An examination of Preservice Science Teachers' views related to use of tablet PCs in science and technology course in terms of different variables

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In this study, preservice science teachers opinions related to Ministry of National Education Fatih Project which will be used in schools for tablet PC were examined in terms of different variables. Descriptive survey method was used in the research. The participants of the study, which was conducted in 2011-2012 academic year in Giresun University Education Faculty, were 420 preservice science teachers who studied 1st, 2nd, 3rd and 4th grades. The data were obtained by using two-part questionnaire form which was developed by researchers and "Computer Attitude Scale" which was developed by Bindak and Çelik (2006). The data were analysed using frequency, percentages, arithmetic mean, One Way Analysis of Variance (ANOVA) and Chi-Square test. The result of the study was showed that between preservice science teachers' PC Attitude score with support the using of tablet PC in schools was a significant difference statistically. In addition, according to preservice science teachers, the most important advantages of tablet PCs using in science and technology courses "a) science and technology courses can more fun with visuals and animations and b) students' interest can increase in science and technology courses" were expressed. They were also expressed the most disadvantages of tablet PCs using in science and technology courses "a) social interaction can reduce among the students and b) The radiation of tablet PCs spread may give harm to health such as eyes etc."

Introduction

One of the fundamental aims of science education is to ensure teaching for the individuals who have acquired the ability to obtain rather than transferring present knowledge to the students (Minister of Education [MEB], 2006). The use of effective methods and techniques are required in teaching-learning environments in order to educate individuals who are compatible with the society, develop themselves, adapt themselves to the innovations and changes and find solutions to the problems which they encounter.

A lot of different methods are benefited from in teaching-learning environments. Observation, experiment, explanation, question and answer, discussion, induction, deduction, analysis, synthesis, case study, group and individual work are the pioneers among these methods (Asan, 2001). Moreover, some researchers include computer assisted learning among these methods (Karadağ, Sağlam & Baloğlu, 2008). Computers can be used both as a tool and a method in education. Today during the process of education, computers are used in two ways as computer directed teaching and computer assisted teaching. Computer assisted teaching, which is used more than the other one, can be described as using computers with the aim to teach a concept or a subject through courses which

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are programmed in the system or to reinforce objectives which are acquired before (Yalın, 2010).

When it is taken into consideration the fact that the more the activities prepared appeal to more sense organs in teaching-learning environment, the more effective, easier and more permanent the learning is (Çepni, Ayas, Ekiz & Akyıldız, 2010), the use of computer technology and teaching software in teaching environment has become a necessity. The reasons for these can be listed as (Demirel & Altun, 2011):
    1. Domination of understanding of lifelong learning,
    2. Providing equality of opportunity and facilities in a more effective way,
    3. The need for individual teaching,
    4. Computers' enriching the teaching –learning environments,
    5. Computer technologies' becoming smaller and a decrease in their size and

6. The students' getting prepared for the society equipped with new technology, need for knowledge and access to information which they search, being able to choose, organize and use the information they reach, being able to solve problems and use technology more efficiently.

It is known that computers whose needs increased considerably are used in a lot of courses as a learning tool. Science and technology course is the leading one among the others. It is a known fact that in the content of Science and Technology course, there are a lot of experiments and activities as well as theoretical and abstract concepts (Tekbıyık & Akdeniz, 2010). Science and Technology course can be thought as a course which is rather difficult and comprehensive with its subject content and laboratory practises. This lesson not only includes disciplines such as physics, chemistry and biology but also a discipline as mathematics. Furthermore, carrying out all the laboratory activities within the content of this course is a rather difficult and problematic process. In order to overcome this problem, the use of visual and educational programs that are prepared such as animations, flashes, and so on in computer technology can be presented as an approach.

