STUDENT TEACHERS' PERCEPTIONS ON EDUCATIONAL TECHNOLOGIES' PAST, PRESENT AND FUTURE

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ABSTRACT

The aim of this study is to reveal Computer Education and Instructional Technologies student teachers', who are in a distance teacher education program, perceptions on past, present and educational technologies of future via infographics. In this study, 54 infographics, which were created by student teachers who were enrolled in Special Teaching Methods II course at spring semester of 2013-2014 academic years, were analyzed. The infographics were analyzed via document review technique. These themes are "Educational technologies of past" (*f*=241), "Educational technologies of present" (*f*=240) and "Educational technologies of future" (*f*=158). Student teachers mentioned the most frequently "CD" (*f*=34) and "Television" (*f*=32) oriented to educational technologies of past. The most frequent views on educational technologies of present were "Smartboard" (*f*=24) and "Online Courses" (*f*=23). The most frequent opinion of student teachers about the educational technologies of future is "Holograms" (*f*=26) and "Virtual classroom" (*f*=22).

Keywords: **Infographics, educational technologies, classrooms of future.**

INTRODUCTION

Lots of technologies are tried to use for education from 1900s till today. One of the technologies used for education at early 21st century was videos. Radio was started to use in education environments and led to great expectation between 1920 and 1930, however its effect was so limited (Cuban, 1986). In conjunction with 2nd World War, using audio-visual technologies for education became popular. At the beginning of 1950s television was commonly used but yielded to computers in a decade (Reiser, 2001). Because of this, 1950s are one of the important date for educational technologies. However, computers were not so commonly used for education till 1980s, they are still one of the most used technologies. Fast-growing technologies from invention of Internet at 1955 till today gathered great importance (Reiser, 2001). Addition to these, lots of tools were started to use for education associated with transition from Web 1.0 to Web 2.0 such as social networks, blogs, wikis (Jimoyiannis, Tsiotakis, Roussinos & Siorenta, 2013). From this point of view, it is seen that there was a rapid growth till today.

According to Mishra, Koehler & Kereluik (2009), the idea of that each of new technologies was the best and it would spark off an educational revolution is continual for a long time.

As Green & Gilbert (1995) says, the expectation that each new technology would enhance teaching and learning causes this. It can be said that this expectation can be met as long as teachers' expectations from these technologies and technology competencies are taken into consideration. In literature, some predictors of technology use in education environments are that teachers should be aware of technologies, be open change and innovation, think they are useful (Chen, 2008; Ertmer, 2005; Vannatta & Nancy, 2007; Wozney, Venkatesh & Abrami, 2006). Similarly, Aldunate & Nussbaum (2013) stated that teachers' adoption of new technologies has an important role in education process, and the teachers who used technologies for teaching and learning tend to adopt new technologies.

When considering historical development of educational technologies and that teachers are one of the sharers of technology use in education environments, it can be said that investigating student teachers' perception on terms of educational technologies is important. The main purpose of this study is to reveal Computer Education and Instructional Technologies (CEIT) student teachers', who are in a distance teacher education program, perceptions on "educational technologies of past, present and future" via infographics. Infographics, can be identified as informative graphics, are graphs that are useful for transferring the gained knowledge, data and experiences in a visual way (Meyer, 1997; Smiciklas, 2012). Accordingly, it was thought that their perceptions could be revealed by this way. It is believed that the perceptions of student teachers on these subjects are important both educational literature and implications. Knowing the perceptions of instructional design and education systems audiences' may be useful and helpful for learning and teaching processes.

METHODOLOGY

Research Design

Document review method in frame of qualitative research approaches was conducted for this study. Document review is a method that employed when there is no opportunity for direct observation or interview, or it is so hard, covered examining and evaluating written or visual materials and stuffs according to some criteria (Bogdan & Biklen, 1998; Creswell, 2012). For this study, the opportunity of direct observation and interview could not have gained because participants and researchers were at different places in a distance education program. In addition, it is decided by researchers that infographics were employed to reveal student teachers' perceptions on a concept for this study. In this situation, the created written and visual materials were needed to be examined. Started from these points of view, it was decided that the best fit model for this study was document review.

