Pre-Service Science Teachers Views On Materials Developed In Instructional Technologies And Material Development Course

Ali ÇETİN
Faculty of Education
Siirt University,Turkey
alicetin@siirt.edu.tr

ABSTRACT

This qualitative study was designed to introduce 3-dimensional and digital materials to pre-service science teachers and identify their views about them. In this context, three projects was performed with 42 pre-service science teachers (13 male- 29 female) who took Instructional Technologies and Material Development course in Elementary Science Education Department in Siirt University. First project was to prepare a movie by using photos and music, second one was to prepare a power-point presentation that contains an animation and their own sound and third one was a 3 dimensional material that can be used during class time. Four open ended questions were asked to all participants to obtain their views about these materials. The results were analyzed with the conventional content analysis. Results indicated that most of the participants believe that the digital material prepared in project 1 enhance retention and take students' attention. In project two, participants thought that the digital material facilitates learning and save class time for teacher. In project 3, while 78% of participants thought positive for the 3 dimensional materials and claim that they facilitate learning and enhance retention, 22% of participants thought negative about these materials and claim that preparing these materials need too much time and effort. In the last finding, "which type of material are preferred by pre-service science teachers in their future life" were asked and 57 % preferred 3 dimensional materials, 19 % preferred digital materials and 24 % preferred both.

Keywords: Material Development, Instructional Technologies and Material Development, Digital Course Materials

INTRODUCTION

The improvement in technology directly affects our life in a broad range of activities like in education field. Technology related aims of education includes that educate individuals to develop their skills about the use of technology and to follow the technological developments. In education faculties, a course, instructional technology and material development, is taken by all pre-service teachers to understand new technologies and materials (Kaya, 2006). Pre-service teachers have some opportunities to apply new technologies in a classroom setting and must also be shown that the use of technology can be more efficient and effective than traditional methods (Şahin, 2003). Course materials may force students, who don't understand, into brainstorming exercises, and create a more congenial classroom environment than formal lectures (Felder, 2002) and these materials shape what students learn (Ball & Cohen, 1996).

"Instructional technologies and material development" is a 3rd grade course and including two hours theory and to hours application. The definition of the course is made by National Higher Education Institute as determining the properties, the place and the usage of materials in education, developing instructional materials by using technologies and evaluating different kinds of materials (YÖK, 1998). Theory part of this lesson includes the subjects of communication skills, method and strategies during instruction, materials, presentation materials, course books, radio, television and other materials, computer based sources, power point, internet and web based learning (Kaya, 2006). In application part, students' prepare their own projects to develop instructional materials.

Karamustafaoğlu (2006) states that although science teachers know the importance of instructional material use in class, they do not make an effort to enrich the classroom environments by using these materials. Similarly, Yılmaz (2007) states that teacher have some deficiencies about the use of technological materials in their

classrooms, so he recommends that the required importance should be given to "instructional technologies and material development" course in education faculties.

Güven (2006) evaluated the qualifications of instructional development and material development course. In the conclusion of the study, she states that while participants improve their skills in cognitive and affective domain, they have deficiencies in psycho-motor domain and computer based materials. This situation was discussed by Güven as the instructor may not fulfill the curricula in term or not enough equipments there are in class. However, this case may be interpreted as students have some difficulties about the use of digital materials and do not know 3 dimensional materials as needed.

The aim of this study was to introduce digital and three-dimensional materials to pre-service science teachers and obtain their views about these materials. So, This research was conducted to address the following research questions:

1. What are the pre-service science teachers' views about digital and three dimensional materials?
2. Which types of materials are preferred by pre-service science teachers in their future teaching life?

METHODOLOGY

Material Development Projects
A main question in this study was how the views of participants in a university were influenced developing several digital and three-dimensional materials. In this context, three projects were prepared by participants. These were:

Project 1: A video contains photos and music prepared by participants. First, a concept related to science was determined and the related photos were searched by using internet. Second a music related to the concept was selected. Finally, photos ordered and music attached to them by using movie maker program. This project took 3 weeks.

Project 2: A power point presentation contains sound and a simple animation was prepared by participants. First, a subject from science education was selected and a power point presentation was conducted. Second, a simple animation that was related to the subject was designed by using the effects of power point program. Thirdly, sound was added to the presentation. This project took 4 weeks.