The use of computers and teaching software in Science and Technology course can provide a lot of advantages in terms of teaching-learning. For example, some studies conducted reveal that the use of computer provides the lesson to be done efficiently, the teacher to save time and develop his/her ability to solve problems (Hançer & Yalçın, 2009; Serin, 2011), the students to increase their academic achievement (Tekbıyık & Akdeniz, 2010; Serin, 2011) and the information to be permanent (Kara, 2007). Moreover, it has been determined that the use of computer not only provides means for the student to get motivated for the course and enjoy himself/herself by spending nice time but also it contributes to their learning (Owusu, Monney, Appiah & Wilmot, 2010). At the same time computers can be thought as an integral piece of teaching and curriculum program (Wekesa, Wekesa, Mualuko & Julius, 2008). It can be said that the contributions the computers make to teaching environment are not only limited to these but also they have got a lot of advantages and these advantages can be listed as follows (Kaptan, 1999).
    1. Increase the interest and motivation of students in teaching-learning environment,
    2. Facilitating individual learning,
    3. Providing infinite revision
    4. Providing opportunities for the development of high level abilities and
    5. Encouraging learning based on collaboration

After the positive effects of use of computer technology were determined, Ministry of Education made attempts to include this technology in teaching process by speeding up opening computer laboratories in schools with in this context (Kaptan, 1999). As a result of these attempts, an increase in the number of computers used in the class environments was observed. However, because of some problems such as big computers and their being difficult to carry, tablet PCs which are as effective as computers take place of them (Bilgi Toplumu Teknolojileri Gazetesi, 2011). Tablet PCs

are technological tools which can be carried and occupy less place and a combination of laptops and pocket computers. However, tablet PCs don't have as big a keyboard as laptop. They have only a screen and are primarily operated easily with its touch screen (Enriquez, 2010). Tablet PCs use digital ink which gives an opportunity to write and draw on its screen. Moreover, it gives an opportunity to change and organise the slides which are formed by Power Point (Mccabe, 2011). Although tablet PCs have advantages such as lighter weight, having a longer battery life, being used for general purposes and not being expensive, they have some disadvantages such as the problems with its batteries, not having CD-ROM, its operations being slow and not having a lot of carriers (Gill, 2007).

Despite its disadvantages, the process of using tablet PCs in teaching environment has begun.   The use of tablet PCs in teaching environment is quite a new period (Fister & Mccarty, 2008). However, the studies conducted with tablet PCs reveal that tablet PCs increase the interest of the students like computers, provide motivation for the course and enable teachers to teach the subject (Gorgievski, Stroud, Truxaw & DeFranco, 2005; Gill, 2007; Dering & Cox, 2008; Le Ber, Lombardo & Quilter, 2008; Maccabe, 2011).

Gorgievski et. al. (2005) carried out a questionnaire which was made up of 13 items with 103 university students in order to evaluate the attitudes of the students towards the use of tablet PCs while teaching mathematics. As a result of the study, the students stated that tablet PCs helped the material presented in the class to attract the attention, to be understood better, and the teachers to explain the material in an effective way. Mccabe (2011), who claimed that concept maps and flow charts were to be used to teach abstract concepts in a better way and to make connections between the subjects, determined that concept maps and flow charts were practised more easily by using tablet PCs. Moreover, Mccabe (2011) stated that the use of tablet PCs gave opportunities for the students to develop positive attitudes towards the course and receive an effective teaching support. Fister and McCarty (2008) determined in a similar study that tablet PCs enriched the students' learning environment and the students benefited from archive notes and the interpretations of the teacher with the use of tablet PCs. They also stated that the use of tablet PCs motivated the students to the course better. Enriquez (2010) claimed that the use of wireless and tablet PC technology in the class environment had a lot of advantages. According to Enriquez (2010), thanks to tablet PCs, making meaningful and immediate evaluations about student learning, helping student learning maximises, and giving required feedback are some of these advantages. Fister and McCarty (2008) attracts the attention on two important points which are related to the students' use of tablet PCs for the study and analysis of problems. First, the use of tablet PCs helps the students to have responsibility for their learning. Second, thanks to tablet PCs, the students feel excited to be in the class. Enriquez (2010) and Hirepic (2011) found out that the use of tablet PCs gave opportunities for both students and teachers to analyse problems, collect data, take notes and combine electronic class materials and handwritings.

