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Determination of Secondary School Students' Attitudes towards Tablet PC Supported Education

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Abstract: The aim of this study was to determine the attitudes of students towards tablet supported education and its effects on its usability. The study was designed as a one-group semi-experimental model using pre-test and post-test. The study group consisted of 319 students in 6th and 9th grade studying at a private college, where 160 of the students were females and 159 of them were males. Frequency, Paired t-test and Independent t-test were applied to analyze the data. The pre-test and post-test results indicated that there were significant positive differences in students' attitudes toward tablet supported education, students' attitudes towards usability of the tablets in education and also in their general attitudes. There was a significant difference between the mean scores of the female and male students' attitudes towards tablet-supported education. However, there was no significant difference between the students' attitudes towards the usability of the tablet and in their overall attitudes.

Key words: Mobile Learning; Tablet Computer Supported Learning
Categories: L.1.2, L.1.5, L.2.0, L.2.2, L.2.3, L.2.5, L.2.7, L.3.0, L.3.1, L.3.2, L.3.4, L.3.5, L.3.6, L.3.8, K.3.1

1 Introduction

In modern society, people's technological understanding has become more important due to changes brought by the innovation and development of informatics technology. In every field, skills for technology use and technological based knowledge are required. It is an unquestionable reality that people are the most important aspect of society and education's essential aim is to raise these people using the most up-to-date and correct information.

Society in the 21st century is reaching in developing our understanding of learning and knowledge to the point where we cannot ignore the necessity of the interactive learning environment and digital culture. The computer, which has enabled competitiveness and access to the Internet among other things, can provide learners of every age with the opportunity to reinforce their interactive learning, starting from their pre-school years. In particular, the computer and the Internet enable learners to follow the latest changes and developments from around the world. Rapid developments in mobile technology allow learning to occur regardless of the time and place. Within the framework of online and offline (distance learning), it plays an

important role for new learning methods. Tablet computers, which are accepted as one of the leading mobile or wireless web technologies, can work interactively with other devices such as tablets, computers, smart boards, other wireless boards etc. [Uzunboylu & Ozdamli, 11]; [Garcia Laborda, Magal Royo, & Bakieva, 17] In this regard, by providing interaction between human-technology and technology-technology, it is possible to contribute to cooperative learning with the support of technology.

Moreover, the permanence of knowledge acquired during lessons can be reinforced by the introduction of 3D versions of animations, sounds and videos. Tablet computers have been determined to be effective devices that can provide new approaches as well as offering a different perspective on the field of education. [Garcia Laborda, & Litzler, 18] Also, the use of and demand for tablets has increased in the learning-teaching environment [Gbenga, Victor, Godspower, Solomon, & Janet, 13]; [Mulholland, 11];[Stickel, 09].

In terms of the usability and approachability of mobile devices, especially for application and exercise activities, they can be successfully used outside of the classroom and are not solely restricted to classroom or lesson time [Calle-Martínez, Rodriguez-Arancón, & Arús-Hita, 14]; [Corlett, Sharples, Bull, & Chan, 05]; [Ozdamli, 11]; [Saran, Seferoglu, & Cagiltay, 09]; [Schaal, Grübmeyer, & Matt, 12]. Recently, there has been increased interest in the use of tablets as they create an environment where students' learning processes can be much faster [Banister, Bloom, & Rosenberg, 10]; [Enriquez, 10].

