Pre-Service Science Teachers' Views About Technology in Educational Settings

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1. Introduction

Today, it is an undeniable fact that pre-service teachers should be competent in terms of technology. Each year, it is seen that primary school students have more knowledge/experience in technology. Therefore, their teachers' knowledge and skills in technology competence should increase as well. The first step to maintaining this is to improve pre-service teachers' competency in technology without considering the branch of teaching. Additionally, it is seen that developments in the use of technology are reflected in the instructional programs of countries. In Turkey, the use of technology takes up a lot of space in the science and technology curriculum, which has been put into practice gradually since the 2005 – 2006 academic year. According to the Ministry of National Education (2006, p.8) technology is not just devices like computers and their various practices but a type of information that makes use of concepts/skills obtained from many disciplines (science, math…etc.). It also involves making use of information for humanity, which is acquired in order to solve a certain problem or meet an identified need using materials, energy and tools [1]. Hopson, Simms, & Knezek (2002) define technology as a catalyzer for restructuring and planning a classroom setting that ensures improving students' high level of thinking skills [2]. Peck & Dorricot (1994, p.12) summarize technology applications as "allows students to independently organize, analyze, interpret, develop, and evaluate their own work" while mentioning the reasons for using technology [3].

Technology integration in education has been discussed since the 1990s. A large number of previous studies have discussed the values and the advantages of using technology in education. Additionally, the importance of preparing pre-service teachers for technology integration has been emphasized frequently [4, 5]. Since teachers are the key factors for effective use of technology in education, it is important to take their ideas about technology and the place of technology in education. Pre-service teachers', in other words teachers of the future, perception of technology can be thought of as the indicator of to what extent they would use technology in their courses. In addition to this, identifying pre-service teachers' opinions about technology's place in the education system and for what reasons it should be a part of the system may provide ideas in terms of appropriateness of these ideas to the goals of the curriculum. Therefore, this study aimed to investigate pre-service science teachers' views about the technology and use of it in educational settings.

2. Method

The present study, which was performed for the purpose of identifying pre-service science teachers' opinions about technology and its place in the education system, is a qualitative study. Qualitative studies enable a viewing of the subject from the perspective of participating individuals and put forth the social structure and processes that make up these perspectives [6]. The study was conducted in the fall semester of the 2010–2011 academic year in an Education Faculty in the Aegean Region of Turkey. Twenty-nine pre-service science teachers studying in the fourth grade participated in the study. Volunteering was essential in determining the participants of the study. As the data gathering instrument, open-ended questions and semi-structured interviews were used. Semi-structured interviews were made with nine pre-service science teachers selected from the study group. Content analysis was used in order to analyze the responses to the open-ended questions while descriptive analysis was used for analyzing the semi-structured interviews.

3. Findings

The findings of the study were examined under two main headings as "findings regarding the way pre-service teachers define technology" and "findings regarding pre-service teachers' opinions on the place of technology in the education system". Results obtained from semi-structured interviews were assessed and interpreted together with responses to the open-ended questions and direct quotations were made from students' responses.

3.1. Findings Regarding the Way Pre-service Teachers Define Technology

When the pre-service teachers' opinions on the definition of technology examined, it is seen that pre-service teachers have different opinions and generally make definitions that emphasize some basic characteristics of technology. These definitions were grouped in terms of content and gathered around themes as facilitator, property, development and access to information. These themes were compared and the facilitator theme became significantly prominent. More than half of the pre-service teachers (f =17) defined technology as facilitating human life/living conditions. Similar expressions were made in the semi-structured interviews conducted. For instance, pre-service teacher I expressed the following: "*What comes to my mind when technology is mentioned in facilitating life*" while pre-service teacher F said "*technology is convenience; it facilitates several things in our lives*". Furthermore, some pre-service teachers (10.4 %) associated the concept of

technology with scientific development, some (8.3 %) dwelled on the aspect of its being time saving. Some of the pre-service teachers who underwent semi-structured interviews generally defined technology in terms of its place in the education system and identified it with computers or computer assisted systems and the internet. Pre-service teacher E who stated a similar view, told "*When technology is mentioned, I remember power-point and the internet. Also, it is the things that help people communicate with each other, like telephone, fax…etc.*". Another pre-service teacher H, who expressed a similar view, said "*technology is the tools used to ensure students learn certain information more easily and for visual purposes completely*".

