



PRE-SERVICE SCIENCE TEACHERS' VIEWS REGARDING COMPUTER-AIDED INSTRUCTION*

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Abstract

Aiming to get pre-service science teachers' views about using computer and computer based instruction in the courses, this research was carried out with the participation of six pre-service science teachers enrolled at Erciyes University, Kayseri. Phenomenology as a qualitative research method was used in the study. In this context, after the literature was reviewed, 13-item interview form was created and a semi-structured interview was conducted for the data collection. The qualitative data were analyzed via descriptive analysis. A science teacher with a six years teaching experience and an expert in the field of science education controlled the analysis process. Taking a number of measures, the validity and reliability of the study were tried to be increased. Overall results obtained in the study were; 'Basic Computer' courses given in the education faculties are inadequate in terms of teaching practice and the training should be more practice-oriented. In addition, according to the findings obtained from all participants, it was reached the conclusion that computer and computerbased instruction should be used in science courses and in this context all pre-service science teachers should be able to use the computer better.

Keywords: Science education, Qualitative Study, Phenomenological Study, Computer-aided Instruction.

INTRODUCTION

For the society's keeping up with the times and reaching the level of contemporary civilization, there is a need for an innovative educational system. Many things can be used to create such an educational system. One of these things is technology (Hadley and Sheingold 1993). Nowadays, usage area of computers widened especially in the field of education and the traditional classrooms gradually gave place to the computerized learning environment with developing technology. In this context, many schools were acquainted with tools such as smart board and projector (Vrasidas and McIsaac 2001; Wall Higgins and Smith 2005).

Meeting of the education system with above-mentioned tools caused to question the effectivity of the classroom instruction through these tools. In other words, whether the teachers use computer and its properties effectively has been a topic that education researchers underlined as well (Becker 2000; Çağiltay, Çakiroğlu, Çağiltay and Çakiroğlu 2001; Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall 2003; Teo, Lee and Chai 2008; Teo, Chai, Hung and Lee 2008). In this context, the importance of Computer-Assisted Instruction (CAI) has increased and the studies regarding this instruction were accelerated (Albion 1999; Albion and Ertmer 2002; Kulik and Kulik 1991; Lim and Chai 2008; Teo, Lee and Chai 2008; Teo, Chai, Hung and Lee 2008; Wang, Ertmer and Newby 2014). Based on the studies about CAI in the literature, CAI can be defined as "teachers' performing meaningful learning in students by using computer and its properties" (Albion 1999; Joo, Bong and Choi 2000; Scheffler and Logan 1999; Teo, Lee and Chai 2008).

Just like all teaching methods, CAI has also some positive and negative properties. The positive properties are: CAI provides an active participation to the course, increases the quality of teaching activities, appeals to multiple sense organs, actualizes the meaningful learning by giving the self-learning and research opportunities to the student, saves time, provides the immediate feedback and turns the learning into a fun environment (Albion and Ertmer 2002; Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall 2003; Preston and Mowbray 2008; Starkings and Krause 2008; Teo, Lee and Chai 2008).

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There are many studies that show CAI also has a positive impact on pre-service teachers. For example, in their study carried out with pre-service teachers Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall (2003) ensured that the participants conduct activities on computers during 11 weeks and observed that pre-service teachers started to use computers as teaching tools more effectively at the end of the study. Hence, they also observed that their self-confidence and competence increased because of effective using. Additionally, as a result of their interviews, the researchers stated that as a consequence of the increase in their self-confidence, pre-service teachers would use computers more often in their future careers. Similarly, Ertmer and Albion (2002) also determined that CAI strengthens the students' confidence and beliefs, and affects their academic achievement positively. In addition, in their study conducted with preservice teachers Teo, Lee, and Chai (2008) also concluded that pre-service teachers' attitudes and skills towards computer and teaching abilities increased through their courses which use computer-aided instruction.

The negative features of CAI are mainly that it influences socio-psychological development of the children, costs a lot, requires special equipment and skills to teacher and students, and causes lack of time when the teachers can not implement it effectively (Cuban, Kirkpatrick and Peck 2001; Çağiltay, Çakiroğlu, Çağiltay and Çakiroğlu 2001; Hughes 2004; Saka and Akdeniz 2006; Zhao and Frank 2003). For instance, Saka and Akdeniz (2006) concluded that CAI was considered as negative since the activities carried out by CAI are time consuming.

As it can be seen from the results identified in the literature, teachers are the most important factor in turning CAI into advantage or disadvantage (Gooler, Kautzer and Knuth 2000). In order to make a contribution to the development of education system, a connection should be established between technology and the teacher who use CAI. If this link is not established, a number of obstacles would be posed in education system and some difficulties would arise from the implementation of CAI. One of these problems is the technological incompetence that push learners and teachers into the failure. In order to eliminate these technological incompetence, the solutions should be searched by putting emphasis on teacher education (Albion 1999; Albion and Ertmer 2002; Becker 2000; Ertmer 2001; Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall 2003; Gorder 2008; Hughes 2004; Scheffler and Logan 1999; Schrum 1999; Teo, Chai, Hung and Lee 2008).

Nowadays, in conjunction with technology, smart boards, tablets and many similar devices is rapidly introducing the educational environment and this situation requires the teachers who will use them to be well-equipped in this field. Since computer or smart board in the classrooms will not solve above mentioned problems alone, the teachers who use them need to be expert in this field and use computers in teaching methods effectively. However, even if teachers have high-level skills in the use of computers, it was determined in the conducted studies that the teachers' skills of computer usage in their courses are not at the desired level (Becker 2000; Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall 2003; Hunt and Bohlin 1993; Lim and Chai 2008; Sheingold and Hadley 1990; Timothy, Ching, David and Chwee 2008).