When the studies about education supported by tablets around the world are considered, one can see that there has been a wide range of studies about it in many countries. In a study carried out by Shepherd and Reeves at Abilene Christian University in the U.S., they reached the conclusion that tablet computers have a positive effect on students' academic success [Toppo, 12]. Among these, "Act for Increasing Opportunities and Breakthrough of Technology" (FATIH) was the most popular study. In terms of its scope, the aim was to completely change the educational standards of 620 classrooms around Turkey. The Turkish Republic Ministry of Education and Ministry of Transport cooperatively are running a project where teachers will be expected to adapt technology as part of their lives. In addition to this, it is stressed that safe Internet use will become a part of the new educational system. As part of the educational process, interactive content such as presentations, videos and pictures will be included in the new curriculum. In this project, which will be introduced progressively across the country, the aim is to apply it to each learning stage starting from pre-school [Tuncay, 11]. Under this umbrella, pilot studies have already begun and positive results have started to emerge [Pamuk, Ergun, Cakir, Yilmaz & Ayas, 13]. In terms of scope, another wide inclusive study was carried out in Korea at the end of 2011, also as a FATIH project. In the first stage of this project, which also was introduced progressively, it was aimed to have tablet-computerized education in 489 schools by 2012. By 2015, the plan is to introduce lesson contents with interactive digital content for both primary and high school students [Choi & Lee, 12]. In addition, in the U.S., there has been a gradual conversion to digital lesson books and the work to transition to tablet computer supported education has gained speed since 2012 [Toppo, 12]. Furthermore, since 2015 in Florida, the goal of using only digital lesson books in schools has become a reality [Ni, 13]. Looking at a

worldwide perspective, in some countries (U.S., Portugal, UK, Korea, and Spain), pilot implementation for the transition to tablet computer-supported education has already begun. However, in none of these countries has there been a study where this transition includes both primary and high school students [Cetinkaya and Keser, 14].

There have been many research studies about pilot implementations within the FATIH project [Horzum & Bektaş, 14]. The most prominent study was carried out by Cetinkaya & Keser in 2014 titled "the Problems that Teachers and Students experience during Tablet Computer Use and their Solutions". In that study, the problems that teachers and students encountered while using tablet computer in the education process were discussed. The study groups were three different education institutions: Anatolian High School, Science High School and Vocational High School. The significance of this study was to put the emphasis on the problems they were already experiencing instead of possible problems that could occur due to active use of tablet computers in education. The most important problem that had been encountered in the study was that the teachers and the students said that they were both using those devices for purposes other than education. In particular, the teachers stated that students used those devices to listen to online music, watch films/videos and especially to play games. The students and teachers also experienced similar problems to each other. For instance, there were some concerns about diminishing interest in textbooks due to tablet computer use. Another concern was the negative effect on the in-class study environment as well as a decrease of actual interaction in the classroom. This demonstrates that there is a need for employing experts in order to realize software itself, tablet computer use and what more can be done with these tablets.

In a study carried out by [Kurt, Kuzu, Dursun, Güllüpınar, & Gültekin, 13], pilot studies were initiated in different regions of Turkey (Ankara, Uşak, Karaman and Mersin). In that study, the aim was to determine teachers' perspectives regarding this project. By looking at the effect of the project on the teachers, on the one hand some teachers claimed that there was an increase in the interaction with students and their workload had lessened. On the other hand, while the interaction with students increased there was no change for other teachers and they experienced an increase in their workload. In addition to this, they also mentioned that they had technical problems. Similar findings have been found in many studies. [Cetinkaya & Keser, 14];[Tataroglu & Erduran, 10]; [Türel, 11].

In Özdemir & Bozdoğan's [2014] study with the title "An Analysis in terms of Different Variations of Science Teacher' Opinions about the use of Tablet Computers' in the Classroom: Giresun Region Sample", they researched the opinions of Science Teachers' regarding the usability of tablet computers in science lessons. At the end of the study, a large number of the teachers who participated (83%) felt positive about using tablet computers in their lessons. Furthermore, 79% of teachers stated that they want to have in-service training for using this new technology. Nearly all the teachers claimed that the Science Lessons that were supported by visual aids were more memorable and they helped students to understand abstract concepts easier. They also mentioned some negative aspects, which were parallel with other studies about their positive sides. The biggest constraint was the desire for using tablet computers outside the classroom. As well as this, they stated that the students

were sometimes stuck on social networking sites during the lessons and therefore they were not paying enough attention.