3.2. Findings Regarding Pre-service Teachers' Opinions on the Place of Technology in the Education System

Pre-service teachers generally tried to explain the place of technology in the education system by talking about the benefits of technology and stated that technology would provide many benefits for education. Even some of the pre-service teachers (f=8) stated that technology is the indispensable part of education. When gains in the education system theme are examined, it is seen that pre-service teachers stressed the following points: contributing in education (10.8 %), supporting time management (4.0%), ensuring system improvement (2.6 %) and increasing efficiency due to the collaboration of education and technology (2.6 %). A great majority of pre-service teachers (f=24) presented different views on gains in the learning – teaching process. When these views are examined, it is seen that the most emphasized view is that learning and teaching will become easier (f= 8). Furthermore, pre-service teachers think that thanks to technology, presenting different activities such as simulations and maintaining visualization are possible. The findings of the semi-structured interview also support this result. To illustrate, pre-service teacher A expressed his/her view on technology's place in the education system by exemplifying the use of computers and simulation: "*Technology should definitely be used in education. For example, when you think of atoms, photos or models of atoms may not be enough but using computer simulations to teach them may be more comprehensible*".

Within the scope of the theme (information – learning gains), pre-service teachers stated opinions regarding the place of technology in education particularly on the issues of enabling learning (f=4), increasing permanence in learning/information (f=3) and enabling reaching information faster (f=2). Thinking that technology helps us understand better, pre-service teacher G, said: "*conventional and modern instruction methods are very different. When technology is used students understand better. Previously, the presentation method used was popular and subjects were presented superficially. Today, students both construct knowledge and create an infrastructure for their own learning thanks to technology.*"

It is seen that some of the pre-service teachers associated their views on the place of technology in the education system generally with student gains. When responses of the pre-service teachers giving opinions in this way are examined, it is seen that they believe that technology increases student activeness. Pre-service teacher D expressed his opinion on the issue as follows: "*I think technology is essential in education. Technology has certainly a great place in a classroom setting for the students to be active at school, and for them to see the models and to be presented with more examples from daily life.*" Some of the pre-service teachers with whom semi-structured interviews were associated technology with appealing to more sense organs. Pre-service teacher H said: "We can make both visual and auditory presentations to students through technology. Thus, I think we can attract more sense organs*".* Some of the interviewed pre-service teachers explained technology's place in education with the contribution it makes in associating the issue with daily life. Pre-service teachers I's view is a good example of this: "*If we claim that updating in education, in other words, making associations with daily life is important and if technology is already in our daily lives, it is impossible to distinguish technology from education. Indeed, we access technology due to our needs and education is a need as well. Therefore, I think technology and education cannot be thought of separately.*"

4. Discussion and Conclusion

When studies on opinions and practices of pre-service teachers regarding technology's integration in education are examined, it is seen that generally similar findings have been put forth. In a study by Choy, Wong and Gao (2009), it was emphasized that pre-service teachers were positive in terms of using technology in their future courses and considered technology as a contributing tool in their courses [7]. In another study by Willis and Sujo de Montes (2002) teacher candidates defined technology as a beneficial tool for personal and professional development [8].

In the present study, while defining technology, pre-service teachers commented most on the fact that technology is a tool that facilitates learning – teaching activities, and as it can be understood particularly from the expressions in the semi-structured interview, they talked about technology's characteristics as being facilitatory, increasing visuality, being attractive. However, it can be said that pre-service teachers need to see far beyond technology's being a facilitator in education or defining it as a tool. In this respect, pre-service teachers are expected to realize their ideas about technology integration [7] and develop their technological pedagogical content knowledge and also they need to be given opportunities towards such practices [9]. Microteaching practices can be given as a good example that can provide an opportunity for pre-service teachers to gain this experience. Some researchers emphasized that during microteaching practices, pre-service teachers should be given opportunities to plan and implement student-centered learning activities developed with technology both under the supervision of university instructors and consulting teachers [7, 10]. During this process, primarily the university instructors and consulting

teachers should be competent and in this case, they should assist pre-service teachers in using technology in a real classroom setting. It can be suggested that in order to maintain cooperation among these shareholders, there should be sharing across disciplines (e.g. Computer Education and Instructional Technology and Science Education departments), university and school cooperation should increase, and practices with regards to developing university instructors' knowledge, competency and skills should be made. Also, more specific method courses regarding the use of technology in education should be taught at education faculties, and in this way pre-service teachers' technological pedagogical content knowledge can be increased and observations can be made by implementing model practices on the issue. As well as these, it is stated in some studies conducted in Turkey that technology's integration in teacher education is not sufficient [11, 12]. It is not surprising that people educated in settings where technology could not be fully integrated in education consider technology merely as a tool. In this case, it can be said that detecting the level of technology's integration in education and observing the reflections of this in a real classroom setting while interpreting the findings accordingly will provide more accurate results.

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