There are many studies in the literature concerning teachers cannot use computer effectively in their classroom practices. For example, Lim and Chai, (2008) identified that teachers still use traditional methods in their lessons and cannot use computers as student-centered. Researchers linked the reason of this situation to teachers' pedagogically deficiency. Similarly, in their study Çağiltay et al. (2001) also emphasized insufficiency of teachers in terms of pedagogy and stated that there is not a sufficient number of computer in their classrooms and content of the program is not appropriate for computer usage are the reasons for teachers cannot use computer in their lessons effectively. On the other hand, similar results were founded in the studies constructed with pre-service teachers and solutions were offered. For example, some researches stated that pre-service teachers need to get training about how they will use computer in in-class activities before they have the profession. (Ertmer and Albion 2002; Ertmer, Conklin, Lewandowski, Osika, Selo and Wignall 2003; Teo, Lee and Chai 2008). As it can be also seen in results of the studies, teachers and teachers of the future still do not have adequate knowledge and skills to integrate technology into teaching.

Science includes many abstract concepts. The concepts should be appealing to several senses for the concretization of abstract concepts and promotion of meaningful learning. Therefore, studies on science education emphasized that CAI should be used effectively for realization of meaningful learning so as to appeal several senses (Joo, Bong and Choi 2000). For an effective CAI, a project carried out by Ministry of National Education (MEB) and Ministry of Transport together was started in November of 2010 under the name of "Movement of Enhancing Opportunities and Improving Technology" (FATİH). The aim of FATİH Project is to provide equal opportunities in education and make information technologies to be used in the most efficient way by improving the technological infrastructure of schools. For this purpose, about 40 thousand schools and 600 thousand classrooms are planned to be equipped with tools such as computer, projector, interactive board (smart board), and photocopier. The project is expected to be completed within the first three years, and its outcomes and reflections in Turkish education system will be watched in

evaluation process within the next two years (Akgün, Yılmaz and Seferoğlu 2011; Akıncı, Kurtoğlu and Seferoğlu 2012).

There are many studies about the use of CAI in science education. For example, Erdemir, Bakırıcı and Eyduran (2009) aimed to identify 325 pre-service teachers' views regarding the skills of computer use and the skills of teaching-purpose technology use based on different variables. As a result of the study, pre-service teachers said that they have problems about the ability to computer use as a teaching tool.

İnel, Evrekli and Balım, (2011) aimed to identify 53 pre-service science teachers' views regarding their ability to use education technologies in their courses. They concluded that majority of the pre-service teachers feel sufficient regarding using educational technologies in learning environment and think the school environments do not have adequate facilities for the use of educational technology in Turkey.

Seferoğlu, Akbiyık and Bulut (2008) aimed to reveal the opinions of elementary education teachers and pre-service teachers concerning the use of computers in learning/teaching process. According to the results of the study conducted with 51 teachers and 56 pre-service teachers, it was identified that teachers have to learn the use of computer via in-service training courses and it was seen that pre-service teachers prefer to learn it on their own or with the help of their immediate surroundings.

As seen in the above-mentioned literature, classroom implementation of computer-aided instruction does still not give the results at the desired level because the overall impression formed in the conducted studies is the idea that the unsuccess is due to the students or technological incompetence. In this study, the problem was looked from a different perspective and it was thought that the solution should be explored by looking at teacher education. For this purpose, under the theme of teacher education, pre-service science teachers' level of use of computer, and how their knowledge and skills about CAI approach will reflect on their profession was investigated.

In this direction, after the necessary literature review was performed by the researchers, a research problem was formed, and the study was conducted to find an answer to this research question and offer new findings and results to the literature.

Purpose

The aim of this study is to determine the pre-service science teachers' levels of computer usage and views on computer-assisted instructional strategy.

Research question

The main question of this study is:

What are the opinions of Erciyes University fourth grade pre-service science teachers about their ability to computer use and computer-assisted instruction?

Sub problems:

- How the pre-service science teachers' computer literacy skills before getting into the university affect their views regarding computer and the level of computer usage in their courses?
- Do pre-service science teachers find "Basic Computer" course that they took at the university sufficient in terms of level of computer usage and teaching profession? Why?
- What are the views of pre-service science teachers towards computer-assisted instruction and "FATIH Project"?

METHOD

Research design

Phenomenology which is the design of the qualitative research methods, was used in this study. In phenomenology studies, it is usually aimed to reveal and interpret personal perceptions or perspectives about a phenomenon (Merriam 2009). Accordingly, qualitative research establishes and learns the individuals' thoughts about the phenomenon more detailed by aiming the questions why and how. Since the pre-service teachers' views about the use of computer in their lessons and the instruction using CAI will be identified deeply, phenomenology, being one of the qualitative research methods, was used in this study.

Sample

Criterion sampling, a sub-step of purposive sampling method, was used to determine the participants. In purposive sampling, while the researchers select the participants, they consider the most appropriate criteria for the research aim. Criterion sampling is to select all cases that meet a number of criteria (Creswell 2009). In this study, the participants consisted of six pre-service science teachers selected from Kayseri Erciyes University primary science teaching department. They were 4th grade students. In phenomelonogy studies, the number of participants should be few and limited to gather more data. Hence, the sample was determined as six people in this research.

The criteria identified by the researchers were gender and graduated high school type. In order to obey the ethical rules, the persons were selected based on voluntariness and the identities of the participants

were not reflected on the study. Additionally, the information was given to the participants about the goals of the research before the interview was conducted. Code names selected by the researchers were used for the participants. Demographic information regarding the participants were presented in Table 1.