To sum up, the studies conducted abroad reveal that the use of tablet PCs in the class environment has a lot of advantages with regard to teachers and students. This period has just begun in Turkey. All the students in the class are required to have their own personal computers in order to benefit from the computer technology. Ministry of Education have just given a start to the Project of Increasing Opportunities and Enhancement of Technology (FATIH project) in order to decrease the cost of course books which are distributed free to the students every year and to overcome this difficulty (MEB, 2011). Within the FATIH Project, it is planned to provide equality of opportunity in education and to enhance technology in our schools. So with this purpose, laptops, LCD Panel Interactive Board, and internet network basis will be provided in 620.000 classes of all pre-school, primary school and secondary school levels for the effective use of the tools of Information Technologies (IT) in the courses to appeal to more sense organs during teaching-learning process.

In-service training will be given to the teachers for the purpose of effective use of IT equipment which is set up in the classes during teaching-learning process. During this process, education programs will be adapted to IT assisted teaching and educational e-contents will be formed. Within this context, FATIH project in education will be made up of five components. These can be listed as below:

1. Providing software and hardware basis,
2. Providing educational e-content and its management,
3. Efficient use of BT in education programs,
4. In-service training for the teachers and
5. Facilitating conscious, secure, manageable and measurable use of IT.

Fatih project in education is a project which is run by Ministry of Education and supported by Ministry of Transportation. It is thought to be completed in five years. It is aimed that the needs for IT equipment and software foundations, e-content, up-dating of teacher's guide book, in-service training for teachers and conscious, secure and manageable IT and Internet use will be completed for secondary schools in the first year, primary schools in the second year, primary school first levels and pre-schools in the third year. As a part of this project, beginning with the 5th and 9th grades in 2012, all the students are meant to be provided with tablet PCs. (www.bitdünyasi.com.tr, 2011).

It is early to estimate what tablet PCs will bring to education and teaching. But there is a known fact that a new technology's being brought into class environment causes excitement and doubt not only with the teachers but also with the students. The implementation of this innovation and its contribution to teaching-learning process depends undoubtedly on the attitudes of the teachers. It is not expected from the computer to cause an important affect unless teachers are trained and computers become an integral part of course syllabus (Kıncal, 2009; El-Gayar, Moran & Hawkes, 2011). So, it is vital to take into consideration the attitudes of teachers before technologic change comes true for the precautions to be taken. With the study conducted with in this context, it is aimed at determining the attitudes of teachers towards computers and their ideas about tablet PCs and analysing them in terms of different variables.

Purpose

The answers to the questions given below were sought within the context of the study which studied the views of preservice teachers about the usability of tablet PCs in Science and Technology courses.

1. Do pre-service science teachers support the use of tablet PCs in Science and Technology courses?
2. According to the views of pre-service science teachers, does the use of tablet PCs have advantages in Science and Technology courses?
3. According to the views of pre-service science teachers, does the use of tablet PCs have disadvantages in Science and Technology courses?

4. Does the pre-service science teachers' state of support show difference according to gender, the grade they are educated at, their condition of having computers, the time they spare for the use of computer, their aims for using computer, and their attitudes towards computer?

Method

Research Model

Descriptive method was used in the study. This method is used to enlighten a given condition, to make evaluations towards standards and to reveal possible relationships between the events. The main purpose in such studies is to describe and explain the condition which is analysed thoroughly (Çepni, 2007).

Participants

The study was conducted in 2011-2012 Academic Year in the Faculty of Education in Giresun University. The data of the study were obtained from 420 pre-service science teachers who were studying in the 1st 2nd, 3rd and 4th years of the Department of Science Teaching.

Data Collection and Analysis

During the process of data collection, a questionnaire form which was developed by the researchers and whose content reliability was obtained with the views of three different experts and computer attitudes scale which was developed by Bindak and Çelik (2006) and whose reliability coefficient is α =.91 is were benefited from. A formula (scale's range width a=range width / number of groups to be done) was used for the interpretation of the points obtained from computer attitudes scale which was made up of 22 items. The questionnaire form was made up of two parts. The first part of the questionnaire is made up of 7 items which determine the demographic information and the second part is made up of 4 items to determine the views about tablet PCs, two of which are ranging scale items and the other two of which are classification scale. For the required statistical solutions of data collected about the sub problems whose answers were sought within the scope of general purpose of the study, frequency (f), percentages (%) and arithmetical mean ($\overline{X}$) of descriptive statistical method was used and single factor ANOVA and chi-square tests were benefited from to determine the differences between independent variables. The data related to numerical developments were interpreted by converting them into tables and whether there was meaningful difference between the independent variables or not were tested in the level of α = .05. The demographic information about pre-service science teachers taking part in the research was given in Table 1.

