interviewees used to support the data were coded as follows: Student 1 = S1, Student 2 = S2 and so on.

3. Findings

Based on the research framework and the results of the content analysis, the data were categorised into five themes. These are presented below (Table 1).

Table 1. Emergent themes and codes

1. Views on attitude change	2. Views on using TPCs in class	3. Views on interaction	4. Problems	5. Suggestions
Positive or	Purpose of use	Student–teacher interaction	Technical problems	About effective use
High expectations	Inconsistent use	Student–student interaction	Internet access	About teachers' training
Neutral	Teachers' skills–qualifications	EBA Contents	Slow Internet connection	About students
Negative	Lack of information	E-books	Fear of tracking	About EBA content
Disappointment	Motivation	Other training sources	Effects on health	About Internet use
Hope				Other suggestions

3.1. Students' views on attitude change before and after tablet computer use

Most students (94%, *f* = 15) stated that their attitudes towards using tablet computers in education were positive prior to their distribution. The findings also revealed that 87.5% of the students harboured high expectations that tablet computers would be of use in the learning and teaching process. Some students expressed their views about this issue as follows;

S2: 'I was excited when I heard that we were going to get tablet computers. I was delighted to witness the developments in the country. I was also hoping that these improvements soon will have an impact in our education system'.

S7: 'Prior to the distribution of tablet computers, I had great expectations and strongly believed that tablet computers would be useful and increase my success. It was a very important issue, especially for me, since I grew up in a school environment where chalk and blackboards were used instead of interactive board and tablet computers'.

All the participants (f = 16) stated that they felt disappointed shortly after starting to use tablet computers. They expressed their feelings as follows:

S1: 'I am sorry to see that nothing has changed since using a tablet computer for a while'.

S2: 'I would have liked the project to be successful …. When tablet computers were distributed to us, I was overly excited. While I was expecting to follow the tutorials and to watch relevant lesson videos on my tablet, I was frustrated when I found myself playing online games with my friends during the lessons'.

S12: 'I am sorry to say that I have lost all my hopes in a very short time. This way of using tablets in education cannot contribute anything to my success'.

S15: 'I was in middle school when the tablets were started to be distributed. Nabi AVCI, Minister of National Education at that time, participated in the tablet distribution ceremony at our high school section. At that time, a student's dialogue with the MoNE appeared on TV news as; 'Dear Minister, we are so excited about the use of tablet computers in education, and are expecting them to be distributed to us as soon as possible, so when are we going to receive our tablets?' I am the person who asked this question. I was still excited when the tablet computer was deployed after 4 years, but unfortunately after a few months of using it, I was disappointed. This is because it has become an indispensable Okey game tool for my dad, and I am really sorry'.

The analysis also revealed that students overly anticipated the benefits of tablet computers. They stated that once the tablets were distributed, they would no longer need to carry books, notebooks and schoolbags. However, after a short period of time, students' extreme expectations were replaced with disappointment. For instance, 93.75% (f = 15) of the respondents broadly supported the view that '*they had to add a tablet to their bags, while waiting to get rid of books, notebooks and schoolbags*'.

The findings also showed that, even though tablet computers did not meet students' expectations, half of them were still hopeful that the project would be successful if they were used correctly. For example, one student stated that; '*I believe the project would be successful if administrators, students and teachers take all kinds of responsibilities and use them thoroughly. Since the government has invested a lot in this project I do not want the investment to go to waste*' (S7).

3.2. Students' views towards the use of tablet computers in the learning and teaching process

Three-quarters of the participating students (f = 12) stated that they did not use tablet computers in class. Another important finding of the research concerned the purpose of using tablet computers. All the students (f = 16) stated that they used tablet computers to play games. Additionally, 56.25% of the participants (f = 9) noted that bringing tablet computers to the class and using them in the lessons were prohibited by teachers. Students expressed their views about this as follows:

S8: 'We never used tablet computers in the class in any way, I was not allowed to bring it to class. However, prior to the distribution of the tablets, we were told that books and notebooks would not be used, but we have used the book and the notebook. Only tablet computers were never used in the class'.