Table 1: Graduated high school types and ages of the participants

Participant	Graduated high school type	Age
Adem	Regular high school	21
Burak	Regular high school	22
Canan	Anatolian high school	22
Derya	Regular high school	21
Ece	Regular high school	22
Filiz	Anatolian high school	22

Adem started to Erciyes University Education Faculty in 2014 fall semester. Accordingly, he took "Basic Computer" course and most of the pedagogical formation courses in another university. Similarly, it is Filiz's second year in Erciyes University Education Faculty. She also took related courses in another university.

Instruments

In this research, semi-structured interview, which is the most widely used tool in qualitative researches, was used as a data collection tool. The reason for using the semi-structured interview is to try to learn pre-service science teachers' views regarding the topic in detail and to obtain deeper data by looking at the mimics and movements of the participants (Patton 2002).

In this research, observation and document analysis were not used as a data collection tool and data was collected using only semi-structured interview. Therefore, this study was limited in terms of data triangulation.

In a semi-structured interview, the researchers prepare an interview form which contains the questions that are planned to ask (Merriam 2009; Patton 2002). In this study, after the necessary literature was reviewed (Ekici and Yilmaz 2013; Erdemir, Bakirci and Eyduran 2009; Galanouli, Murphy and Gardner 2004; Starkings and Krause 2008), 15-item interview form was prepared. Under each interview question, there are also probe questions to deepen the person's thoughts. The prepared interview form was checked by two science educator who are expert in their field. At the end of this checking, two questions which were not found appropriate for the research purpose regarding the use of internet were removed. In this way, the interview form took its 13-question final form.

The interviews were conducted by interacting long-term with the participants in predetermined days and times. The interviews were performed by two of the researchers and a voice recorder was used with the approval of the participants. The interviews were performed in a proper classroom environment at Erciyes University Education Faculty. The interviews lasted for 23-39 minutes.

Data Analysis

Descriptive analysis was used to analyze the data in this research. Descriptive analysis is the process of presentation of the obtained data to the reader through code and themes that was identified before or by the researcher. In this type of analysis, in order to reflect statements of the interviewees obviously, the researcher often includes direct quotations (Marshall and Rossman 2006). In this research, 13 themes and codes belonging to these themes were created by the researchers and the data were presented including direct quotations in the findings chapter. The codes and themes were identified by one of the researchers firstly, then they were reviewed together with a science teacher who has an experience of 6 years and revised, and finally the consensus was reached by getting together with other researchers. In this way, the internal reliability was tried to be enhanced. The constructed themes were presented in Table 2. Codes were discussed in detail in findings chapter of the study.

Table 2: Developed themes

Themes
• Introduction to computer and the purpose of use of computer
• Participation to computer course
• The frequency of using a computer before starting the university
• Computer possession time before starting the university
• The adequacy of basic computer lesson
• Contribution of homework or activities in the pedagogical formation lessons to the computer usage
• Computer usage requirement
• Negative and positive sides of CAI
• Computer usage level
• The use of computers in teaching profession
• The areas of computer usage of teachers
• Harms of computer
• Benefit of tablets in terms of CAI

The themes in Table 2 were developed by using of codes that were identified based on the answers of participants to the interview questions.

Validity-Reliability

Internal validity: In this research, a long-term interaction with participants was provided during the interviews to enhance internal validity. In addition to this, researchers performed the confirmation to participants for their responses during the interview process. Two science educators were received help in the sections of formation of interview questions, data analysis and findings. Findings were presented as direct quotations without interpretation. Data triangulation was not performed in the study. Semi-structured interview was used as the only data collection tool.

External validity: In order to improve external validity of the study, sample was selected as appropriate to the purpose of study. Moreover, a detailed descriptions were executed for the all sections of the document not to leave the question mark in reader's mind.

Internal reliability: Findings were presented without any interpretation to enhance internal reliability (consistency) of the study. Furthermore, themes and codes were finalized in accordance with the consensus among the views of a science teacher with six years of experience and two specialized science educators.

External reliability: Results of the study and results obtained from the literature were discussed in detail in this research. Furthermore, two science educators controlled the findings and discussion part to understand whether these parts are consistent or not each other.

FINDINGS

In this part, themes and codes were exhibited in tables. The responses of interviewees were reflected in the same way and data was tried to be presented without any comment below in the tables.

Introduction to computer and the purpose of use of computer

Table 3: Codes developed in relation to the question "When and for what purpose did you meet first with the computer?"

Codes	Participants
High school, school-aid	Adem
Primary school, game	Burak
High school, fiddle away	Canan
High school, homework	Derya
Primary school, game	Ece
High school, game	Filiz

As seen on Table 3, Burak and Ece stated that they started to use computer at primary school firstly, while Adem, Canan, Derya and Filiz stated that they started to use in high school. Regarding what purpose they use computer, Whilst Adem responded as "*well, firstly I bought it to help school. I bought it to prepare for the exam*", Canan expressed that "*at first as I said to watch film, listen to music, we did not bought computer homework-purpose*".

Burak, Filiz and Ece stated that they use it more for the game For instance Ece expressed herself as "*Game-oriented... at that time Mario was very popular. We were continuously playing Mario. So there were no such thing assignments on computer. We always used to go to library to do homework; I mean we grew up in that way. As I said I used it as only game-oriented.*" Derya stated she used homework-oriented with the words "*First, uhh normally, we had a lot of homework and my primary school in the village. My family had still been in the village. I was a child and my first time was in the city. , I mean we needed to goto internet cafes. My family would fear, if something bad happened to me. Hence, it is the first time I had a computer homework-oriented in order to didn't go those places or didn't do my homework at internet cafes*".