Table 1. Demographic information about pre-service science teachers

Demographic information		1. grade	2. grade	3. grade	4. grade	TOTAL	
		f	f	f	f	f	%
Gender	Male	35	27	49	39	150	35,7
	Female	89	75	62	44	270	64,3
	Total	**124**	**102**	**111**	**83**	**420**	**100,0**
Computer ownership status	Yes	63	70	85	52	270	64,3
	No	61	32	26	31	150	35,7
	Total	**124**	**102**	**111**	**83**	**420**	**100,0**
Duration of PC use	1-4 year (university)	23	25	20	24	92	21,9
	5-7 year (high school)	50	37	48	33	168	40,0
	8-10 year (primary II. stage)	42	27	35	21	125	29,8
	11 year and over(primary I. stage)	9	13	8	5	35	08,3
	Total	**124**	**102**	**111**	**83**	**420**	**100,0**

Frequency of PC use	Every day	1-2 hours	53	38	49	22	162	38,6
		3-4 hours	13	19	14	10	56	13,3
		5 hours and over	3	11	4	4	22	05,2
		Total	**69**	**68**	**67**	**36**	**240**	**57,2**
	Every week	1-2 hours	23	18	10	15	66	15,7
		3-4 hours	19	13	18	19	69	16,4
		5 hours and over	2	3	11	2	18	04,3
		Total	**44**	**34**	**39**	**36**	**153**	**36,4**
	Every month	1-2 hours	7	0	2	4	13	03,1
		3-4 hours	2	0	1	2	5	01,2
		5 hours and over	2	0	2	5	9	02,1
		Total	**11**	**0**	**5**	**11**	**27**	**6,4**
	Total		**124**	**102**	**111**	**83**	**420**	**100,0**
Purpose of PC use	For Education *(homework,research etc.)*		56	51	55	44	206	49,0
	For social sharing *(Facebook, MSN, twitter etc.)*		61	41	33	23	158	37,6
	Others *(Game, movie, music, news, shopping, payments etc.)*		7	10	23	16	56	13,4
	Total		**124**	**102**	**111**	**83**	**420**	**100,0**

Results

The relationship between the pre-service science teachers' condition of support for the use of tablet PCs in Science and Technology courses and their total computer attitude points were analysed and it was given in Table 2 and 3.

Table 2. Computer attitude test scores of pre-service science teachers

Support of Tablet PC	f	$\overline{X}$	df
Yes	343	3,8972	,52291
No	39	3,4545	,52192
No idea	38	3,7201	,38140
Total	420	3,8400	,52777

When Table 2 was analysed, mathematical average of total points of computer attitude scale was determined as ($\overline{x}$=3,89) for preservice science teachers who participated in the study and supported the use of tablet PCs in Science and Technology courses,($\overline{x}$=3,45) for preservice science teachers who didn't support it, and ($\overline{x}$=3,72) for preservice science teachers who had no idea about this subject.

One way ANOVA was done for the unrelated measures which aimed at whether total points of computer attitudes scale of preservice science teachers who participated in the study differentiated or not and the results were given in Table 3.

Table 3. Results of One-Way ANOVA for the independent measures for the total scores of computer attitude test of pre-service science teachers

Source of Variance	Sum of Squares (SS)	df	Mean Square	F	p	Meaningful Difference
Between groups	07,462	2	3,731	14,241	,000	**2-1**

Within groups	109,247	417	0,262
Total	116,708	419	

1-Yes, 2-No, 3-No idea

When Table 3 was analysed, a meaningful difference between the total points of computer attitudes scale of preservice science teachers who supported the use of tablet PCs in Science and Technology courses and the total points of computer attitudes scale of preservice science teachers who did not support was observed, and it was in favour of preservice science teachers who supported the use of tablet PCs [$F_{(2-417)}$= 14.241, p<.05].