S2: 'Some of the teachers did not want to see the tablet in the classroom, while others were asking us to open digital books on our tablets'.

The principal reason for the uncertainty around the use of tablets was a lack of information on how to use them. A significant number of students (f = 12) felt they were not adequately informed about how to use the tablets, both in and out of class. They also added that there was no cohesion in practice. Students stated that the only information they received was on how to download digital copies of the textbooks from EBA. A sample of students' views on the inadequate information given to them is presented below:

S3: 'The fact that teachers did not correctly inform us about the use of tablets prevented us from using it effectively. We experienced a short period of uncertainty when the tablets were distributed, then found out ways to break passwords and enter prohibited sites. We started to download and play games. From then on, no information on the use of tablets has been provided'.

S7: 'If you give tablet to a student at the age of 16, and do not inform them properly about how, where and when to use it, you cannot expect them to use it properly. Thus, I have downloaded games and I play games'.

62.5% of the respondents (f = 10) stated that their teachers possessed inadequate knowledge about technology and how to use tablet computers during the lessons, while 68.75% (f = 11) reported that tablet computers negatively affected their interest and motivation in the classroom. For example, they stated that:

S2: 'It was not possible for a teacher, who does not even have a smartphone, to use tablet computers effectively'.

S12: 'When the tablets were delivered for the first time, teachers started to use tablets as eagerly as we did, but it was funny that sometimes teachers were asking assistance from us about the use of tablet computers'.

3.3. Students' views towards interaction during the learning and teaching process

The findings showed that tablet computers were used in some lessons but not in others. Subject to the students' limited experiences with these computers, 50% (f = 8) of them reported that the use of tablet computers had a negative effect on student–teacher interaction in the classroom. Although students' attention is an important issue during the learning and teaching process, the research findings revealed that the use of tablet computers can adversely affect their focus and attention during lessons. Regarding this issue, students commented that:

S2: 'While using tablets in the lessons, both the teachers and the students fully concentrated on the tablets in front of them. Therefore, communication was negatively affected in the lessons. This situation was reducing our interest in the lessons. Consequently, most of us were playing online games during the lessons'.

S8: 'Even if the tablet was in the schoolbag, it was negatively affecting my attention because my mind was constantly on tablets and games'.

A significant number of participants, (f = 12) expressed a view that the use of tablet computers negatively affected student–student interaction and changed students' discussion habits. They stated that, before the tablet computers were distributed, students used to chat with each other during breaks, but once the computers became available they started to play games whenever they had any free time. Some of the students expressed their views ironically about the negative influence of tablet computers on student–student interaction both in and out of class, as shown in the following comments:

S9: 'In online games, there was a lot of talk about who made the foul, who played the game, is there any new game or who break a new record, etc. The distribution of the tablets had a negative effect, and I regret to say that I could not able to stop playing game for hours both at school and at

home. I would prefer to study a 1-hour lesson instead of playing games with my tablet for at least 5 hours every day'.

S14: 'Once the tablets were distributed, in the first few months some of our teachers, especially geography and mathematics teachers did their best to use it during the lessons. Even during this period of time, a group of friends were intentionally sitting in the back rows to watch movies or play games'.

S16: 'Tablet computers had a positive effect concerning student–student interaction, especially in terms of meeting new friends while playing online games. Thanks to the online games, I even made new friends (implying a girlfriend). The teachers were not able to realise when we were playing games, because we were choosing games that gave the impression of turning pages'.

Regarding student-lesson material/EBA interaction; 87.5% (f = 14) of the students stated that EBA was a good idea and that they had logged in to the EBA platform at least once. However, almost all the participants (f = 15) found the EBA content to be inadequate and they stated that they could not find enough content to interest them. Although 75% of the participants (f = 12) stated that they were sufficiently informed about the EBA contents, 50% (f = 8) stated that they preferred to use YouTube channels and other educational sites to watch lecture-based videos. For example, one student commented that:

S6: 'We have downloaded the PDF books from EBA based on the direction of our instructors. For a while, we used PDF books in lessons through our tablets, and some of our teachers solved the question through EBA. Apart from this temporary desire which lasted a month or two, our teachers never used tablets in class'.