Project 3: A three-dimensional material was prepared by participants. a subject from science education was selected and a three dimensional material was constructed. This project took 6 weeks and participants presented their material each two weeks to the instructor.

All projects was demonstrated at the end of the course to all participants and their views about the materials was discussed in classroom environment.

Design
A qualitative research study was conducted to identify pre-service science teachers' views about digital and three dimensional materials. Qualitative research is useful for describing the perspectives of a participant group toward events, beliefs or practices (Gay &Airasian, 2000).

Participants
The study was carried out at Siirt University located in Siirt city of Turkey. The data was collected from 42 pre-service science teachers (13 male- 29 female) in their fifth semester of the program in the department of elementary science education. The pre-service teachers enrolled in Instructional Technologies and Material Development course participated in the study during 2016 spring semester. The objectives of this course are to introduce properties of some instructional technologies, to give information about the role and the use of these technologies in science and developing 2- and 3- dimensional teaching materials (Aran, Derman & Yağcı, 2016).

Data Collection Procedure
Structured interview form developed by researchers was used during data collection process. The interview form includes four open-ended questions These are:

1. In project 1 (Photos + music): Do you think using these materials in science courses is beneficial? Yes on No. Explain your answer.
2. In project 2 (Power point + sound + animation): Do you think using these materials in science courses is beneficial? Yes on No. Explain your answer.
3. In project 3 (three-dimensional material): Do you think using these materials in science courses is beneficial? Yes on No. Explain your answer.
4. What are the similarities and differences between three dimensional and digital materials? which one will you prefer in your future teaching life?

Data Analysis
The conventional content analysis was used to analyze the answers of pre-service science teachers. In this analysis, coding categories are derived directly from the text data (Hsieh &Sahnnon, 2005). Texts were read word by word to derive codes to capture key thoughts or concepts. Response frequencies and percentages were calculated for each category. Some participants gave more than one answer for the same questions, so some tables contain greater number of responses than the number of participants.

FINDINGS
The findings related to first-three question were analyzed in Table 1. Of the 42 participants 40 supplied answers as "yes" and 7 replied as "no" to the first question. 38 supplied as "yes" and 4 replied as "no" to the second question and 33 supplied answers as "yes" and 9 supplied as "no" to the third question.

Table 1. Pre-service science teachers' answers to the first-three question

Do you think using these materials in science courses is beneficial?		Project 1 (Photo+music)		Project 2 (Power point + sound + anim.)		Project 3 (Three-dimensional)	
		n	%	n	%	n	%
	Yes	40	95	38	90	33	78
	No	2	5	4	10	9	22

According to Table 1, 95% of participants found the material developed by using photos and music as beneficial, and 90 % of participants thought that the use of digital materials constructed by power point, sound and animation was beneficial and lastly 78 % believed that using three dimensional materials were helpful for science education. So, it can be said that most of the participants thought that using both digital and three-dimensional materials may be helpful during teaching and learning process.

The codes collected from the responses of first-three questions are demonstrated in Table 2. 17 codes were constructed for project 1 and used 94 times in the responses. For project 2, 20 codes were developed and used 74

Table 2. Distribution of codes for each project

Project 1	n	%	Project 2	n	%	Project 3	n	%
Enhance retention	30	32	Enhance retention	18	24	Facilitates learning	14	18
Take attention	13	14	Facilitates learning	17	23	Enhance retention	10	13
Visual	8	9	Take attention	8	11	Self-confidence	8	10
Increase attitudes	8	9	Participation in class	4	5	Handicraft	8	10
Facilitates learning	8	9	Increase attitudes	4	5	Concretization	5	6
Funny	7	7	Saving time	4	5	Different ideas	5	6
Participation in class	6	6	Concretization	3	4	Imagination	4	5
Saving time	3	3	Funny	2	3	Visual	4	5
Increase motivation	2	2	Facilitates teaching	2	3	Take too much time	4	5

times. Lastly, 22 codes were constructed for project 3 and used 77 times.

According table 2, participants thought that project 1 enhances retention and takes students' attention to the lesson most. Project 2 enhance retention and facilitates learning most. Lastly, project 3 facilitates learning and enhance retention most.