Participation to computer course

Table 4: Codes developed in relation to the question "Did you attend a course or other activities related to the use of computer before getting into the university?"

Codes	Participants
Attended	Ece and Filiz
Not attended	Adem, Burak, Canan, and Derya

In second question of interview, interviewees were asked whether they attended an activity or course related with computer usage before starting the university or not. Ece and Filiz stated that they attended to computer course which was opened in public education centre, while other participants stated that they did not attend any course or activity. For instance, while Ece explained the course as "*I went when I was at nine grade ... well, it was the course opened by municipality. We enrolled on the course together with my*

mother. My mother would go herself but couldn't go alone", Adem stated that he has not attended a course in advance: "In fact, there were courses of municipality. I registered but didn't go. I didn't attend it."

The pre-service teachers who had attended a course were asked which subjects they had been taught in that course. While Filiz answered as "*There was a program in the field of accounting named as GO. Excel, Word known programs. We learned them*", Ece responded as "*Excel, Word and so forth simple programs we learned... Word, Excel, next PowerPoint and so forth*" this question.

The frequency of using a computer before starting the university

Table 5: Codes developed in relation to the question "How often have you used computer programs before starting to the university?"

Codes	Participants
Often	Adem, Burak, and Filiz
Sometimes	Derya and Ece
Never	Canan

Adem, Burak, and Filiz stated that they frequently used computer programs before starting the university. Burak answered as "*Computer programs at the era of high school... as I said I did not receive a training of it in the high school, but at the era of high school hmm I developed some programs in behalf of my skills and interest. I obtained some information through various friends. And again as I said I did not go to a course. I learned in my own ways*". Based upon the researcher's question "*alright, did you frequently use these programs?*" his answer was affirmed by stating "*I frequently used, yes.*"

Derya answered as "*I predominantly overutilized Word program. Well there are some programs, for example PowerPoint, I did not use them a lot in high school. When I come to the university, there are lectures based on presentations, but I did not even know how to do a proper presentation until two years ago.*" The probe question of the researcher was that "*then, you did not mingle with computer programs in your high school years?*" and she stated that she sometimes use computer programs responding "*No we already had computer lesson in high school, but it was completely theoretical, we went to a computer lab and the computer was opened in front of us, but it was completely theoretical, the information was left in suspense and we did not have the thing to put into practice.*"

Canan stated that she has not used computer programs before the university with the words "*in no way.*" Researcher repeated as "*in no way, right.*" to make sure about the answer given, she answered as "*No. I did not benefit from the computer programs to do homework.*"

Computer possession time before starting the university

Table 6: Codes developed in relation to the question "When did you have your own computer before starting university?"

Codes	Participants
Primary school	Ece
Secondary school	Burak
High school	Adem, Canan, Derya, and Filiz

All participants stated that they had their own computers before the university. Ece stated that she had her own computer when she is at primary school; Burak stated that he had his own computer at secondary school, and Adem, Canan, Derya and Filiz stated that they had their own computers in their high school years. For instance, Burak answered "*Yes. I had my own computer at secondary school.*" Likewise, the conversation between Filiz and the researcher was given below:

Filiz: It was uh-huh

Researcher:Namely the first computer that you met in high school was your computer, it belongs to you, is that right?

Filiz: Yes. There was at home. Later on, my father already bought for myself, for me, when I got into the university.

The adequacy of basic computer lesson

Table 7: Codes developed in relation to the question "Do you find adequate computer course that you took in the university? Why?"

Codes	Participants
Adequate	Burak
Not adequate	Adem, Canan, Derya, Ece, and Filiz
Because of the lecturer	Derya and Filiz
Because of the teaching method	Adem, Canan, and Ece

The sufficiency of courses of "Basic Computer-1" and "Basic Computer-2" given in Education Faculty was investigated by researchers and participants was asked whether they find these courses sufficient or not . Only Burak stated that he find sufficient these lessons both in terms of computer skills and application of computer on teaching with the words "*Hmm I find it sufficient thanks to my teachers. They were really equipped people... They provide us the enough information about computer skills. Hmm I can say that I have the sufficient information about computer programs can be used by teacher and its application on teaching.*"

Other participants pointed out that they do not find sufficient these lessons in terms of computer skills. For example, Derya answered this question as “*Can I say it is exactly sufficient? I cannot say. Besides, again our teacher showed it exactly. There were group differences. Well, while a group works on computer, our teacher tell via presentation, the computer stand in front of us. Let's do that, let's do it. You do it at that moment, well we do not have homework. With the same logic of high school, we take the exam, answer, go. Well we had not anything such as do that with computer, prepare that, bring me and present that. We listen to the teacher, go home, again study the worksheets notes given by the teacher, come here and take the exam.*” and she cited the lack of lecturer as the reason for unsufficiency.

Adem stated that he did not take basic computer courses in Erciyes University Education Faculty and stated that courses were inadequate. According to him, the reason for this inadequacy is the teaching method of lecturer. He stated that “*I absolutely do not think it is adequate. Because I cannot say that our teacher made us do something.*”

Contribution of homework or activities in the pedagogical formation lessons to the computer usage

Table 8: Codes developed in relation to the question “Do you think that the homework or activities in the pedagogical formation lessons in university contribute to your ability to use computer and the teaching profession? Why?”