3.4. Issues considered a problem from students' point of view

Students' responses indicated there were many problematic issues arising from the use of tablets in education. These include the following:

- Anxiety about the breakdown of tablets—87.5% (f = 14)
- Battery and charging problems—87.5% (f = 14)
- Slow Internet connection—81.25% (f = 13)
- Touch screen and typing problems—75% (f = 12)
- Anxiety about being chased through programs and tablet camera—68.75% (f = 11)
- Unable to connect to the Internet—43.75% (f = 7)
- Rapid degradation of tablet pens—37.5% (f = 6)

Expanding on these issues, students expressed the following views:

S16: 'The keyboard was a very serious problem and note taking on a standing tablet is not a good idea'.

S2: 'Because of the uncertainty about whether tablet computers would be collected or not when we graduate and the contract that we signed was putting pressure on us, we refrained from using it. On the other hand, note taking was really difficult on tablets, we could not use it as we wish, thus, even for note taking we preferred our smart phones. The touch screen was problematic, the tablet pens were bad, and I had trouble getting notes because the tablet pens quickly deformed'.

3.5. Students' recommendations regarding the effective use of tablets in education

Students' responses mainly focused on inadequate information about the effective use of tablets in class. Thus, most of the students (81.25%, f = 13) believed that providing appropriate information about how, when and where to use tablets could increase their effectiveness. Linked to the previous suggestion, 75% of the participants (f = 12) believed that teachers should be trained in the use of

tablet computers. Additionally, 56.25% of the participants (*f* = 9) proposed setting up a system where they can view and, if needed, save lesson notes to their tablets from an interactive board or from teachers' tablet computers. Some students explained that they had experienced such a system, but current practice meant that a lack of saving options from interactive boards rendered tablet computers useless. Similarly, students proposed the use of a learning management system that would allow teachers and students to access and share announcements, assignments, homework, projects and course resources.

Regarding students' suggestions, 75% (*f* = 12) stated that EBA content could be enriched to appeal to students, while 50% (*f* = 8) stated that they prefer interactive books to PDF books. Furthermore, half of the participants (*f* = 8) felt that the prohibition of access to useful training sites where high-quality videos and resources were available should be removed. Some students (25%, *f* = 4) also argued that laptop computers were more beneficial because due to their superior writing functionality. Students' opinions on this issue were as follows;

S7: 'As it is used in Internet cafes, a program should be set up where a teacher should be assigned as administrator. This system should allow teachers to see students' tablets and vice versa when logged in. This system should also enable students to save notes from teacher's tablets to their own tablets. This will let teachers and students share the assignments and homework through this system'.

S2: 'I was not able to find the right content on EBA, but I have found a teacher on YouTube that appeals to me. For instance, I admire some of the teachers' lecture style, but I have to use my smart phone to follow their lesson videos from YouTube. For this reason, hosting the most preferred teachers' videos or other training materials on EBA can be an option. The other option is to remove bans on accessing such useful training sites'.

4. Discussion and conclusion

In this research, the aim was to explore the views of high school students on the use of tablet computers in education. The research findings show that, prior to the distribution of tablet computers, students' attitudes towards tablet computer use were positive and they had high expectations. However, soon after they began to use their tablets, their expectations were replaced with disappointment. Pamuk et al. (2013) found similar results in their study, in that students' high expectations at the beginning of the project decreased in almost 3 months. There are many reasons for this attitude change such as a lack of required skills, knowledge and desire about tablet computers; a lack of sound policies, strategies and instructions on the effective use of tablet computers in lessons and inconsistent teaching practices.