The support condition of preservice science teachers for the use of tablet PCs in Science and Technology courses in terms of different variables was analysed and it was give in Table 4.

Table 4. Distribution of support condition of preservice science teachers for the use of tablet PCs in Science and Technology courses in terms of different variables

Variables	Support of Tablet PC						Meaningful Difference
	Yes		No		No idea		
	f	%	f	%	f	%	
Gender							$\lambda^2_{(2)}$= 3,468; p = ,177
Male	125	83,3	9	6,0	16	10,7	p > 0.05
Female	218	80,7	30	11,1	22	8,1	
Grade							
1. grade	107	86,3	7	5,6	10	8,1	$\lambda^2_{(6)}$=10,542; p= ,104
2. grade	89	87,3	7	6,9	6	5,9	p > 0.05
3. grade	82	73,9	14	12,6	15	13,5	
4. grade	65	78,3	11	13,3	7	8,4	
Computer ownership status							
Yes	228	84,4	22	8,1	20	7,4	$\lambda^2_{(2)}$= 4,016; p = ,134
No	115	76,7	17	11,3	18	12,0	p > 0.05
Duration of PC use							
1-4 year (university)	72	78,3	11	12,0	9	9,8	
5-7 year (high school)	131	78,0	18	10,7	19	11,3	$\lambda^2_{(6)}$=12,608; p= ,050
8-10 year (primary II. stage)	113	90,4	8	6,4	4	3,2	**p < 0.05***
11 year and over(pri. I. stage)	27	77,1	2	5,7	6	17,1	
Frequency of PC use							
Every day	205	85,4	16	6,7	19	7,9	$\lambda^2_{(4)}$= 9,132; p = ,058
Every week	118	77,1	21	13,7	14	9,2	p > 0.05
Every month	20	74,1	2	7,4	5	18,5	
Purpose of PC use							
Educational *(homework, research etc.)*	161	78,2	24	11,7	21	10,2	
Social sharing *(Facebook, MSN, twitter etc.)*	141	89,2	9	5,7	8	5,1	$\lambda^2_{(4)}$= 11,592; p = ,021 **p < 0.05***
Others *(Game, movie, music, news, shopping, payments etc.)*	41	73,2	6	10,7	9	16,1	
TOTAL	343	81,7	39	9,3	38	9,0	

When Table 4 is analysed, the support condition of preservice science teachers for the use of tablet PCs in Science and Technology courses does not reveal a meaningful difference in terms of gender, class, condition of having a computer and the frequency of use of computer. However, a meaningful

difference between the views of the preservice science teachers was determined in terms of computer use time $[\lambda^2(6)=12{,}608; p<.05]$ and the purpose for computer use $[\lambda^2(4)= 11{,}592; p<.05]$.

The relation between the state of preservice science teachers' needs for in-service training course about the use of tablet PCs in Science and Technology courses and their computer attitude scale points were analysed and it was given in Table 5 and 6.

Table 5. Scale of distribution and central tendency related to computer attitudes points of preservice science teachers

The conditions asking in-service training about the use of tablet PCs	f	$\overline{X}$	df
Yes	303	3,8248	,48910
No	84	3,9800	,56910
No idea	33	3,6240	,66913
Total	420	3,8400	,52777

When Table 5 was analysed, mathematical average of total points of computer attitudes scale was determined as ($\overline{x}$=3,892) for preservice science teachers who participated in the study and needed an in-service training for the use of tablet PCs in Science and Technology courses,($\overline{x}$=3,98) for preservice science teachers who didn't feel the need for in-service training, , and ($\overline{x}$=3,62) for preservice science teachers who didn't express their ideas about this subject.

One way ANOVA was done for the unrelated measures which aimed at whether total points of computer attitudes scale of preservice science teachers who participated in the study differentiated or not and the results were given in Table 6.