Codes	Participants
Yes	Adem, Burak, Canan, Derya, Ece, Filiz
Contribution to computer usage	Adem, Burak, Canan, Derya, Ece
Contribution to teaching profession	Adem, Canan, Ece, Filiz

In this question, it was aimed to take pre-service teachers' opinions about contribution of the teaching, namely pedagogical formation lessons, which is given in education faculty science teaching program during 4 years to computer usage skills and teaching profession. From the participants, Ece responded as “*It happened. It happened very much. Hmm especially hmm I mean much more in statistics lesson rather than other lessons... I mean I learned it is a very different program.*” Canan also answered as “*Of course we learned to prepare slides very well, in different ways, we learned to prepare question without error. Well of course it has an effect.*” Moreover, Burak expressed that “*Absolutely we use Powerpoint and we did presentations in projector or smart boards. I mean, we also mainly used Powerpoint program while teaching the lesson and since we took it in computer-2 lesson in a good way, we can use it effectively, I mean we can use it in order to teach students more effectively.*”

Likewise, Derya also stated that pedagogical formation lessons contribute to computer usage skill with the words “*Of course. Preparing a presentation is a material for us. I already need a computer and recognize computer for the presentations, homeworks, assignments, and researches given by teachers.*”

Adem, Canan, Ece and Filiz stated that they find the activities done by computer programs useful for teaching profession. For example, Adem stated his view as “*Hmm it has contributed, of course. Especially in presentations... I am currently doing practice teaching in a primary school. When I go to internship to school, our mentor usually teaches by the help of presentation in every classroom.*” Ece also mentioned her idea as “*It was very beneficial. It was very beneficial yes. It added hmm richness to the visuality. Hmm it supported my expression. It helped me to transform the concepts from concrete to abstract. We have a lot of opportunities to show analogy samples using computer programs.*”

Derya also mentioned that the lecturers must explain the computer programs that students use before pedagogical formation lessons. She stated her thoughts as “*Yes, well if there is an education of something, this education should be given properly. Well when I arrived with an expectation to the course, my expectation should have been met in that lesson. When it was called as computer-aided instruction, what comes to my mind is how a presentation is prepared. However, it should not be the aim of computer based instruction. Eventually hmm we become 4th grade students, we will be appointed as teacher, and we sometimes find something ready like this for example a presentation, a simulation, and animation, but we cannot find some of them ready. Well we want to do an original thing. I mean there is no education on original media at the moment.*”

Computer usage requirement

Table 9: Codes developed in relation to the question “Do you agree with the opinion of using computer would be inevitable and everyone must absolutely learn to use computer? Why?”

Codes	Participants
Agree/Everyone should know	Adem, Burak, Canan, Ece, Filiz
Disagree/Teachers should know	Derya
Technological era	Burak, Filiz, Adem, Canan, Ece

In the interview, Adem, Burak, Canan, Ece and Filiz stated that everyone has definitely to learn how to use a computer and for this reason everyone should know to use computer. For instance, Adem answered as “*Of course I agree. Besides I agree 100%.*” Then, researcher asked the reason of his view and he indicated the

technological era as the reason for this and gave an answer as "Today, computer is the technology, I can use a sentence like it captured the people. It is especially a true sentence in education, too. Right now hmm smart tablets made by our government were distributed, books are being pushed into the background. In fact, I think that there can be a totally computer-aided instruction in 2025-2030s."

Likewise, Burak stated that everyone has to know to use computer with the sentences "Hmm I agree yes... Our life is organized via electronic systems, electronic programs. For example, instead of going to the bank now we make a transaction with ATM machine, it is also a computer. We use calculator, it is also a computer. We use meter, laserimeters in industrial area, it is also a computer. Therefore everyone should learn to use a computer I think." and he thought in the same direction with Adem and stated that technology era is the reason of this necessity.

Derya explained everyone does not have to know how to use a computer with the sentences "Even now it is used intensely but in terms of obligation Does everybody have to? Hmm I have doubts about it, well maybe, it may not be obligatory." Researcher asked as "alright, if we think in terms of teacher?" and she stated as "I agree with it. I strongly agree." Hence, she referred that teachers absolutely should know the computer. When the reason for the necessity of computer use in education was asked, she answered as "I am going internship right now. My mentor teacher is over the age of 40. He can do some things in classroom environment but cannot do some things. For example, in the simplest term, if a data will be entered to the computer, he say that he cannot do this. Or hmm he does not use computer in education. Hmm how can I say... I substantially think that he should use computer. Most of the things do not make sense. I mean while it is necessary to use computer there are many points that he does not use it."

Positive and negative sides of CAI

Table 10: Codes developed in relation to the question "What are the positive and negative sides of computer-aided instruction?"

Codes	Participants
Saving of time	Adem, Burak, Canan, Ece, and Filiz
Visuality	Adem, Burak, Ece, and Filiz
Meaningful learning	Adem, Burak, and Ece
Difficulty of classroom management	Adem, Burak, Filiz, and Canan
Negativity arising from the teacher	Burak and Filiz
There is no negative side	Derya

As it was seen in Table 10, the participants stated that positive sides of CAI are to save time, promote meaningful learning and ensure visuality. For instance, Ece mentioned that "Saving of time is very important. At the present, I observe my mentor, time is running out. I mean if s/he use computer, s/he may save time in the course. Moreover, CAI facilitates to children's understanding very much. If students have some deficiencies about topic, teacher can give a slide, a presentation, or an animation since they know how to use a computer. In that way... they can overcome from these deficiencies." Burak mentioned the positive sides of CAI like Adem and Ece with the sentences "When we teach verbally the students, they listen passively and hmm actually it does not provide meaningful learning. However, through computer-aided instruction, the student both see and hear, reinforce our tellings with images in instruction, and umm increases students' curiosity."