Many studies have shown that teachers must have sufficient knowledge and skills regarding the use of technological tools for the FATIH project to be successful (Ayvaci et al., 2014; Daghan, Kibar, Akkoyunlu & Atanur-Baskan, 2015; Kayaduman, Sirakaya & Seferoglu, 2011). Research findings have also revealed that tablet computers were often used for extracurricular purposes such as games, music and entertainment, both in and out of class. In general, many studies have shown that tablet computers have ended up being used as entertainment tools rather than being used as teaching materials (Cetinkaya & Keser, 2014; Daghan et al., 2015; Pamuk et al., 2013; Yazar, 2015). Thus, comprehensive in-service training is recommended for teachers.

Another finding that affects students' attitudes towards the use of tablet computers in education was the immense expectation that was created before the tablet computers were deployed. Prior to their distribution, students were motivated by the expectation that they would be freed of the need to carry books, notebooks and schoolbags. They expected to change to a new system where learning would become more enjoyable. In other words, tablet computers were perceived as magic technological tools that would provide a solution to many educational problems. However, after a short period of use, tablet computers were not able to meet these expectations and students became

frustrated. If used properly, technological tools such as computers, tablets, projectors and interactive boards do have the potential to solve many educational problems. However, the potential inherent within such tools should not be overemphasised.

Contrary to expectations, the current research findings show that all the students perceived tablet computers as a gaming device, even having them in their schoolbags, which negatively affected their attention and motivation. Many other research studies support this finding (Cetinkaya & Keser, 2014; Pamuk et al., 2013). For instance, in Daghan et al. (2015), one teacher commented that *'Tablet computers were not useful and distracting students. They were constantly playing games in the classroom'*. In contrast, other researchers have found that the integration of technology increased students' motivation and interest towards the lesson, contributed to the presentation of the course contents and positively affected educational activities (Ozdamli, 2017; Tufekci & Akdeniz, 2016). Further research is, therefore, required to determine the effects of different factors.

Research has also shown that tablets are perceived as digital bookstores, yet students in the current study found the EBA contents to be inadequate and inappropriate to their learning needs. Ozoglu, Ozoglu and Kaysi (2013) found similar results and pointed out that delivering PDF books rather than hardcopy books is an ineffective method and wastes time. Therefore, as suggested by most of the students in this and in many other research studies, interactive books may be more useful than PDF books (Kaysi & Aydin, 2014; Ozoglu et al., 2013; Pamuk et al., 2013). Moreover, to appeal to students, the following suggestions could be implemented: enriching EBA content and aligning it to different educational levels, hosting high quality multimedia materials either developed by subject matter experts or obtained from external sources, removing the ban on Internet access to external training sites and providing alternative training materials and enriched books.

The current research findings have illustrated that there are also many practical problems arising from the use of tablet computers in education such as: feeling anxiety about the breakdown of tablets, battery and charging problems, slow Internet connectivity, unable to connect to the Internet and touch screen and typing problems. Many researchers have noted similar problems (Cetinkaya & Keser, 2012; Elyazgi, Mahrin, Rahim & Imtiaz, 2014; Pamuk et al., 2013; Tufekci & Akdeniz, 2016). In some research studies, the use of tablet computers and interactive boards has been associated with eyesight problems caused by radiation (Cetinkaya & Keser, 2014; Ozdamli & Tavukcu, 2016; Yazar, 2015). However, the current research findings show that students who believe in using computers will have no adverse effect on their health.

This research study also found that students were anxious about being chased by pre-installed programs and tablet cameras. It is assumed that this anxiety is a response to strict warnings aimed at preventing malicious use. Given that an inherent paradox exists in the dual concerns surrounding the malicious use of tablet computers and student anxiety, administrators and teachers should be advised to use more explicit language when informing students.

In conclusion, this research has revealed important findings pertaining to students' experiences when using tablet computers. However, the generalisability and usability of the research findings is limited due to rapid changes in software, hardware and practices over time. Moreover, the sampling method used in this research is an important factor that limits the generalisability of the findings. These should, therefore, be considered as examples and experiences that are useful in understanding similar situations. The success of one of the world's most comprehensive projects on the integration of technology into education depends on the optimal use of the potential of tablet computers. More research is, therefore, needed to develop strategies to improve the effectiveness and sustainability of the project.

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