Evaluation of Educational Digital Stories Prepared by Science Pre-service Teachers

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Abstract

The use of digital technologies in education has become essential and unavoidable similar to many areas of life. In order to increase the effectiveness of learning, new methods and techniques have been widely used in educational settings. One of the new methods that is widely used in education is digital storytelling. The aim of this study is to investigate the quality of digital stories developed by pre-service science teachers in terms of different dimensions. Phenomenology from qualitative research methods is used for study design. The criterion sampling was used from the purposeful sampling methods to determine the participants. The study was carried out in the spring semester of 2018-2019 academic years with 40 pre-service teachers from Eskisehir Osmangazi University. At the beginning of the process, a total of 4 hours of training was given to the prospective teachers about nature of science, characteristics of scientific knowledge, approaches to teaching nature of science, and digital story creation process. Throughout the process, pre-service teachers were provided help and feedback by two researchers. The implementation period of the project is approximately 3 months. Pre-service teachers worked in groups and developed digital stories about lives of scientists. These digital stories (N=19) were evaluated using the Digital Storytelling Rubric in Educational Context. Digital stories were scored by two independent evaluators, and the weighted kappa coefficients were calculated and it was determined that very good and good agreement between the two evaluators for majority of dimensions. When the digital stories are examined in terms of product quality, it is concluded that the vast majority of digital products prepared by science are of high quality. Experimental studies can be conducted in which the digital stories prepared by pre-service science teachers are applied in actual classroom settings and at different grade levels, and the effects of these applications on various variables are examined.

Keywords: *Digital storytelling, science pre-service teachers, Educational Digital Storytelling, Evaluation Rubric;*

1. Introduction

The new generation faces technological devices such as iPods, iPads, tablets, mobile phones and smartphones from the moment they were born. Skills that are expected and desirable from today's generation are re-generated by new millennium (Dede, 2010). Digital skills that are an integral part of 21st century skills are determined under seven core skills: technical, information management, communication, collaboration, creativity, critical thinking and problem solving (Laar, Deursen, Haan, 2017). These skills are also emphasized in today's educational environments and teachers are required to have those professional skills in their classroom activities (James & McCormick, 2009; Leonard, Elizabeth and Marta, 2007). Educators apply contemporary methods and techniques for increasing the effectiveness of learning. The use of digital technologies in implementing these methods is also an important approach in terms of developing 21st century skills and adapting to technological developments.

The digital story approach is a current practice in developing the mentioned skills (Malita and Martin, 2010).

Studies in science education and science related fields posit that new, creative, contemporary methods to engage students with science content are needed in science teaching and learning (Feinstein, Allen, & Jenkins, 2013; Wieman, 2012). These new methods should employ educational technologies and promote a deep interest for learning in science concepts (Hoban, Nielsen, Shepherd, 2016; Swarat, Ortony, Revelle, 2012). Digital story method, which allows to use many different media elements such as sound, image and written text at the same time in the framework of a certain plan, is seen as an up-to-date teaching method in the field of education.

The process of creating a digital story includes creative skills such as setting a topic, researching the subject and creating scripts; it is a teaching method that supports collaboration and production skills

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(Karataş, Bozkurt, Hava, 2016; Sadik, 2008). Enrich the learning experiences by maximizing the interaction with the content (Karataş, Bozkurt, Hava, 2016). In this research, pre-service teachers were asked to digitize scientists` life stories to enable them to be educated as a science literate, to be able to learn the stages of science, the characteristics of scientific knowledge, how scientific knowledge changes over time and the ways in which scientific knowledge can be reached. At the same time, using various media forms to increase their technology skills, increasing collaborative working skills by working in groups. The aim of this study was to investigate the quality of digital stories developed by prospective science teachers in terms of different dimensions.

2. Methods

2.1 Study Design
This study was designed as phenomenological study from qualitative research methods. Phenomenology aims at gaining a deeper understanding of the nature or meaning of our everyday experiences (Patton, 2002). In this study, this method was preferred to examine the experiences of pre-service science teachers while developing digital stories on life stories of scientists.

2.2 Participants
The study was carried out in the spring semester of 2018-2019 academic year with 40 pre-service teachers at a public university in Turkey. In this research, criterion sampling was used from purposeful sampling methods. The main criterion was taking Special Teaching Methods I and have taken Computer II course. Thirty-three of the participants were female and three of them were male.