Canan indicated the negative side of CAI as teacher's losing control of the classroom. Canan made a remark with her own words "Ministry of National Education gave a computer to every student. However, if the classrooms are crowded, they cannot follow their teachers."

Burak and Filiz found teachers inadequate in terms of CAI. For example, Filiz stated "The disadvantage... Everything depends on the teacher... I observe my mentor teacher. S/he only sometimes solved the questions on the projector... In a lesson, being active of students in the lesson depends on the teacher. Because, if the teacher use CAI properly, if it is suitable for the purpose, the student will not bored. I don't think it will be harmful..." Likewise, Burak also expressed as "When the teacher has inadequate equipment, s/he may have limitations in the use of computer. However, I don't think that a high-level user or a medium-level user will have so much limitations."

Derya stated that CAI does not have any negative side and thought that "At the moment umm I don't see any disadvantage... Really a disadvantage does not come to my mind. ... There is no disadvantage as long as the student uses it purposive."

Computer usage level

Table 11: Codes developed in relation to the question "Being a pre-service science teacher at what level do you find yourself as a computer user?"

Codes	Participants
2 out of 5	Canan
3 out of 5	Derya, and Ece
4 out of 5	Adem, and Filiz
5 out of 5	Burak

On the 10th question addressed to the pre-service teachers, on what level they find themselves as a computer user was urged upon, and given answers were coded as above. When the question of "Why did you give such a note to yourself?" was asked by the researcher, being a reason for giving herself 2 out of 5, Canan commented "*Let's don't say is inadequate in the university but results from the teacher.*"

While Derya who gave 3 points stated that "...*It is a little bit because of me I didn't improve myself on this topic. Also because of me.*", Ece stated "*Even it is maybe generous. Namely there is lots of thing that we don't know. There are completely different things.*" However, Ece clarified her statements for the researcher's question of "How many points do you give yourself when we consider the subject for teaching?" in the oncoming parts of interview "*I say I use well when we look based on the schools, when we look based on the present schools. Then I give myself 4-5 out of 5. But I don't find it sufficient when we take it as it should be.*"

Adem who gave himself 4 out of 5 points expressed his thought as "*I think that I know basic skills such as umm Word, Excel, Powerpoint very well... I know how to design all kind of materials on the Internet, puzzle, presentation, all kinds of from that aspect. Umm I think the lessons that we took in the university have an effect.*" Filiz stated that "*I already do most of the homeworks on my own. I don't know how to prepare animation of course but I always prepare the presentations given by teachers myself...*"

Burak who gave five points himself in terms of computer usage expressed his thoughts as "*When I look from the viewpoint of science teacher, I can use the programs that I will use properly.*" Then, researcher asked him that "Namely you mean this; I can prepare written material, presentation, slide, animation, graph, worksheet, activity without any help." He mentioned that "*I can definitely prepare. Yes.*"

The use of computers in teaching profession

Table 12: Codes developed in relation to the question "In the future, when you become a teacher, how often do you think to use computer in your lessons?

Codes	Participants
Often	Adem, Canan, and Ece
Whenever necessary	Derya and Burak
Sometimes	Filiz

Adem, Canan and Ece stated that they will frequently use computer in their lessons when they become a teacher. For instance, while Canan expressed that "*If I have adequate materials, I can teach the lesson on the computer every day, in any case...*", Ece explained that "*I usually use. I mean I use in all my lessons. Activities... etc. However, it depends on school circumstances. .*"

Derya and Burak stated that they will use computer in their lessons when they find it necessary. For instance, Burak explained that "...*I mean I use it when needed. WellI mean the computer should never take the role of teacher.*" Derya also explained that "*I think to use it whenever I find it necessary...*"

Filiz stated that she will sometimes use computer in her lessons. She declared that "*Umm if it is, too much students get bored with it.*"

The areas of computer usage of teachers

Table 13: Codes developed in relation to the question "What do you think about in which fields a teacher uses computer?"

Codes	Participants
Daily routine	Adem, Burak, Canan, and Ece
Research and self-improvement	Burak and Ece
Sharing	Adem and Burak,
Communication	Adem, Canan, Derya and Filiz
Area of interest	Filiz

Burak stated that teachers can use computer in daily routine as "...*The teacher can use computer in the daily routine in any case.*"

For the purpose of research and self-development, Burak stated that the teachers can benefit from the educational websites on the Internet.

Adem stated that the computer will be used by the teachers with the aims of sharing and communication. He explained his view as "*For example I am a trainee teacher. I taught my courses with computer-aided instruction to my students. After that they add me in social networks and we made various sharing.*"

Filiz stated that the teachers may use computer in line with their interests with the sentences "*S/he uses it in her/his own business. For example, people have interests. S/he may keep archive. For instance I keep archive of comics. It is used in most things. For example it may be the photo archive of the family. I mean such things can be done.*"

Harms of computer

Table 14: Codes developed in relation to the question "Do you think that the use of computer is harmful for the students during the lesson?"

Codes	Participants
Bad habit, eye health, posture disorders	Adem
Technology captive, radiation, eye health	Burak
Communication, morals, eye health	Canan
Communication, necessity, radiation	Derya
Communication, eye health, radiation	Ece
Mental deficiency, eye health, radiation	Filiz

Adem answered as "*It may do a little harm with regards to sociality and communication... If it is necessary s/he may make various bad tempered friends in terms of communication or since they may hang out at bad websites, I think it restricts the communication and uses it on the downside ... Remaining at computer too much damages to the eye firstly. It may cause to standing disorders and deformations. I undergone a little, thanks to the doctors we are trying to figure out a little bit.*"

Burak explained as "*Certainly there are great troubles. We take drama lessons in this year. The friends studied on a case study about this topic in drama lessons, too. People have been became enslaved by technology nowadays. Rather than obtaining the technology, the technology obtains them now. People really become blunt thanks to the technology at some points. ... There are great troubles of the technology in terms of health, radioation definitely. It may be eye health, may be radiation... various unknown troubles... Umm technology is a sickness in fact, definitely. It's a sickness on its own.*" and stated that computer is harmful in terms of technology, radiation and eye health.