Table 6. Results of One-Way ANOVA for the independent measures for the total scores of computer attitude test of pre-service science teachers

Source of Variance	Sum of Squares (SS)	df	Mean Square	F	p	Meaningful Difference
Between groups	03,256	2	1,628			
Within groups	113,452	417	,272	5,984	,003	**2-3**
Total	116,708	419				

1-Yes, 2-No, 3-No idea

When Table 6 was analysed, a meaningful difference between the total points of computer attitudes scale of preservice science teachers who did not feel the need for in-service training for the use of tablet PCs in Science and Technology courses and the total points of computer attitudes scale of preservice science teachers who had no idea about it was observed, and it was in favour of preservice science teachers who did not feel the need for in-service training $[F_{(2-417)}= 5.984, p<.05]$.

The state of preservice science teachers for the need of in-service training for the use of tablet PCs in Science and Technology courses was analysed in terms of different variables and given in Table 7.

Table 7. Distribution of the state of preservice science teachers for the need of in-service training for the use of tablet PCs in Science and Technology courses in terms of different variables

Variables	States to request in-service training						Meaningful Difference
	Yes		No		No idea		
	f	%	f	%	f	%	
Gender							$\lambda^2_{(2)}$= 17,728; p = ,000
Male	91	60,7	46	30,7	13	8,7	
Female	212	78,5	38	14,1	20	7,4	**p < 0.05***
Grade							
1. grade	94	75,8	17	13,7	13	10,5	$\lambda^2_{(6)}$=16,724; p= ,010
2. grade	80	78,4	18	17,6	4	3,9	**p < 0.05***
3. grade	80	72,1	21	18,9	10	9,0	
4. grade	49	59,0	28	33,7	6	7,2	
Computer ownership status							$\lambda^2_{(2)}$= 5,116; p = ,077
Yes	185	68,5	62	23,0	23	8,5	p > 0.05
No	118	78,7	22	14,7	10	6,7	
Duration of PC use							
1-4 year (university)	79	85,9	9	9,8	4	4,3	
5-7 year (high school)	132	78,6	19	11,3	17	10,1	$\lambda^2_{(6)}$=47,022; p= ,000
8-10 year (primary II. stage)	77	61,6	42	33,6	6	4,8	**p < 0.05***
11 year and over(pri. I. stage)	15	42,9	14	40,0	6	17,1	
Frequency of PC use							
Every day	164	68,3	58	24,2	18	7,5	$\lambda^2_{(4)}$= 8,331; p = ,080
Every week	115	75,2	24	15,7	14	9,2	p > 0.05
Every month	24	88,9	2	7,4	1	3,7	
Purpose of PC use							
Educational *(homework, research etc.)*	162	78,6	37	18,0	7	3,4	
Social sharing *(Facebook, MSN, twitter etc.)*	112	70,9	29	18,4	17	10,8	$\lambda^2_{(4)}$= 20,944; p = ,000
Others *(Game, movie, music, news, shopping, payments etc.)*	29	51,8	18	32,1	9	16,1	**p < 0.05***
TOTAL	303	72,1	84	20,0	33	7,9	

When Table 7 is analysed, the state of feeling the need for in-service training by preservice science teachers for the use of tablet PCs in Science and Technology courses does not reveal a meaningful difference in terms of the state of having a computer and the frequency of computer use. However, a meaningful difference between the views of the teachers was determined in terms of gender [$\lambda^2(2)$= 17,728; p < 0.05], class [$\lambda^2(6)$=16,724; p < 0.05], computer use time [$\lambda^2(6)$=47,022; p<.05] and the purpose for computer use [$\lambda^2(4)$= 20,944; p<.05].

The views of preservice science teachers about the advantages and disadvantages of the use of tablet PCs in Science and Technology courses were analysed and the frequency values were given in Table 8 and 9.