In this article, information about studies on education via tablet computers in both Turkey and around the world has been provided. It is apparent there has been no study in our country related to this topic. As mentioned before, education supported by tablet computers only began in North Cyprus with a pilot study in a private college in the 2013-2014 Spring Semester. For this reason, there has been no previous study on the topic and therefore the need has arisen to carry out such a study. In this study, which will lead the educational field in terms of tablet computers; the "Tablet Supported Education Attitude and Usability Scale", developed by [Uzunboylu and Tuğun, 16], was used. The scale was formed of two aspects. The first one was; "Attitudes towards tablet computer aided education" the second aspect was; "The usability of tablet computer aided education". The aim of this study was to determine the attitudes of students towards tablet supported education and their usability in education. In order to achieve this aim, the three following questions were determined:

1. Is there a meaningful difference between the students' attitudes towards the learning environment in their pre-study and post-study tests?
2. Is there a meaningful difference between the students' opinion towards the usability of the environment in their pre-study and post-study tests?
3. Do the students' attitudes towards tablet-supported education differ according to gender?

2 Method

In this section, there are definitions for the study model, study group, data gathering method and analysis of this data.

2.1 Research Model

The study was designed as a semi-experimental model in order to determine the difference between the pre-test and post-test scores for the attitudes of students in year 6 and 9 at a private college regarding tablet-supported education and its usability.

2.2 Study Group

The study group consisted of 319 students from 6th and 9th grade studying at the college. There were 160 female students (50.2%) and 159 of them were males (49.8%). As can be seen, the gender of students was evenly distributed. The average age of the students was 13.1 (min 11, max 15, standard deviation was 1.6 years). As the students were given tablet computers at the beginning of the semester, they were not asked the question "Do you have a tablet?" Instead of this, they were asked "Have you ever used a tablet computer before?" A total of 260 (81.5%) of the students gave the answer "Yes" and 59 (185%) of them said "No". The distribution of the regions they lived in was as follows: 204 (64%) Nicosia, 81 (254) Kyrenia, 18 (5.6%) Morphou and 16 (5%) Famagusta. The students were asked "Is there an Internet

connection in your house and if yes, what kind of connection is it?" All of the students replied that they had an Internet connection in their homes. Those who had a Wi-Fi connection were 237(74.3%), 69 (21.6%) had ADSL and 13 (4.1%) had 3G. In answer to the question "How many hours do you connect to the Internet per day?" 104 of the students (32.6%) said 1 hour or less, 144 (45.1%) said 2-3 hours and 71 (22.3%) said they connected for 4 or more hours.

2.3 Applications used in Tablet Computer Education

In the lessons supported by tablet computers, some paid applications were used, generally with the agreement of the Apple Store. The paid applications were provided by the school to the students and they were downloaded to their tablets. Applications that were used actively were:

- Showbie (virtual class environment),
- Teacherkit (allows the teacher to check attendance, homework, punctuality of students in a virtual class environment),
- Annotating pdf (makes it possible to take notes on pdf)
- Goodreader (helps to download pdf files from dropbox etc., which students can then share and also they can note anything they want on them),
- Explain Everything (it helps with screencasting on tablets),
- iBooks (helps students to create their own books/ lesson notes etc...),
- ePrint(printing via wireless connection)
- Note Plus (helps to take notes via either handwriting or keyboard, fast and easily).

Students mostly used the Showbie app. The following is a screenshot of a lesson that uses Showbie.

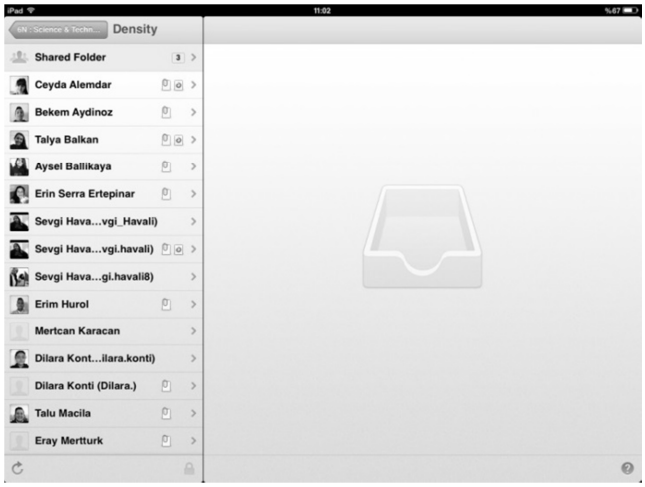

Figure 1: Screen image with Showbie application

3 Application

The application was used in every lesson found in the curriculum for years 6 and 9 at the college during the 2013-2014 Spring Semester. Students and teachers used the tablet computers actively In and out of the classroom with the applications mentioned in the above list. The lessons were held with a constructive learning principle during the semester. The application where data/files were shared enabled more interactive lessons due to the accessibility of Internet access throughout the school.