Canan thought that computer is harmful in terms of communication, morality, and eye health. She stated that "*...If we consider the student sitting at back side in the class, s/he may connect to the wrong sites. I mean s/he connects to the noxious sites. And this damages moral structure of the student... In terms of health, at first the student's eyesight is deteriorated. ... If s/he is continually busy with computer, his/her communication with the environment may decrease.*"

Filiz expressed her opinion as "*The eye may be in terms of health (laughing). It strains eyes very much. I mean I think it may cause deterioration of eyesight. Researchers stated that when you do a long term work, the brain starts to work under its own speed because of the radiations emitted by technological devices. This is a bad thing. Television is also just like that, for example. Watching television continuously causes mental deficiency.*"

Benefit of tablets in terms of CAI

Table 15: Codes developed in relation to the question "Do you find the tablets distributed within the scope of Fatih Project useful in terms of CAI? Why?"

Codes	Participants
Yes	Adem, and Canan
No	Burak, and Filiz
Based on purpose	Derya, and Ece

It was asked to the participants whether they concede the distribution of tablets to students within FATIH project in terms of CAI or not. In addition, they were asked to explain why they think in this way. Firstly, Adem supported that tablet distribution will have positive effects in terms of CAI especially in the future years. Likewise, Canan stated that if class size is organized positively, tablets may have positive contributions to CAI. She stated that "*I mean the class size has to be small in that the teacher can follow every student.*"

Burak and Filiz mentioned that they do not concede the tablet distribution in terms of CAI. For example, Burak responded as "*It is very difficult to provide students' motivation. In reality it is so difficult to draw the attention of students, I mean to dominate classroom is very difficult. For example, when there are tablets in front of the students, I don't think they would listen to me at all.*" Filiz explained that she do not find tablet distribution as useful as "*I don't find in fact. Because my brother/sister also goes to high school. S/he only plays game on the tablet. S/he was already playing games on the computer all the time s/he now also catched the tablet. I ask how you use the tablets in the course. S/he said that teacher sometimes says you can download that but no one is doing. I think it is just like a game tool. I think the system did not settled. ...*"

Derya and Ece stated that they find tablets useful if they are used in accordance with the purpose and if it is provided the tablets in terms of CAI, otherwise they did not think that they are not useful. For instance, Derya answered as "*When it is used in accordance with intended purpose, I don't think it has a harm. However, when it deviates from the aim, it has some problems based on deviation direction.*"

RESULTS AND DISCUSSION

It was aimed to investigate pre-service science teachers' views regarding computer-aided instruction in this study. In accordance with this purpose, firstly, it was identified that when and where pre-service teachers met computer. Whilst Burak and Ece met computer in the primary school, the others encountered it in high school for the first time. Starting from the obtained data, it is concluded that pre-service teachers met computer at early ages and this introduction developed their computer usage skills. Indeed, numerous studies in the literature found that the sooner teachers met technology, the more professional they use the computers in their lessons (Galanouli, Murphy and Gardner 2004; Levine and Donitsa-Schmidt 1998; Potosky and Bobko 2001; Rozell and Gardner 1999). Likewise, Özgen and Bindak (2012) determined that having a personal computer at early ages and the computer program use frequency improve the person's computer usage skills. From this point of view, it can be said that the pre-service teachers who started to use computer at an earlier age may use CAI in their lessons more effectively when they become teachers in the future.

Ece and Filiz attended a course regarding computer before starting undergraduate education. Consequently, it is thought that the course taken contributes to the activities and homeworks of their university lessons and teaching practice. On the other hand, considering the points given by participants indicating their level-of-computer usage (Table 11), it is seen that attending a course regarding computer in the past does not make a difference at distinctive level in terms of the participants of this study.

One of the most important results of this study is that "Basic Computer" lessons given in undergraduate education does not contribute to both teaching practices and computer usage skills. Betrus and Molenda (2002) determined that education faculties in the world have been teaching technology to the pre-service teachers for a long time, but there is incoordination between the pre-service teachers' acquisitions on technology and the teachers' implications of technology in their lessons. Also, in the present study, only one of the participants (Burak) stated that he find this lesson adequate, the others justified the view that "Basic Computer" lesson does not contribute so much by showing the reasons that lesson is taught using wrong method and the lecturer is ineligible in this field. Generally, all of the participants suggested that this lesson should be taught in parallel with teaching practices and it should be practiced frequently rather than being theoretical. When the literature is reviewed, it is underlined that "Basic Computer" lessons given in education faculties are very important in terms of computer usage skills (Dupagne and Krendi 1992; Torkzadeh, Pflughoefl and Hall 1999).

It was concluded that the homeworks or activities done in pedagogical formation lessons taken in education faculties during four years contributed to computer usage and teaching profession and pre-service teachers have learned in these lessons how to use computer and computer programs better. In parallel with this result, Gündüz and Odabaşı (2004) suggested that especially "Instructional Technologies and Material Development" course is a device which makes teachers use technology in their lessons more effectively. Hence, this course needs to be taught more efficiently during undergraduate education both theoretically and practically. Similarly, in the literature, many researcher also concluded that pedagogical formation courses should be instructed via computers since teachers integrate computers into their courses better thanks to these lessons (Galanouli, Murphy and Gardner 2004; Jedeskog and Nissen 2004; Jung 2005; Strickland and Coffland 2004). Additionally, in Jung's (2005) study, the teachers stated that they wanted to take the applied lessons based on computer and pedagogy and the integrated lessons instructed in cooperation with computer and pedagogy more frequently.