Table 8. Frequency distribution of the views of preservice science teachers about the advantages of the use of tablet PCs in Science and Technology courses

Advantages	Preservice Science Teachers	
	f	%
1.It can make Science and Technology course more fun with the visuals and animations.	323	76,9
2.It can increase the interest of the students in Science and Technology course.	242	57,6
3.By helping Science and Technology course be more enjoyable, it can increase the permanency (retention) of learning.	220	52,4
4.It can help understanding of abstract concepts easy in Science and Technology course.	198	47,1
5.It can provide opportunities for the students to do research and study about Science and Technology course.	196	46,7
6.It can increase the Students' interest in scientific and technologic developments.	196	46,7
7.It can help the activities which can't be done to be displayed via animations.	169	40,2
8.It can increase the active contribution of the students in Science and Technology course.	166	39,5
9.It can help the students to have access to the information which the students are curious about.	156	37,1
10.It can increase the students' ability of use of technologic tools and equipment.	147	35,0
11.It can save more time for the teachers for science activities.	139	33,1
12.Tablets can increase the use of various programs and software such as MEB vitamin in education.	110	26,2
13.It is easy to carry so it can save the students from the load of course books.	106	25,2
14.It can help the evaluation and assessment related to Science and Technology be done more easily.	92	21,9
15.It can hasten the communication between the teachers and students in Science and Technology course.	50	11,9
16.It can provide opportunities for the students to revise the subjects in Science and Technology course.	44	10,5

When Table 8 was analysed, preservice science teachers pointed out advantages about various topics such as "Science and Technology course will become more fun with the visuals and animations (%76,9)", "the interest of the students in Science and Technology course will increase (%57,6)", "By providing the courses to be more fruitful, the permanency (retention) of learning will increase (%52,4)", " understanding abstract concepts will become easy in Science and Technology courses (%47,1)", "It will provide opportunities for the students to do research and study about Science and Technology course (%46,7)" "The Students' interest in scientific and technologic developments will increase (%46,7)".

Table 9. Frequency distribution of the views of preservice science teachers about the disadvantages of the use of tablet PCs in Science and Technology courses

Disadvantages	Preservice Science Teachers	
	f	%
1.It can decrease the social interaction between the students.	228	54,3
2.The radiation of tablet PCs spread may give harm to health such as eyes.	227	54,0
3.Tablets can be used for purposes other than its purpose.	215	51,2
4.It can decrease the interaction between the teachers of Science and Technology course and the students.	198	47,1
5.It can encourage the students to literal knowledge in Science and Technology course.	197	46,9
6.It can prevent the ability of students from being realized by the teacher.	188	44,8

7.It can decrease the interest in the printed books related to science and technology.	183	43,6
8.The students can damage tablet PCs fast.	179	42,6
9.It can lead the Science and Technology teachers to laziness.	164	39,0
10.It can reduce the use of Science and Technology laboratories.	148	35,2
11.The break down of tablet can hinder the processing of Science and Technology course.	128	30,5
12.It can cause the students' ability of writing to regress in Science and Technology course.	118	28,1
13.The individual differences between the students can lead to problems about the use of tablets in Science and Technology course.	116	27,6
14.It can make the class management of the teachers difficult.	92	21,9
15.It can affect the students' ability of interpreting scientific events negatively.	83	19,8
16.It can be difficult to carry and protect tablet PCs.	61	14,5

When Table 9 was analysed, preservice science teachers stated that there would be some disadvantages if tablet PCs were used in Scenic and Technology courses. Some of these disadvantages can be listed as "It can decrease the social interaction between the students (%54,3)", "The radiation the tablet PCs spread may give harm to health such as eyes (%54), "Tablet PCs can be used for purposes other than its purpose (%51,2), "The interaction between the teachers of Science and Technology course and the students can decrease (%47,1), "It can encourage the students to literal knowledge in Science and Technology course (%46,9), and "It can prevent the ability of students from being realized by the teacher (%44,8).