Participants

The study was conducted with 65 student teachers who were taking Special Teaching Methods II course at 2013-2014 academic year, spring semester via distance education. 59 of these student teachers participated to the study by creating infographics, and 54 of these infographics were included into analysis process because of that they had the features of infographics and they oriented with research topic and purposes. The participants were chosen by conducted convenience sampling method, one of purposive sampling methods. Convenience sampling is a process, which is chosen the units related with research topic and can be reach in an easy way (Siklar & Ozdemir, 2013). Firstly, it is needed that student teachers gained some technological knowledge about how to create infographics to use for this study. In the meantime, having knowledge about educational technologies, which is the main topic of the study, is important, too. During the process of training student teachers on the aforementioned competencies, for progressing the research process without influencing their perceptions, it is needed that the researcher, who collecting data, should be known and trusted as far as committing themselves in a direct way by student teachers (Glesne, 2013). Providing these conditions for a new audience has some difficulties in the aspect of time and opportunities. For this reason, the data were collected during Special Teaching Methods II course, which lectured by one of the researchers and the content of one weeks' semester was "Educational Technologies and Basic Concepts".

Preventing that researchers influenced the nature of research in conjunction with smoothing out research process were provided thanks to aforementioned conditions. The main purpose of determining the participant as CEIT student teachers is that they have the necessary technological competencies for collecting data process.

Data Source and Process

The information about research process were given to the participant, who were determined based on aforementioned criteria, before starting to collect data. It was made a commitment on the subjects with participant student teachers that participating to the study was based on voluntariness completely, they can stop sharing of infographics created by their own and at a platform where chosen by student teachers when they want. The data sources of the study recorded by the researchers such as infographics, personal information, and the links are going to be shared no one not within participant student teachers' knowledge. In addition to these, it is asked student teacher to create an infographic, which would have exemplified educational technologies of past, present and future. On this infographic, past would have explained between the years of 1950 and 2000s' educational technologies, present would have explained between the years of 2001 and 2014s' educational technologies and future would have explained between the years of 2015 and 2050s' educational technologies. Under the aforementioned conditions, 59 student teachers participated to the study thereby confirming to create infographics. Five visuals excluded from the analysis process because of that these visuals did not have being an infographic features. Thus, the analysis process conducted with 54 infographics created by student teachers. Some of these infographics have been presented at Appendix 1.

Data Analysis

When analyzing the documents, deductive analysis was conducted. During deductive analysis processes, the data are analyzed according to an existing frame- work (Patton, 2002). The main themes of analysis were determined as "The educational technologies of past", "The educational technologies of present" and "The educational technologies of future", and the frequencies of codes, which were situated under these themes, were examined. After the examination of frequencies of codes, it was tried to interpret what the codes express under which theme by the researchers. The documents of this research are infographics created by student teachers. The document in other words the data source was infographics because the main purpose was "revealing the perceptions of student teachers on the educational technologies of past, present and future" and the visuals are useful to reveal individual perceptions on a concept. For these reasons, a data purging process was conducted at the beginning of analysis process. The infographics collected in this context were examined whether they had infographic features and they were related with research topic and purposes, or not. If an infographic was not related with research topic and purposes or did not have infographic features, it was excluded from data source. The valid 54 infographics were analyzed via deductive analysis.

FINDINGS

In the context of current study, student teachers created 639 views, in other words codes totally via infographics. These views were fallen under three different themes. These themes are "Educational technologies of past" (f=241), "Educational technologies of present" (f=240) and "Educational technologies of future" (f=158). The infographics codes were analyzed in a grouping manner that "Educational technologies of past" theme covered between the years of 1950 and 2000, "Educational technologies of present" theme covered between the years of 2001 and 2014, "Educational technologies of future" theme covered between the years of 2015 and 2050. Figure 1 presents the distribution in terms of percentage of these themes' codes in a perspective of themes.