At the beginning of the semester, the "Tablet Supported Education Attitude and Usability Scale" scale developed by [Uzunboylu and Tuğun 16], was applied to the students. While the applications such as annotating pdf, iBook, Explain Everything, animations and videos were used in the lessons, activities were organized on the Showbie Virtual Class Environment outside the school. Students studied on the applications for project based learning and cooperative learning, according to the lesson contents. The scale was applied again as a post-test at the end of the semester.

3.1 Data analysis and interpretation

The scale developed by the researchers was called "Tablet Supported Education Attitude and Usability Scale". The Cronbach Alpha value for the scale was α =.914. There were 17 items on the scale and it had two dimensions. The first dimension was "Attitudes towards tablet computer aided education (Cronbach Alpha α =.920)" and there were eight items in this dimension. The second dimension was "The usability of tablet computer aided education (Cronbach Alpha α =.921)" and there were 9 items on that dimension. The points 1 (completely disagree), 2 (disagree), 3 (neutral), 4 (agree), 5 (completely agree) were given to each subject and the data was analyzed by SPSS 16. The data was illustrated on a table as percentage (%), average (x), frequency (f) and standard deviation (SS) {SD}.

4 Results

In this part of the study, data was analyzed and the results were interpreted by illustrating them on a table.

In order to determine the attitudes of students towards tablet pc supported education in pre-study and post-study, paired t-test analysis was performed. The obtained findings are illustrated in Table 1.

	N	Mean	SD	sd	t	P
Pre-test	319	3.45	1.10	318	-15.26	.000
Post-test	319	4.31	.37			

Table 1: The Attitudes of Students towards Tablet Supported Education

According to the findings obtained from the analysis in order to determine the post-study situation and the students' attitudes towards tablet supported education, their attitudes showed a meaningful positive increase (t=14.31, p<.05).

When we evaluate the findings, we can say that the students' attitudes towards tablet-supported education were positively affected. In the pre-study test, the students' attitudes revealed doubt, but in the post-study test, their attitudes were more positive. They used some statements such as: "in the lessons with tablet computers I can ask questions more easily (pre-test mean: 3.25, post-test mean: 4.25)"; "the use of tablet computers during the lessons helps us to remember the information more (pre-test mean: 3.22, post-test mean: 4.20)"; "the use of tablet computers increases in and out of class interaction (pre-test mean: 3.61, final test mean: 4.38)".

In order to determine the students' attitudes towards the usability of pc tablets and their applications that were used during the semester, paired t-test analysis was applied. The analysis findings obtained are illustrated in Table 2.

	N	Mean	SD	sd	t	P
Pre-test	319	3.61	1.08	318	-13.92	.000
Post-test	319	4,37	.47			

Table 2: The Opinions of Students towards the Usability of Tablet Supported Education

When examining the data Table 2, one can see that by the end of the semester the students' attitudes towards the usability of this new technology have increased. (t=14.67, p<.05). This result can be explained by the effective use of applications that satisfied the needs of the students.

When evaluating the findings, one can see that the students' attitude towards the usability of tablet-supported education was positively affected. Before using the tablet-supported education environment, there was some doubt among the students but afterwards they were more positive about the use of tablet-supported education. This was illustrated in the scale with statements such as: "it is easier to share materials (pre-test mean: 3.13, post-test mean: 4.29)"; "thanks to the tablet computer applications, it enables us to take extra notes on the materials that the teacher gives us on the tablet (pre-test mean: 3.18, post-test mean: 4.26)"; and "thanks to e-books, I do not have to carry my books around (pre-test mean:3.54, post-test mean:4.29)".

As the genders of students in the study group were evenly distributed, independent t-test analysis was used to determine whether there was a difference between the attitudes of students towards the tablet-supported education and their attitude towards its usability according to their gender.