Discussion and Conclusion

The support state of preservice science teachers for the use of tablet PCs in Science and Technology courses does not reveal a meaningful difference in terms of gender, class, condition of having a computer and the frequency of computer use. However, the support state of preservice science teachers who have been using computers for years for the use of tablet PCs revealed a more meaningful difference [$\lambda^2(6)=12,608$; p<.05] than preservice science teachers who have been using computer for a short time. The support state of preservice science teachers for tablet PCs who have been using computers rather for social sharing revealed a difference on a meaningful level of [$\lambda^2(4)= 11,592$; p<.05] than preservice science teachers who have been using computer more for the purpose of education-teaching, and film, game, music and so on. Moreover, a meaningful relationship about the support of the use of tablet PCs between the preservice science teachers whose computer attitudes is high and whose computer attitudes is low was determined. The data gathered from other dimension of the study does not reveal a meaningful difference in terms of the state of the need preservice science teachers feel for in-service training about the use of tablet PCs in Science and Technology courses; the state of having computers; and the frequency of computer use. However, female preservice science teachers' desire to have in-service training about the use of tablet PCs in Science and Technology courses showed a more meaningful difference than male preservice science teachers [$\lambda^2(2)= 17,728$; p < 0.05], preservice science teachers who are studying in 1st, 2nd and 3rd grades than preservice science teachers who are studying in 4th grade [$\lambda^2(6)=16,724$; p < 0.05], preservice science teachers who have been using computer for a short time than preservice science teachers who have been using computer for years [$\lambda^2(6)=47,022$; p<.05] and preservice science teachers who mostly use computers for education-teaching than preservice science teachers who mostly use computers for the purposes of social sharing, and music, film and games [$\lambda^2(4)= 20,944$; p<.05]. Moreover, a meaningful difference between the total points of computer attitudes scale of preservice science teachers who did not feel the need for in-service training about the use of tablet PCs in Science and Technology courses and the total points of computer attitude scale of preservice science teachers who had no idea about this subject was

observed and it was in favour of preservice science teachers who did not feel the need for in-service training.

Preservice science teachers listed the advantages of the use of tablet PCs in Science and Technology courses as "Science and Technology course will become more fun with the visuals and animations (%76,9)", " it can increase the interest of the students in Science and Technology course (%57,6)", "By providing the courses to be more fruitful, the permanency (retention) of learning will increase (%52,4)", " it can make easier for the understanding of abstract concepts in Science and Technology courses (%47,1)", "It can provide opportunities for the students to do research and study about Science and Technology course (%46,7)" and "It can increase the students' interest in scientific and technologic developments (%46,7)". In a study which was conducted by Enriquez (2010) with university students, while the experiment group was allowed to use tablet PCs, the courses studied were teacher centred in the control group. As a result of the study, the students who used tablet PCs thought that tablet PCs provided visuals for themselves and the course was fruitful and fun. Fister and McCarty (2008) asked total 682 students who have been using a single tablet class in different courses since 2004 in Murray State University to evaluate the use of tablet PCs as an education tool. As a result of the study, the students stated that the use of tablet PCs enriched their learning environment so they benefited from the teacher's interpretations and written records and their interest in the course increased. El-Gayar, Moran & Hawkes (2011) determined in the study they conducted that the students showed positive attitude towards tablet PCs. Derting and Cox (2008) wanted to determine the effects of the use of tablet PCs on teaching in the Introduction to Organic Chemistry course. The results of the study revealed that the use of tablet PCs enriched learning environment and enhanced learning. Leber, Lombardo and Quilter (2008) found that tablet PCs were used by the students to save some notes, at the same time, they enhanced their learning. McCabe (2011) determined that by forming concept maps and flow charts with tablet PCs, abstract concepts might be reified. As it is seen, the study we conducted shows similarities to the studies conducted before.

As a result of the study, preservice science teachers determined that there would be some disadvantages if tablet PCs were used in Science and Technology courses. These disadvantages were stated as "It can decrease the social interaction between the students (%54,3)", "The radiation the tablet PCs spread may give harm to health such as eyes (%54), "Tablet PCs can be used for purposes other than its purpose (%51,2), "The interaction between the teachers of Science and Technology course and the students can decrease (%47,1), "It can encourage the students to literal knowledge in Science and Technology course (%46,9), and "It can prevent the ability of students from being realized by the teacher (%44,8).

Implications for Further Study

These suggestions can be made depending upon this study conducted about tablet PCs and with the previously conducted studies.

1. After tablet PCs are used in education, the process can be evaluated by conducting a similar study with the teachers and the students.
2. The effects of software such animations on the attitudes of the students and their achievements can be determined after they are being operated with tablet PCs.

Limitations

The sampling of the study conducted was obtained from preservice science teachers of Education Faculty in Giresun University. Collecting data from different preservice teachers studying in different Education faculties will provide benefit about the use of tablet PCs in primary education within this context.

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