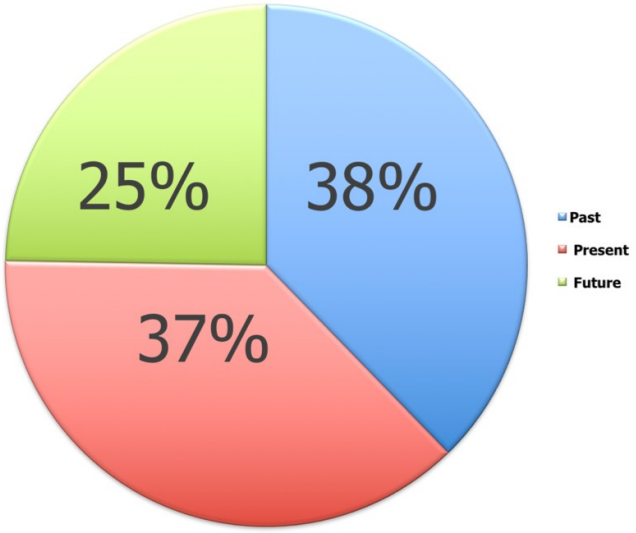

Figure 1. The distribution of student teachers' views on educational technologies of past, present and future

As shown at Figure 1, student teachers were created views or codes about educational technologies of past the most frequently (%38; *f*=241). Student teachers created views under the educational technologies of present theme (%37; *f*=240) by a narrow margin both percentage and frequency aspect. On the other hand, they created views about educational technologies of future (%25; *f*=158) the least frequently. But, it is believed that the created views are so important to reveal student teachers' perceptions on educational environments or technologies of future when views or codes and their frequencies, which are under this theme, are examined. When considered from this point of view, examining the codes under themes gain importance. The distribution of views gathered in the frame of research topic under the three different themes is presented below.

Student Teachers' Views on Educational Technologies of Past

"Educational technologies of past" concept is used in the meaning of the technologies that they were used in the past for education or still are being used, but thought they were and had to been in the past by student teachers. In other words, the codes which thought they could not keep up with current educational needs and system or there are more efficient technologies instead of them by student teachers, are located under this theme. Student teachers suggested 30 different views with different frequencies under this theme. Aforementioned views and their frequencies are presented at Table 1.

Table 1. Frequencies of Student Teachers' Views on Educational Technologies of Past

Educational technologies of past	*f*	Educational technologies of past	*f*
CD	34	Teleconference	3
Television	32	Calculator	3
Wireless telephone	22	Blackboard	2
Computer	19	Microchips	1
Basic programming language	19	Internet	1
Magnetic tape	15	Library	1
Photocopy machine	14	Telegraph	1
Mouse	14	Models	1
Slide Projector	11	Headphone	1
Sesame Street	11	Chalk	1
Radio	10	Book	1
PDA (Personal Digital Assistant)	6	Notebook	1
SMS (Short Message Service)	6	Sidney Pressey's teaching machine	1
Letter	4	Video camera	1
Optical reader	4	Disc	1
Total			241

Student teachers mentioned the most frequently "CD" (*f*=34) and "Television" (*f*=32) oriented to educational technologies of past. The most interesting finding oriented to the educational technologies of past can be that an entertainment TV program named as "Sesame Street" (*f*=11) was indicated as an educational technology by student teachers. "Sidney Pressey's teaching machine" was administrated multiple-choice questions and students' answers to these (Pressey, 1963). Pressey worked up this machine in time into a machine, which gave feedback and taught via questions. But this machine is not accordance with constructivist and connectivist learning because it was designed within the frame of programmed learning. This situation was verbalized by one of the student teachers.
In addition, there are same views under different themes. These views highlighted at Table 1 with red color. "PDA", "SMS" and "Internet" technologies were coded under both past and present technologies. The whole views on educational technologies of present is presented below.