It is an indisputable fact that computer-aided instruction enhances meaningful learning and success of the students (Hughes 1974; Starkings and Krause 2008; Woodard 2003). Thus, in this study, pre-service science teachers (Adem, Burak, and Ece) mentioned that CAI will enhance the students' meaningful learning and success.

Based on the results of this study, pre-service science teachers labeled the positive sides of CAI as it visualizes the lesson, appeals to multiple senses, enhances meaningful learning, provides saving of time and contributes to safe experimentation. These results are parallel with the results of the studies of Starkings and Krause, (2008) and Woodard, (2003). When the negative sides of CAI were examined in the direction of views of great majority of pre-service science teachers (Burak, Derya, Ece, and Filiz), it was concluded that when teachers are inadequate in terms of CAI, their teaching activities may get into trouble. For instance, pre-service science teachers stated that the teacher will use computer ineffectively since s/he is inadequate with regards to CAI and this may cause the lack of time. Similarly, Saka and Akdeniz (2006) concluded that CAI

activities require a skill in terms of computer usage and the science teachers who have not this skill may get into trouble in terms of time.

Participants stated that the teachers who know how to use Word, PowerPoint and Excel from "Microsoft Office" programs would use CAI in their science lessons effectively. In addition to this, participants specified that they find themselves inadequate in terms of animation preparation. Accordingly, they put emphasis on importance of animation in science education and stated that the teachers should use animations in science classes. Additionally, the participants also stated that they need to take a course about animation preparation in education faculties. When the literature was reviewed, it was concluded that animations improve meaningful learning in science courses (Demirci 2008; Gregorius, Santos, Dano and Gutierrez 2010; Karaçöp, Doymuş, Doğan and Koç 2009).

The participants who were asked for their opinions within "FATIH Project" stated that the students do not use tablets for the purpose of them, but if tablets are utilized for the purpose, they will be useful. Hu, Clark and Ma (2003) stated that teachers resist to the instructional technologies. Being one of the reasons of this, researchers stated that the teachers did not take a sufficient education on this topic in their pre-service education period. Additionally, in the present study, Burak, Derya, Ece and Filiz stated that the teachers in the practice schools are insufficient in terms of smart board and tablet usage. Many studies in the literature determined that the teachers are insufficient regarding technology use (Al-Bataineh and Brooks 2003; Gorder 2008; Jung 2005; Pina and Savenye 1992). Al-Bataineh and Brooks (2003) suggested that pre-service teachers should take sufficient lessons in terms of CAI and curriculum should be arranged considering CAI. Similarly, Cüre and Özden (2008) stated that teachers have serious insufficiencies regarding the use of information and communication technologies.

In addition, although Kreijns, Kirschner, Jochems and Buuren, (2007) and Hyun (2005) stated that technology-aided group works have positive effects on students in terms of social, friendship and communication, in this study the participants stated that the distributed tablets in FATIH project will cause problems for children in terms of social-communication and friendship. Additionally, the participants mentioned that if each student has a tablet in a lesson, teacher will get difficult in terms of classroom management and the students will use tablets game-purpose rather than lesson-purpose. In terms of health, the participants said that tablets will cause problems especially regarding eye health.

In conclusion, "FATIH Project" is a developing project in Turkey and its in-class practices have not exactly been revealed yet. Therefore, it is inevitable to have the negativities. The overall result on this topic is that making the project applicable directly without covering it in detail brought and will bring some troubles (Altan and Tüzün 2011; Pamuk, Çakır, Ergun, Yılmaz and Ayas 2013).

SUGGESTIONS

During this period that we call technology era, the computer has been an indispensable tool in education, as it is in every field. For this reason, we have to educate future students with this understanding. Of course, before the students, teachers who educate the next generation, should use computer and CAI in their lessons effectively. Therefore, it is very important to improve both computer lessons taught before the university and "Basic Computer" lessons taught in the education faculties. In addition, computer lessons in high schools should be considered important, and the students should be able to use basic computer programs in a good way before going to the university. Lessons based on computer should be implementation-oriented rather than theoretical. Additionally, pre-service teachers should be emphasized how to integrate the computer skills into their future lessons (CAI) as practically in computer lessons in education faculties. In other words, elective courses besides basic computer lessons should definitely be suggested to the pre-service science teachers and pre-service teachers should be taught how a person can use computer effectively in terms of pedagogy in this elective course.

Based on the data obtained in this study, it can be concluded that even our newly graduated pre-service teachers have some troubles in the use of smart boards. To resolve this problem, more extensive seminars should be given to in-service teachers, it should be aimed that every teacher should be able to use smart boards easily.

In order not to cause the tablet computers distributed within "FATIH Project" to the troubles mentioned in the study and to provide to use it in the direction of purpose, a cooperation of teacher-student and parent should be executed and students' tablet usage should be got under control.

The following suggestions are related to for further researches that will be conducted about this topic;

- Since this study was conducted via qualitative research method, the same topic can be investigated via quantitative methods in order to receive opinions of more people. For example, the computer adequacy of pre-service science teachers can be measured with quantitative methods.

- As it was mentioned in validity-reliability part of the research, data triangulation was not covered in this research. Therefore, much more data collection tools should be used.
- This study was carried out with only pre-service science teachers. This study can also be conducted with other pre-service teachers (e.g. mathematics).

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