2.3 Process
At the beginning of the project, about 4-hour training was given to pre-service teachers, including science, the characteristics of scientific knowledge, and approaches to teach the nature of science. In addition, about 4 hours of training was provided on digital story creation process. Pre-service science teachers worked in groups, 19 stories were developed. First, they researched the life stories of scientists. Then, they have adapted the dramatic parts of life stories into scenarios and digitalized them. Scientists who worked on the subjects included in the middle school science curriculum were chosen for this assignment. 21 digital stories have been developed. Throughout the process, pre-service teachers were provided help and feedback from two researchers. The implementation period of the project is approximately 3 months.

2.4 Data Collection and Analysis
For the evaluation of digital stories, *digital story* section of Digital Storytelling in Educational Context Rubric developed by Sarica and Usluel (2016) was used. The *digital story* section consists of 18 criteria. Digital stories (N=19) produced within the scope of the study were evaluated according to 17 categories (copyright category was not scored) of *digital story* section of the rubric. The validity study of the developed rubric was conducted by experts in terms of content, structure and criteria dimensions. For the reliability of the rubric, Evaluation was conducted by two independent evaluators and the weighted kappa coefficients were calculated. Cohen`s Kappa index was calculated using interrater reliability coefficient = number of agreements / (total number of agreements + disagreements) (Miles & Huberman, 1994). If the evaluators gave the same score for one item it has accepted as *agreement* and accepted as *disagreement*, if they gave different scores. The values obtained from the Kappa coefficient are interpreted as: strength of agreement is slight for 0.00-0.20, fair for 0.21-0.40, moderate for 0.41-0.60, substantial 0.61-0.80, and almost perfect 0.81-1.00 (Cohen, 1960; Landis and Koch, 1977). It is stated that a minimum of .60 value should be searched for reliability (Cohen, 1960). Among the two evaluators, it was determined that the majority of the criteria showed *substantial* or *almost perfect* agreement. Kappa coefficients between two evaluators` scores were given in Table 1, it can be seen that there was almost perfect agreement for five criteria, substantial agreement for five criteria, moderate agreement for six criteria, and fair (acceptable) agreement for one criteria.

Table 1. Kappa Statistics for Rubric Categories

Rubric categories	Purpose	Language	Clarity	Length	Originality	Affect	Plainness	Proper visuals	Effective visuals
Kappa coefficient	0.947	0.947	0.894	0.684	0.473	0.473	0.947	0.526	0.578

Rubric categories	Proper audio	Audio speed	Audio quality	Proper music	Music speed	Music level	Integrity	Fluency	
Kappa coefficient	0.526	0.684	0.631	0.736	0.842	0.736	0.316	0.421	

3. Findings

Digital stories (N=19) were evaluated independently by the two raters. The categories for the digital stories were rated in three level (weak, medium, good). The frequency information for each category is presented in Table 2.

Table 2. Frequencies of mean of ratings for digital story quality (N=19)

Rubric categories	Weak	Medium	Good
Purpose	0	100	0
Language	0	0	100
Clarity	0	11	89
Length	0	11	89
Originality	0	5	95
Affect	0	0	100
Plainness	0	5	95
Proper visuals	0	26	74
Effective visuals	0	32	68
Proper audio	0	5	95
Audio speed	0	16	84
Audio quality	0	5	95
Proper music	0	37	63
Music speed	0	37	63
Music level	0	42	58
Integrity	0	21	89
Fluency	0	26	74

In Table 2, it can be seen that all 19 digital stories at least at *medium* level. For the "purpose" item, all of the stories were at *medium* level. For fourteen categories, stories were at *medium* level, frequencies ranging from 5% to 42%, and at *good* level frequencies ranging from 58% to 100%.

4. Discussion and Future Directions

When the weighted kappa coefficients related to the categories developed by Sarica and Usluel (2016) were examined, majority of the criteria showed *substantial* or *almost perfect* agreement between two raters. According to this result, it can be said that product evaluation results are valid and reliable. It has been found that the majority of digital stories prepared by pre-service science teachers were at high quality level.

Similar studies can be conducted with different samples and compared with this study. Experimental studies can be carried out on use of digital stories prepared by pre-service teachers in actual classroom settings in science courses and the effects of using digital stories for instructional purposes could be examined.

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