Student Teachers' Views on Educational Technologies of Present

Educational technologies of present point out the technologies, which are being used educational environment currently. Participant student teachers mentioned some technologies, which there were but not used for educational activities yet, and if they used, they can be gained favor. These technologies were examined under this theme, as well. Student teachers created 29 different codes in other words views under this theme with different frequencies. Aforementioned views and their frequencies were shown at Table 2.

Table 2. Frequencies of Student Teachers' Views on Educational Technologies of Present

Educational technologies of present	*f*	Educational technologies of present	*f*
Smartboard	24	Electronic note-book	4
Online courses	23	Web 3.0	3
Internet	22	Data projector	3
e-Mail	22	Smartphone	3
e-Book	19	Wearable technology	3
Automatized classroom	19	Smart classroom	3
PDA	15	Google	1
e-Newspaper	13	Student response system	1
Fiber optic cables	12	Pocket PC	1
Tablet PC	11	e-Learning	1
Video	8	e-Teacher	1
Laptop	8	Smart toys	1
Web 2.0	7	Mobile learning	1
Social networks	5	Built-in microphone	1
SMS	5		
Total			240

It is attracted the attention that some of student teachers' views at Table 2 were highlighted with different colors. Colorization was originated differences of student teachers' views. Some student teachers identified some technologies which were identified educational technologies of past as educational technologies of present. This situation pointed out at Table 2 with red color. For example; while there is one student teacher, who identified internet as educational technologies of past, 22 student teachers identified internet as educational technologies of present.

A similar situation was observed at the point of PDA and SMS codes. Some student teachers believed these technologies are educational technologies of past, some of them thought these are educational technologies of future. In other words, the classification of "PDA" (f_{past}=6; $f_{present}$=15) and "SMS" (f_{past}=6; $f_{present}$=5) technologies caused an opinion difference among student teachers, too. These differences highlighted at Table 2 with green color.

The most frequent views on educational technologies of present were "Smartboard" (*f*=24) and "Online Courses" (*f*=23). One of attractive findings under this theme is that student

teachers took up with smartphones as an educational technology of present. Moreover, it can be said that the finding of e-teacher is one of educational technologies of present according to student teachers is so important for both formal and distance education systems. It can be assumed that both systems intermixed gradually.

Student Teachers' Views on Educational Technologies of Future

Educational technologies of future inferred the technologies, which will take place in educational environments according to student teachers. In other words, student teachers suggested that these technologies, which were listed infographics at the year of 2015 and to the end, and examined under "educational technologies of future" theme, would being used for educational activities at future. It can be predicted that student teachers, who will be teachers in the future, will take the advantage for educational activities from these technologies, which they identified as educational technologies of future.

Student teachers created different 33 views under the educational technologies of future theme. Total frequencies of these views calculated as 158. Aforementioned views and their frequencies were demonstrated at Table 3.

Table 3. Frequencies of Student Teachers' Views on Educational Technologies of Future

Educational technologies of future	*f*	Educational technologies of future	*f*
Holograms	26	Mobile learning	2
Virtual classroom	22	Virtual studios	2
Real e-books	18	Neuro-informatics	2
Fiber plastic desks	15	Printer without ink	2
Forbidding published book	14	Kindle	2
Artificial intelligence	6	Virtual habitat	1
Human robots	5	5D classrooms	1
3D classrooms	4	Smart desks	1
Communication with brain waves	4	Power-pen, saves printed info	1
Biometrical technologies	4	Teacher	1
Nanotechnology	3	Laser pens	1
Wearable technology	3	GPRS dress	1
Virtual reality	3	Keyboard, detects eye movements	1
Smart table	3	3D printer	1
Augmented reality	3	Retinal screen	1
Smart computers	2	Affective internet technologies	1
Eye-tracking	2		
Total			158

The most frequent views of student teachers about educational technologies of future was "Holograms" (*f*=26). Besides, "Virtual classroom" (*f*=22), "Real e-books" (*f*=18) and "Fiber plastic desks" (*f*=15) were dwelled on educational technologies of future frequently by student teachers. When examining the classifications of educational technologies of present and future, it was seen that "Wearable Technology" ($f_{present}$=3; f_{future}=3) and "Mobile Learning" ($f_{present}$=1; f_{future}=2) suggested under both themes. The findings related with this situation highlighted at Table 3 with green color.