Factors	Gender	N	Mean	SD	sd	t	P
Factor1*	Female	160	4.25	.34	317	-2.80	.005
	Male	159	4.36	.29	311	-2.80	
Factor2**	Female	160	4.45	.45	317	-.69	.490
	Male	159	4.92	.49	314	-.69	
General	Female	160	4.31	.34	317	-1.86	.064
	Male	159	4.37	.37	314	-1.86	

* Attitudes towards tablet computer aided education

** The usability of the tablet computer aided

Table 3: Student Attitudes towards Tablet Supported Education and its Usability According to Gender

As can be seen in Table 3, the attitudes of students towards tablet supported education show meaningful differences ($t=-2.80$, $p<0.05$) in males (Mean=4.36, SS=.29) and females (Mean=4.25, SS=.34). However, there is a meaningful difference between general attitudes ($t=-1.80$, $p>0.05$) and the attitudes for usability ($t=-69$, $p>0.05$).

In previous literature on the experimental studies supported by technology there are many studies that show a meaningful difference in favor of males in terms of attitudes and perception [McKinney, Dyck, & Luber, 09]; [Hooper, Fitzpatrick, & Weal, 08]; [Ozdamli, 11]. Furthermore, according to research about tablet education, there is a difference in terms of gender [Daşdemir, Cengiz, Uzunoğlu, & Bozdoğan, 12]; [Özdemir & Bozdoğan, 14].

5 Discussion and Conclusions

In this study, the attitudes of students towards tablet computer supported education and the usability of the environment were researched for the first time in the Turkish Republic of Northern Cyprus. There was a meaningful difference between scores in the pre-test and post-test results for the 319 students who took part in the study. From the results, it can be deduced that the students have positive attitudes towards tablet PC supported education and the tablet supported education environment. One of the reasons for this could be that tablet computers create positive attitudes for students.

[Chen & Sager 11] found out that students can focus more and due to the interactive class environment, they can receive instant feedback by asking questions. These aspects change the students' attitudes positively. With the use of applications, interactive contents and visuals are more in the forefront and the students play more active roles in the learning-teaching processes as opposed to traditional education.

This makes it a very important element for students and many studies carried out on this topic support similar results [Ellington, Wilson, & Nugent, 11]; [Horton, Tech, Kim, Kothaneth, & Amelink, 11]; [Sumari, Alomari, & Hasan, 12]. The applications used in this study can be an example for the FATİH project.

In academic literature, there are studies related to the attitudes and perspectives of students about the use of tablet computers in education and its environment. The results from the studies around the world and the TRNC are consistent. This shows that the students find this method favourable and as the time goes by it will gain importance in education [Bouyer, 11]; [Enriquez, 10]; [Ozok, Benson, Chakrabort, & Norcio, 08]; [Pryor & Bauer, 08].

[El-Gayar, Moran, & Hawkes, 11] had developed an application to understand how their attitudes were towards tablet computers. Similar results were also found in that application.

The number of worldwide studies about tablet computer-supported education is now numerous. As a result of this, it also has become important in the Turkish Republic through the FATIH Project and many studies have provided parallel results to the worldwide studies [Cetinkaya & Keser, 14]; [Kurt et al. 13]. Generally, the students' attitudes show positive differences in relation to this field.

Even though there are variations in attitudes and perspectives of students in these studies, it is emphasized that there are some aspects where they still have some doubts. [Banister et al. 10]; [Enriquez, 10Cengiz

For instance, the students insist software limitations in particular. The prevention of access to social networking sites and playing games is a big problem for students. In addition, some students insist that there could be some difficulty in terms of ergonomics and health. Besides this, other studies about this topic show some instances where Internet connection problems during the application have affected the educational process. However, schools' administration established a new private fiber optic Internet connection during the application of this study. As a result of this, Internet access problems were not faced in this situation.

There are some limitations in this study as with other studies. One of these limitations was to only include students in the study group. Teachers and parents should also be included in prospective studies. Another limitation was quantitative data used in terms of methodology. In prospective studies, advantages and difficulties can be determined with the help of a qualitative data gathering approach.

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