According to the responses of the fourth question, the similarities between digital and three dimensional materials are categorized as both of them are visual, take attention and enhance retention. The differences between them can be said as digital materials are virtual, abstract and simply prepared, three-dimensional materials are real, concrete and difficultly prepared. As a result, 57 % (n=24) preferred 3 dimensional materials, 19 % (n=8) preferred digital materials and 24 % (n=10) preferred both.

CONCLUSION AND DISCUSSION
The aim of this study was to introduce three-dimensional and digital course materials to pre-service science teachers and then obtain their views about these materials. Two projects related to digital and one project for three-dimensional materials were prepared by all participants. Findings of the study indicated that students' view have similar for both material types in some properties. Most of the students believe that both of digital and three-dimensional materials, enhance retention, facilitate learning, are visual and concrete. These properties can be called as common properties of digital and three dimensional materials. As stated in Yanpar, Koray, Parmaksız and Arslan (2006), pre-service science teachers describes aims and intelligibility dimensions of technology based and handicraft materials as the same with each other.

"Increase attitudes", "funny" and "increase motivation" are the codes related to affective domain of students and these properties are seen in digital materials (project 1 and project 2). This shows that digital materials mainly affect students affective domain properties as stated in Güven (2006). Additionally, Table 2 also shows that, digital materials are preferred mostly to save time in class. Participants believe that these kinds of materials may increase the speed of lecturing or may be helpful to create extra time for other activities in class.

In the last finding of the study, pre-service science teachers thought to prefer three-dimensional materials to digital ones in their future teaching life because of the instructional properties like retention and facilitates learning. ir

As a conclusion, pre-service science teachers mostly thought to prefer three-dimensional materials in their future teaching life but the effort and time that they should spend to prepare these materials are engrossing. Pre-service teachers to develop their creativities to construct new materials easily and quickly (Yanpar, Koray, Parmaksız & Arslan, 2006). Instructional development and material development course is a good chance to improve their creativity in education faculties. The instructor of this course should perform new projects to develop pre-service teachers' creativities.

REFERENCES
Aran, Ö.C., Derman, İ. & Yağcı, E. (2016). Pre-service science and mathematics teachers' thoughts about technology. *Universal Jornal of Educational Research, 4*(3), 501-510.
Ball, D. L. & Cohen, D. K. (1996). Reform by the book: What is: or might be: The role of curriculum materials in teacher learning and instructional reform? Educational Researcher, 25 (9), 6-14
Felder, R. M. (2002). Learning and teaching styles in engineering education. Engineering Education, 78(7), 674-681.
Gay, L.R. & Airasian, P. (2000). *Educational Research: Competencies For Analysis And Application.* Merrill Prentice Hall, Columbus, Ohio.
Güven, S. (2006). Öğretim teknolojileri ve materyal geliştirme dersinin kazandırdığı yeterlikler yönünden değerlendirilmesi (İnönü Üniversitesi Eğitim Fakültesi örneği. Türk Eğitim Bilimleri Dergisi, 4 (2), 165-179.
Hsieh, H.F. & Shannon, S. E. (2005) Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9): 1277-1288.
Kaya, Z. (2006). *Öğretim teknolojileri ve materyal geliştirme.* Pegem Publishing, Ankara.
Karamustafaoğlu, O. (2006). Fen ve teknoloji öğretmenlerinin öğretim metryallerini kullanma düzeyleri:Amasya ili örneği. Bayburt Eğitim Fakültesi Dergisi, 1 (1), 90-101.
Şahin, T. Y. (2003). Student teachers' perceptions of instructional technology: developing materials based on a

constructivist approach. British Journal of Educational Technology, 34(1), 67-74.

Varank, İ. & Ergün, S. S (2008). Determining practical educational technologies and material development competencies. 8. International Conference on Educational Technologies, Eskişehir: 8-9 May.

Yanpar, T., Koray,Ö., Parmaksız R.Ş & Arslan A. (2006). Investigation of Hands-On and Technology Based Materials Prepared By Preservice Teachers With Respect to the Dimensions of Creativity. Educational Administration: Theory and Practice, 12(45), 129-148.

YÖK(1998).Eğitim Fakültesi Öğretmen Yetiştirme Lisans Programları. Ankara.

.