It was observed that student teachers made 33 different views under this theme. This situation shows that student teachers declared more various views than the other two themes from the point of view variety. That the total frequency of views is 158 shows not being gathered around some views besides student teachers have a large variety of views. In other words, it can be said that student teachers have got ideas on educational

technologies of future in a large variety, but their ideas on educational technologies of future are not gathered around one or more than one views.

It is known that student teachers created 29 views under the educational technologies of present theme, 30 views under the educational technologies of past theme and 33 views under the educational technologies of future theme. In other words, educational technologies past and present themes have less various codes than educational technologies of future. This can be alleged that student teachers reach a consensus nearly on educational technologies of past and present. Despite this consensus, when the variety of views is considered separately, the variety of views has a great number under the themes. This situation can be clarified by means of both being in a distance education program, so their ideas and views are not affected by each other, and having different learning experiences. Differentiated perceptions on educational technologies and varied ideas of student teachers can be approved normal because of aforementioned reasons.

DISCUSSIONS AND CONCLUSION

Within the scope of current study, perceptions on educational technologies periods of student teachers who are in a distance education program were examined. Participants considered "CD" (*f*=32) and "Television" (*f*=32) as educational technologies of past most frequently. This situation could prove that aforementioned technologies became old and lost their efficiency obviously. It can be said that online materials took their place step by step. Studies on open access online courses such as OERs, MOOCs, LOOCs were figured in literature. Lots of studies express their advantages (Bozkurt, 2015; Firat, 2016; Rodriguez, 2014). Suggesting the most frequent views of educational technologies of present are "Online courses" (*f*=23) supported this idea. From this point of view, it might be said that student teachers benefit from online courses and think they were useful for learning.

The most remarkable findings of study may be foresights of student teachers' educational technologies of future. Student teachers dwelled on some technologies such as "Hologram" (*f*=26), "Virtual classroom" (*f*=22), "Real e-books" (*f*=18) and "Fiber plastic desks" (*f*=15). This situation reveals student teachers' foresights and expectations on future classrooms. Surprisingly, "real e-books" suggested under this theme. This finding can show student teacher think about that accessed e-books have not enough features for learning and expect that these books should be presented more featured and efficient in the future.

The most frequent views were created under educational technologies of past (*f*=241) and educational technologies of present (*f*=240) themes. The main reason of this may be that people can give opinion on their experiences easier and more efficient than foresights. Student teachers created views under educational technologies of future (*f*=158) at least by the favor of same point of view. Moreover, it is attracted attention that the codes are quite innovative approaches under the theme when examined suggested educational technologies of future. Starting from this, it can be said that student teachers who are going to teach in the future classrooms attach great importance to use technology in classrooms, they have high-expectation on educational technologies, and these situations would be have positive impact on future education environments.

When the findings of current study were examined holistically, the technologies used or can be used for distance education systems were created as codes quite predominantly. This situation may arise from participants were in a distance education program. Apart from these views, student teachers also created views directed face-to-face education such as "Fiber plastic desks", "3D classrooms". Starting from these views, the opinion on the classrooms equipped with advanced technology is common highly, even. However, studying on this idea has a great importance. As Akkoyunlu (2002) stated, in order to use educational technologies effectively, teachers should be trained in the use of technologies and their integration into the teaching/learning process. At this point, it is suggested that current study is supported through action researches with student teachers and compare findings with this study.

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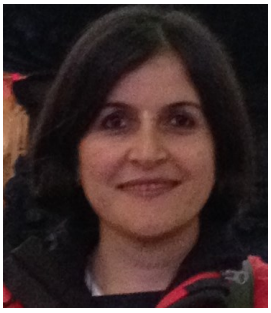

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APPENDIX

Some of infographics created by participant student teachers